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Environmental Engineering

Final Thesis

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Dry toilet guide to Latvia

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Commissioned by	Global Dry Toilet Club of Finland
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## ABSTRACT

There is a need to develop sanitation with new dry toilet technology in many countries. The old and traditional model of dry toilet is just a hole in the ground where all the waste sinks in and releases all the nutrients in to the ground or to the surface waters. The aim of this study has been to collect general information about dry toilet technology and legislation in Latvia. The collected information is delivered to Latvians in the form of a guidebook that is available in the experimental sites. There are two possible sites in Latvia, where Finnish dry toilet technology could be constructed in public toilets. When doing the final thesis the sites were not confirmed. Information in the guide book is collected based on the current situation in Latvia that was observed during the visit. Also the future needs of fulfilling different EU directives are taken into consideration. The Latvians also needed further information about composting and different types of dry toilet models suitable for their needs.

In the future will be seen how the instructions have helped Latvians to maintain their dry toilets and how willing they are to improve their old dry toilets.

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## TIIVISTELMÄ

Useissa maissa on tarvetta kehittää sanitaatiota uuden kuivakäymäläteknologian avulla. Perinteiset ja vanhat kuivakäymälät ovat vain kuoppia, jonne kaikki jäte putoaa ja liukenee vapauttaen ravintoaineita maaperään tai pintavesiin. Tämän työn tarkoituksena oli kerätä yleistietoa kuivakäymälöistä ja Latvian lainsäädännöstä koskien kuivakäymälöitä. Kerätty tieto tullaan jakamaan latvialaisille oppaana asennuskohteissa. Latviassa on kaksi mahdollista kohdetta, jonne voitaisiin asentaa suomalaista kuivakäymälätekniikkaa. Työn tekemisen aikaan kohteet eivät olleet vielä varmistuneet. Opas on laadittu Latvian nykytilanteen mukaan, johon tutustuin vierailullani. EU:n asettamat vaatimukset on myös otettu huomioon. Latviassa oli myös tarvetta lisätiedolle kompostoinnista ja erilaisista kuivakäymälämalleista, joita voidaan asentaa käyttötarkoitusten mukaan.

Tulevaisuudessa jää nähtäväksi kuinka opas on auttanut latvialaisia huoltamaan mallikohteiden kuivakäymälöitä ja parantamaan omia kuivakäymälöitään.

## LIST OF ABBREVIATIONS

DT	dry toilet, toilet that uses little or no water to transport faeces
Outhouse	a dry toilet located outside
Bulking material	material that is added to a dry toilet or compost (e.g. wood chips, hay, sticks, saw dust)
Soil amendment	material that improves the soil quality e.g. composted material from dry toilet
Excess liquid	liquid that has drained through solid faeces
Composting	aerobic or anaerobic decomposition of organic material

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TABLE OF CONTENTS

1 INTRODUCTION .....	7
2 LEGISLATION IN LATVIA .....	7
2.1 EU directives .....	7
2.2 National legislation in Latvia .....	9
2.3 Opportunities and barriers for dry toilets in the legislation.....	10
3 DRY TOILET MODELS .....	11
3.1 Commercial models.....	11
3.1.1 Composting toilets.....	11
3.1.2 Toilets in which the end product needs further composting.....	12
3.1.3 Electrical toilets .....	13
3.1.4 Chemical toilets .....	14
3.2 Self-made dry toilets.....	15
4 SELECTING A DRY TOILET MODEL.....	16
4.1 Space.....	16
4.2 Usage .....	17
5 MAINTENANCE.....	17
5.1 Bulking material .....	17
5.2 Hygiene.....	18
5.3 Odour .....	18
5.4 Flies .....	19
5.5 Dry toilet cleaning .....	19
6 MANAGEMENT OF THE EXCREMENT .....	20
6.1 Composting.....	20
6.1.1 Right conditions for the compost.....	20
6.2 Urine as a fertilizer .....	21
7 EXAMPLES IN LATVIA .....	23
7.1 Rujiena.....	23
7.1.1 Suitable dry toilet model for the church .....	24
7.2 Dikli.....	25

7.2.1 Suitable dry toilet model for Dikli.....	26
8 DISCUSSION AND CONCLUSIONS .....	27
9 REFERENCES .....	29
APPENDIXES .....	33
1 Latvia ja sanitaatioasiat .....	33

## **1 INTRODUCTION**

Sanitation and waste water treatment are challenges that we are facing nowadays. Dry toilets are toilets that do not need water to operate and they are not connected to a sewage system. Dry toilets save clean water and instead of releasing nutrients to the water resources the nutrients are recycled back after composting to the soil.

Dry toilet technology has developed by huge steps during the past years. Modern dry toilets differ a lot from the old toilets where all the excrement sunk straight to the soil and the smell was terrible. Still the most common way in the rural areas of Latvia is to dig a hole into the ground where all the excrement sinks. According to the interviews and our visit there is a clear need to improve sanitation in the rural areas.

There are many types of dry toilets where to choose from. They can be e.g. composting or partly composting, electrical, urine separating. Dry toilets can be bought or self-made and the installations can be done outdoors or indoors.

The aim of this guide book is to provide information for Latvian about the available dry toilet technology and the dry toilet issues in Latvia. EU and national regulations concerning dry toilets are introduced. The most effective way to promote dry toilet technology in the rural areas is to get dry toilets installed in public places. There are two possible construction places in Latvia where the installation may happen. These are introduced in the end.

## **2 LEGISLATION IN LATVIA**

### **2.1 EU directives**

EU is regulating legislation in all member states by Council directives. There are no directives that regulate directly dry toilets, but water quality and waste waters are considered. Latvia has adopted some of these directives, but few have longer transition period. This time can be used for construction of proper waste water treatment facilities and also sewage systems.

Council directive 91/271/EEC regulates the urban waste water treatment in municipalities over 2000 residents. This directive sets the minimum requirements for treated waste waters. In Annex I some requirements are set for urban waste water collecting systems. These requirements include: the use of best possible technology in design, construction and maintenance of collection systems and this is done notably regarding the volume and characteristics of urban waste water, prevention of leakage and limitations of pollution receiving the waters due to storm water overflows. Latvia has a transition period up to December 2015. /18/

Council directive 98/83/EC sets the quality of water of intended for human consumption. Member states should ensure that the healthiness and purity requirements mentioned in this directive are fulfilled. /16/

Drinking water quality requirements are in the directive 98/83/EY. It states that the water should be clean from parasites and micro-organisms and from everything that may cause danger to human health. Transition period in Latvia is until December 2015. /12/

Council directive 76/160/EEC regulates the bathing waters. This directive sets the minimum quality requirements for the swimming waters. /13/

The use of sewage sludge in agriculture is regulated in the directive 86/278/EEC. The directive encourages use of sewage sludge in the agriculture in a way that harmful effects on soil, vegetation, animal and man are prevented. The directive prohibits the use of untreated sludge and use of sludge on fruit and vegetables crops during growing seasons in order to prevent harmful effects. Sludge is treated when it has undergone biological, chemical or heat treatment or long-term storage. Sludge should be used according to the plants need for nutrients, i.e. over fertilization should be avoided. Also the quality of soil and groundwater shouldn't be impaired. /17/



## 2.2 National legislation in Latvia

Legislation in Latvia is greatly affected by the EU as in all member countries. In addition to EU regulations also national laws and regulations are set. Although dry toilets are just mentioned in the legislation, water quality and waste waters are considered more thoroughly.

There are regulations regarding protection of soil and water from nitrate pollution caused by agricultural activity. The amount of waste from dry toilets is much smaller than in animal husbandry. Although the scale is different compared to fertilizers used in agriculture, dry toilets are mentioned in this regulation. It is said “faecal residues from septic tanks and the receptacles of dry toilets shall not be utilised for fertilisation without prior composting”. /24/

Law on pollution bring out the concept of highly sensitive areas. These include territories where pollution may have an increased effect on human health or the environment and its biological diversity, or the territories that are highly sensitive to pollution load. Highly sensitive areas have also increased requirements for the protection of soil and water from pollution with nitrates. Also more attention has to be paid to the rural waste water treatment. /24/

Law on environmental protection is setting some regulations for human actions. The purpose of this law e.g. is to ensure public participation in the observation of environmental protection principles and also implementation of these principles. Also the public awareness on environmental issues is considered important. In addition to educative issues environmental protection law is set to ensure the environmental protection from the impacts created by anthropogenic loads. Dry toilets can be seen as an improvement compared to traditional out houses where all waste goes straight to the soil. Enhancement of the public awareness on environmental issues also encourages to the use of dry toilets in the rural areas. /24/

Regulations on utilisation, monitoring and control of sewage sludge and the compost thereof are issued pursuant to law on environmental protection. Determination of sewage sludge in these regulations also includes septic tanks. /10/

Mandatory harmlessness and quality requirements for drinking water, and the procedures for monitoring and control thereof are adopted in Latvia in 2003. These requirements are quite similar to the EU directive 98/83/EY. The content is more comprehensive, also set limit values for chemicals in the drinking water are mentioned. /24/

Law on water management defines the water bodies and sets the rights and duties of the water users. Polluter pays principle is introduced and the focus is on the protection of water resources. /9/



Figure 1 Lake Mekkojärvi (Photo: Mari Viskari, 2005)

### **2.3 Opportunities and barriers for dry toilets in the legislation**

There are no legal barriers for dry toilets. EU directives and national legislation aims to improve the current quality of soil and water. DT's can be seen as an important tool in rural areas without sewerage systems. One of the biggest problems with DT's is money. Timo Kirkko-Jaakkola, director of Vidzeme Development Agency, said that there is a lot of good will and enthusiasm to develop conditions, but it is hard without any financing. EU is giving finance to many kinds of projects in the country and development is taking place, so it is likely that during few years also the DT's become more general.

The biggest challenge is the public awareness. Modern dry toilet technology is not generally known in Latvia. Dry toilets or outhouses are very common especially in the rural areas, but they differ a lot from modern DT's. In many outhouses the

faeces sink straight to the soil or the containers are emptied without prior composting. These are the reasons why it is important to get the people to know the new technology and the benefits that it has to offer for the users and for the environment. Local water resources such as wells are especially vulnerable for run offs from dry toilets. In sensitive areas where the groundwater is high the emissions can filter through soil to the groundwater. This can severely impair the drinking water and water quality in general. One way to promote the ideology and technology is to install public DT's in the rural areas of Latvia.



Figure 2 An eutrophicated pond in Valmiera (Photo: Mari Viskari, 2005)

### **3 DRY TOILET MODELS**

Dry toilet is a general name for different types of toilets. The toilets are similar in two ways; they are waterless and they do not have connection to the sewage system. The most common terms that are used are dry toilet and composting toilet.

/5/

#### **3.1 Commercial models**

##### **3.1.1 Composting toilets**

In the composting toilets the material is fully composted in the toilet container and the end product can be utilized for example in the garden.

Containers are usually large or so called carousels. Carousel in this context means that there are for example five different containers and when one is full you rotate the next container into use. When all containers are full the last one, which was in use first, is composted into humus and can be utilized. Urine can be collected into a separate tank or excess liquids can be collected from the bottom of the container. Urine, which is collected separately, can be used as a fertilizer and the excess liquids can be used to boost up composting process in garden compost. /7;2/

There are many sizes of composting toilets in the markets for outside and inside use. Some of them are emptied once a year when the material is composted and some of them can be used for several years before emptying. /5/

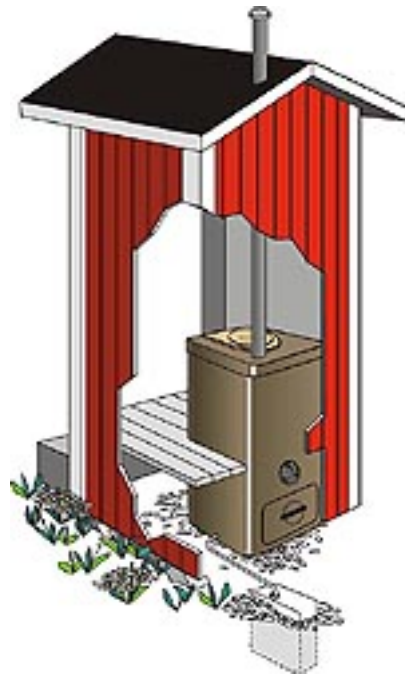


Figure 3 Composting toilet, BIOLAN. (7)

### 3.1.2 Toilets in which the end product needs further composting

Some toilets that are called composting toilets does not compost the mass completely. The mass needs to be composted further after the container has been emptied.

Dry toilets, which use bulking material, are used in both in houses and in summer cottages. They are usually placed into outhouses, but can also be installed inside buildings. The excrement containers are small, because they are directly connected to the toilet seat. That is why the toilet has to be emptied often and the mass has no time to compost and needs further composting. This kind of toilets also contains a container for the bulking material that has to be added after every use. /5/ Urine can be collected into a separate basin and then evaporated. Proper aeration is also organized in this kind of toilets in order to avoid odour and humidity problems. /7/



Figure 4 A toilet which needs bulking material. BIOLAN (7)

### 3.1.3 Electrical toilets

Electrical toilets need electricity to manage the excreta. There are two types of models available. Some toilets produce material that needs further composting and some toilets are composting. Electrical toilets can only be installed indoors, because the evaporation and the composting processes need at least +18 °C.

One benefit of small electrical toilets is that they can be used to replace water toilets, because the need for electricity and warmth is not an issue. Toilets need only a small space and can be installed on the floor. Also the waste can be stored in a

small container. As a disadvantage can be seen that usually electrical toilets need more maintenance to work properly than dry toilets with large containers. /5/

Electrical toilets can also be incinerating, packaging or freezing. Incinerating toilets consists of traditional seat connected to a holding tank with gas-fired or electric heating system to incinerate waste products. The end products are primarily water and non-hazardous ash. /25/ In packaging toilets the waste goes straight to a plastic or cornstarch bag. When the container is full the bags can be emptied to a landfill or compost depending on the material used in the bag. /21/ Freezing toilets are totally dependent on the electricity. The waste is stored in plastic bag from -10 to -15°C. When the container is full the frozen material can be emptied to compost. Freezing toilets do not need any ventilation and are easy to install e.g. to a walk in closet. /5/

#### 3.1.4 Chemical toilets

Chemical toilets are small and usually used in special cases or in temporarily use. They can be used for example in boats. Chemicals are added to the container to silt up the faeces and paper. Chemicals also temporarily prevent biological degradation and kill intestinal bacteria. /5/

There are all kinds of chemicals on the markets, but it is good to use ones that are less harmful. Some cheaper chemicals may even smell worse than the actual waste in the toilet container. The toilet seat or container should be emptied into a separate collection points. Usually the material cannot be composted because of the chemicals, but there are also available biodegradable chemicals. These chemical are based on the bacterial activity. When these are used the material can be composted. /5/

### 3.2 Self-made dry toilets

The old and still very common way to build a dry toilet is just to dig a hole in the ground where all the excreta sinks in. This way is smelly and causes large pollution in a small area and may cause deterioration of ground water quality.

In Latvia plastic tubes are used in the mouth of the self-made toilets. Tubes usually narrow down and because of this feature they become dirty and start to smell. If tubes are used they should be straight.



Figure 5 A simple dry toilet without any container in Oler Latvia. (Photo: Mari Viskari, 2005)

Although there are different variations from self-made dry toilets, it is possible to build a hygienic and operating toilet. Self-made dry toilets can be built outside or even indoors where they operate as good as a water toilet. The simplest way to do it is to get two big tubs. The one is like a big bucket with holes in the bottom and the other is a basin filled with peat. The bucket is placed on top of the basin on supportive frame of wood. This allows the liquid to drain to the basin and absorb into the peat. /1/

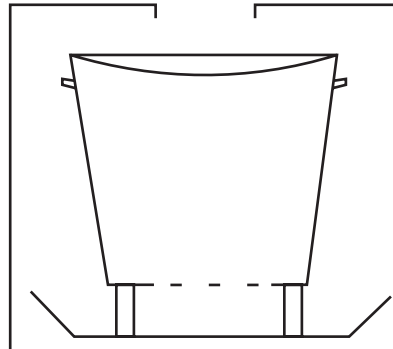


Figure 6 Picture of self-made dry toilet (Mari Viskari, 2006)

Unwanted odours can be prevented by liquid separation and proper ventilation. When urine is separated and bulking material is used the mass in the toilet starts to compost and does not smell bad. Ventilation tubes channel the odours outside the building and keep the toilet comfortable to use. Ventilation tubes can be similar to those that are used with commercial DT models.

The mass coming from self-made dry toilets needs further composting.

## 4 SELECTING A DRY TOILET MODEL

There are many things to consider when planning and building a dry toilet. These include usage, space and maintenance. It is important to consider all these factors in the planning phase and find the right type of DT technology for the situation in hand.

### 4.1 Space

There are some things that have to be taken into consideration when building a dry toilet. At first you choose the right dry toilet model for your needs. Then you built a house for it. If the building already exists it sets more limitations to the toilet model. There are basically three kinds of models available. Models that can be installed indoors on the floor instead of water toilet and models that need space under the floor. These models, which need space under the floor, can be installed



on top a cellar or alternatively can be installed outdoors. The toilets that need further composting usually have to be installed into outhouses. /5/

Also the space needed for the maintenance has to be taken into consideration in the planning phase. There should be enough free space for the maintenance process. Use of tools, like shovel and wheelbarrow, should be easy. Also there should be a place where to store compost accelerators and beddings, chemicals and other cleaning equipment. Also a place for washing hands should be available. /5/

## 4.2 Usage

The needed capacity for the toilet should be calculated in the planning phase. The average amount of toilet waste generated in a year is 520 kg/person. This amount can be divided so that the solid faeces are 70 kg and urine 450 kg. Variations can be big, e.g. working reduces the amount of waste produced at home considerably. /5/

Public toilets need more capacity than toilets in the private homes. It is important to know the amount of people using the toilet regularly, because the toilet models are planned for certain amount of usage. If there is too much or too little use the toilets do not usually work in the way that they should be. Another thing to remember is that the more there is users the more often the toilet needs to be emptied and needs maintenance.

## 5 MAINTENANCE

### 5.1 Bulking material

Bulking material is used in many dry toilets to absorb liquids, to work as a carbon or energy source and to keep up sponginess of the waste. It also works as covering flux and prevents flies and other insects from reproducing in the faeces. /5;4/

Bulking material can be bought from different manufacturers, but also the organic material e.g. leaves, sawdust, straws raked from the garden can be used. The best in liquid absorption can be obtained from combination 50% of woodchips and 50% of peat. Mixture is put in the bottom of the container to provide enough air to get the composting process started and prevent odour problems. Bulking material is then added after every use, according to the manufacturers' instructions. In this case it is important to remember that not all dry toilets need bulking material. /5;4/

Also kitchen waste such as potato and fruit peels can be used in some extent. They diversify the compost mixture. Food waste decays fast and because of that there might arise problems with odour and flies. Also when using kitchen waste one has to remember not to add too moist waste. /5;4/

## 5.2 Hygiene

Hygiene is an important part of the sanitation both in water and dry toilets. There should be a possibility to wash hands after use. The toilet should be maintained and cleaned regularly with proper equipment. Hands should be washed with soap and the used maintenance equipment cleaned thoroughly.

## 5.3 Odour

Most of the odours in the DT are caused by urine. Functioning DT smells less than water toilet as the ventilation sucks all the odours before they reach the toilet room. Good ventilation should include electrical fan and access to enough fresh air. Odours can become a problem with the dry toilet if the ventilation is not working properly and there is too much liquid.

Odours can easily be prevented by proper use, but if there is unwanted odour there are ways to solve the problem. If the toilet is installed properly and ventilation is working the reason for the smell can be too wet compost. Use of drier bulking material and mixing may help. This addition and mixing can be done more than once; it only accelerates the composting process. Also the bulking material can be

changed, because some materials like peat absorbs odours better and some are spongier like wood chips. There are also some microbiological additives available that speed up the composting process and therefore reduce the smell. Lime, ash or super phosphates should not be used, because they hinder the composting process.

/5/

## 5.4 Flies

First way to prevent flies in the toilet is to prevent them from entering the toilet container. There are many ways to accomplish that. A tight net put to the ventilation pipe shuts out the flies. If the compost is working properly flies cannot reproduce in there that is why it is important to use bulking material after use and not to let the material in the container get too moist. Also closing the lid helps.

If flies have for some reason taken over the toilet, also chemicals and pesticides can be used. Mixing the compost and putting the maggoty waste deeper kills maggots in the container. It is scientifically proven that maggots die when the temperature gets over +43 °C. Pesticides that are used, like pyrethrin, should be decomposable. Effective fly traps are also available. These traps can be based on light and they can be installed in big toilet containers. Also fly papers can be used. /5;4/

## 5.5 Dry toilet cleaning

Dry toilet should be cleaned as any other place so the use can be a pleasant experience. In public toilets there is always a named person with replacements responsible for the cleaning and maintenance work.

Cleaning can be done by spraying diluted washing detergent to all washable surfaces. It is left for a while to take bigger effect and then the dirt is brushed or wiped away. Otherwise dry toilets can be cleaned like ordinary toilets. The cleaning equipment should only be used in the dry toilet and they can be disinfected with hot water. Protective gloves can be used in the cleaning, but

usually there is no need to use other kinds of protective gear. Hands should be washed with soap after cleaning.

## **6 MANAGEMENT OF THE EXCREMENT**

### **6.1 Composting**

Composting is a good way to reduce the amount of waste going into the landfill. All waste that is biologically degradable can be put into the compost. These include: garden waste, kitchen waste and dry toilet waste. If the mass from the DT is transferred into open compost, it should be covered with straw or peat to prevent nutrient runoff and nitrogen evaporation. /5/ As an end product from the compost is humus rich with nutrients. This humus can be used for improving the soil quality. /20/

#### **6.1.1 Right conditions for the compost**

Compost can be a separate container or just a wooden frame like commonly used. These structures differentiate compost from compost heap. Usually compost heaps are just piles of organic waste and they smell rotten. In the ordinary garden compost the bottom should be sealed up with plastic or tarpaulin to prevent leakages to the soil. The frame for the compost can be done from board, steel net or weatherproof plates. The compost pile should consist of layers of different organic material to ensure good conditions for the composting process. Both models work well, but only if the following things are taken into consideration. The compost needs enough oxygen and nutrients, right humidity and warmth.

Micro-organisms that break down organic material are aerobic and need oxygen to complete the process. To ensure enough oxygen some coarse material, like straws or wood chips, should be added to the compost. Oxygen also prevents problems with odour of rotten material. Warmth in the compost is produced in this decomposition process.

Compost has to be moist to operate. As a general rule of thumb can be used that when you squeeze composting material in your hand there should come few drops of liquid. If liquid flows down the compost is too wet. The compost can freeze during the wintertime and then the operation stops. If the use of compost is little the freezing is not a problem, because the decomposition process starts again in the spring when the temperature is warm enough. Freezing becomes a problem if the compost becomes full in the winter time. The frozen material can only be emptied with pickaxe.

Micro-organisms in the compost need carbon and nitrogen for energy production. Garden waste is a good source of carbon and the nitrogen can be obtained for example from dry toilet waste. Usually there is enough carbon in the household compost, but there is a shortage of nitrogen. This shortage may lead to lower temperature in the compost and the decomposing process slows down. Also the excess nitrogen has to be avoided, because it releases ammonia and causes emissions to the atmosphere. /8/

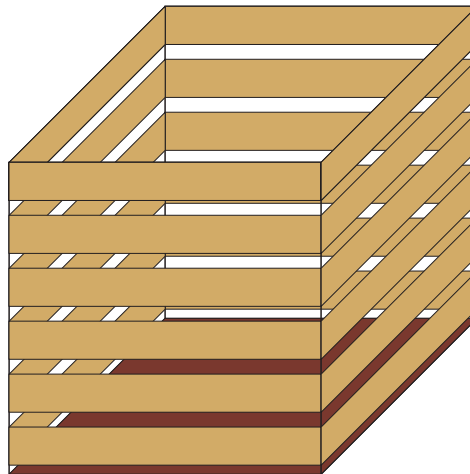


Figure 7 Compost picture (Mari Viskari, 2006)

## 6.2 Urine as a fertilizer

In the dry toilet waste most of the nutrients are in urine. It is rich with nitrogen (N 81.5%), which can be used as fertilizer for plants. Urine is composed of eaten food so it contains only small amounts of heavy metals, harmful substances and microbes. Because of these features urine can be safely used as a fertilizer. /1;6/

If urine is separated in the toilet seat it can be used as fertilizer as such. In own household the urine can be used right away, but urine from public toilets should be stored before use. The storage times vary, but it can be said that the urine should be stored at least for a month to kill all the bacteria. /6/ Urine can be used pure or diluted. Suitable rate for dilution is one part of urine and two parts of water. Urine should be applied close to the soil in order to minimize nitrogen loss and unwanted odours. /11/

An average person produces urine 500 l in a year. If there are local regulations the amount of nitrogen should be calculated. Otherwise it can be estimated that there is 3-7 g of N in a litre of urine. A general rule of thumb can be used to apply the urine one person produced in a day (24 h) for one square meter of land per growing season. For this rule of thumb we can derive that urine from one person will be enough to fertilize 300-400 m<sup>2</sup> of crop per year. /11/

If urine is not collected separately the excess liquids can be collected from the bottom of the container. This liquid is also rich with nitrogen and it can be utilised in the compost or as a fertilizer.



Figure 8 Rural landscape (Photo: Mari Viskari, 2005)

## 7 EXAMPLES IN LATVIA

There are two possible places for public dry toilets built by residents with the help of Global Dry Toilet Club of Finland. The one is an old church in Rujiena and the other is in a park in Dikli, both are located in North Latvia.



Figure 9 Map of Latvia (19)

### 7.1 Rujiena

Rujiena is a small city of 3700 inhabitants in the rural areas of Northern Latvia. The coordinator in the city is Ieva Zemite, who is working as a Development Department Manager.

The possible dry toilet or toilets installation place is an old church from 1200 - century. The church is conserved and it is really hard to do any changes to the place, also the waste water channelling is difficult. The first dry toilet would come to the arch outside the church. At the moment the space is storage. Congregants would use this toilet during the services and other ceremonies.



Figure 10 Church with the arch in Rujiena. (Photo: Mari Viskari, 2005)

### 7.1.1 Suitable dry toilet model for the church

As mentioned before the space in the arch is very limited and it cannot be altered. In addition to these there is no heating and the space cannot be digged. These are the reasons that separative dry toilets cannot be used although the excrement is mainly in liquid form.

A suitable model for the church is Ekomatic, which is manufactured by Finnish dry toilet manufacturer Lassila-Tikanoja. Ekomatic is manufactured from durable plastic and it resists cold well. Bulking material is used in the toilet and it is easily accessible just by turning a handle in the toilet. The mass needs further composting. This model is small and due to this it has to be emptied quite often. In optimal situation in the arch would be two dry toilets. /21/





Figure 11 Ekomatic, LASSILA-TIKANOJA (21)

## 7.2 Dikli

Dikli is a rural municipality with 1400 inhabitants. In the village centre lives about 500 people. Dikli has a long history and the inhabitants have actively promoted cultural tourism. The coordinator in the village is Evija Nagle, who is working as Planning Specialist in the municipality. There are two possible places for dry toilets.

The first possible place for dry toilet is an old singing platform. The platform is the oldest in Latvia. There are organized singing festivals and theatrical performances during the summer time nearly once a week. Also the need of toilet is mainly in the summer time. Near the platform is already a dry toilet, which is made a few of years ago. That toilet is not good enough for the use that can be even a busload of people at the same time. The dry toilet has only two places and it is untidy and smells especially during the springtime. There has once been a bigger dry toilet with four seats both men and women, but the old toilet building is not in use anymore and it is in terrible shape.



Figure 12 Singing platform in Dikli (Photo: Mari Viskari, 2005)

The other place for dry toilet would be in the end of so-called cultural path. This path would begin from the singing platform, go through forest and end near the house of culture and welfare. In there small scale concerts and seminars are organized. The toilet could be in outside or in the building with own access.



Figure 13 Picture from outside the house of culture and welfare. (Photo: Mari Viskari, 2005)

### 7.2.1 Suitable dry toilet model for Dikli

The use of dry toilet varies a lot during the year. As mentioned before the use is mainly during the summer, but in bigger scale. There should be more than two toilets. These needs can be achieved with Green Toilet 330.



Figure 14 Green Toilet 330. PIKKUVIHREÄ (22)

Green toilet 330 is has large containers and it is easy to maintain. If the toilet is in heavy use there will be two containers to use. The container is changed when it becomes full and then left to compost. When the other container gets full the first one can be emptied and the mass is composted. The excess liquid will be collected into a separate container and emptied when it becomes full. /26/

## 8 DISCUSSION AND CONCLUSIONS

The aim of this study was to make a guidebook for Latvians where national legislation and different types of dry toilet technology are introduced. This guide is a second part of three different guides to three different countries; all are commissioned by Global Dry Toilet Club of Finland. One was made to Estonia last year and based on the feedback obtained from Estonians I added a chapter about dry toilet cleaning in this guide.

There is easily available literature about dry toilets, but the legislation of Latvia was difficult to find. There is only one reference to dry toilets in the legislation, all the other parts I collected from different sources and pieces of legislation.

During the visit to Latvia I saw the possible sites and the current situation in rural areas of Latvia. I found out that there is need for improving their old dry toilets to

meet the modern standards. EU directives and regulations have certain time limits and huge improvements have to happen before that. EU funding has a big role in this development.

The toilets will be constructed during the spring and summer of 2006. In the future we will see how these instructions have helped the Latvians to maintain their public dry toilets and improve their old dry toilets.

In addition to different types of dry toilets I added chapters about composting and urine as a fertilizer. Although composting is general in rural area of Latvia, the methods can be improved in order to decrease the odours and nutrient loads coming from composts or compost heaps.

In to the appendixes I have added a small summary about the situation in Latvia. This summary is written in Finnish. It is meant for Finnish product suppliers and the information can be used to emphasize the need for improvements and to encourage them to invest in to the Latvian markets.

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## APPENDIXES

### 1 Latvia ja sanitaatioasiat

#### 1. Yleistä

Latvia liittyi Euroopan Unionin jäseneksi toukokuussa 2004. Latvia on ehkä köyhin kolmesta Baltian maasta. Asukkaita maassa on 2,4 miljoonaa ja pinta-alaltaan maa on noin 65 000 km<sup>2</sup>. Asukkaista 68% asuu kaupungeissa, Riikassa jopa 800 000 ihmistä. Maassa vallitsee meri-ilmastoa, talvet ovat leutoja ja sateisia. Ympäristöongelmia Latviassa aiheuttaa huono viemäriverkosto ja juomaveden laatu, jätehuolto sekä ilman saastuminen.

Sanitaatioasiat kuuluvat ainakin kahden ministeriön toimialaan, ympäristö- ja terveysministeriö (State Sanitary Inspectorate ja Ministry of Environment). Euroopan Unionin direktiivit ovat sisällytetty Latvian lainsäädäntöön, mutta monella ympäristöasioita koskevalla säädöksellä on toteuttamiseen siirtymäaika. Pieniä kuntia on maassa paljon, mutta heillä ei ole rahaa kehittää asioita. Rahan puute johtuu maan käytännöstä, jonka mukaan kunnat voivat verottaa asukkaitaan vain kiinteistövero, muut verorahat valtio jakaa kunnille. Kuntien tehtäväksi on kuitenkin annettu esim. ympäristöasioiden valvonta, mutta käytännössä siihen on varaa vain harvassa kunnassa.



#### 2. Viemärointi ja vesistöt

Latviassa vain kerrostalot johtavat yleensä viemäriverkkoon, ja suurella osalla asukkaista on jokin oma jätevesien käsittelyratkaisu. Jokainen asukas on itse vastuussa omasta saostuskaivostaan tai kuivakäymälästään. Kuivakäymälöinä käytetään vielä haisevia betonisia altaita, joiden tyhjentämisestä asukkaat joutuvat itse maksamaan. Tyhjennysautot saattavat kuitenkin olla kunnan omistamia. Altaiden tai saostuskaivojen kuntoa ei valvota, joten ne saattavat vuotaa maaperään. Omakotitaloissa vesikäymälöiden vesiä saatetaan käsitellä kahdella saostuskaivolla, mutta suodatuskentät ovat kuitenkin harvinaisia. Käytetyissä kuivakäymälöissä on vain maahan kaivettu kuoppa, jonne jätteet putoavat.

Yli 2000 asukkaan yhdyskunnilla on vuoteen 2010 aikaa toteuttaa yhdyskuntajätevesidirektiivin vaatimukset. Vanhentuneet ja huonosti hallitut viemäriverkostot ja puhdistamot vaativat

uudelleen rakentamista tai korjauksia. Latvian vesiensuojelustrategiassa mainitaan erityisesti jätevesien laadun parantaminen. Tavoitteena on myös parantaa juomaveden laatua ja suojella pohjavesiä.

Latviassa tutkittiin vuonna 2000 vesistöjen tilaa ja tutkimusten mukaan 66 % joista olivat vähän saastuneita ja 21 % puhtaita tai lähes puhtaita. Järvissä yli 90 %:ssa todettiin rehevöitymistä.

### ***3. Rahoitus***

Latvia saa tänä vuonna Leader+ rahoitusta. Kunnat ovat muodostaneet paikallisia toimintaryhmiä ja niille strategioita. Näistä valitaan 5+10, jotka saavat rahoituksen. Hankkeille aletaan myöntää rahoitusta kevään aikana. Aikataulu on kiireinen, sillä ohjelmakausi päättyy vuoden lopussa ja sitä ennen rahaa jaetaan toimintaryhmille noin 250 000€

Kun rahoituspäätöksiä tehdään, voitaisiin rakentaa myös lisää mallikohteita kuivakäymälöistä eripuolille Latvian kyliä. Vidzeme Development Agencyn johtaja Timo Kirkko-Jaakkola ehdotti esimerkiksi hanketta, jossa jokaiseen kylään rakennettaisiin muutama mallikohde kuivakäymälöistä Leader+ rahoituksella. Development Agency tekee mm. maakunnallista ja seudullista kaavoitusta ja suunnittelua pohjois- Latviassa.

### ***4. Sanitaation kehittäminen***

Euroopan Uniooniin liittymisen myötä Latvian lainsäädäntö on muuttunut huomattavasti tiukemmaksi ympäristöasioissa. Maassa on seuraavan kymmenen vuoden aikana tapahduttava suuria kehitysaskelaita kohti parempaa jätevesien käsittelyä, puhtaampia vesistöjä ja juomavettä.

Kuivakäymälät ovat maaseudulla tehokkaita kuormituksen vähentäjiä. Tarve kehittää on suuri, mutta tällä hetkellä rahoituksen kanssa on ongelmia. Leader+ rahoitus tuo kuitenkin jo tänä vuonna helpotusta kuntien taloudellisiin tilanteisiin. Kehitystä tapahtuu koko ajan ja muutokset ovat huomattavia neuvostoaikojen olosuhteisiin, jotka yhä vallitsevat monin paikoin maaseudulla.

Latvialaiset eivät vielä ole tietoisia moderneista sisäkuivakäymälöistä eikä heillä ole tietoa muistakaan uusista kuivakäymälämalleista. Kysyntää varsinkin yleisökohteiden kuivakäymälöistä on erittäin paljon.

