LIFE−Environment demonstration projects		
	EUROPEAN COMMISSION ENVIRONMENT DG	**LIFE00 ENV/EE/000924**
Project Acronym:	Estwaste	

Declaration of the applicant

The undersigned hereby certifies that:

1. This application or a similar one has not been forwarded to the Commission with a view to obtaining funding within the framework of financial support or programmes other than LIFE.

2. The applicant has not been served with bankruptcy orders, nor has he/she received a formal summons from creditors.

3. Where, in the case of joint funding by LIFE, one or more partners cancels or reduces his/her financial participation, the applicant will guarantee the total financial cover for the project.

4. Should the proposal be accepted, then the applicant will conclude with the partners/co−financiers, any agreements necessary to the completion of the work, provided these do not infringe on their obligations, as stated in the decision of the Commission. Such agreements should describe clearly the tasks to be performed by each partner and define the financial arrangements.

The undersigned undertakes to inform the Commission and the appropriate national authorities immediately of any changes in circumstances which affect the declarations made or the information provided in this application.

I/We certify, to the best of my/our knowledge, that the statements made in this application are true, and the information provided is correct.

Signed :

At ..... on .....

Name(s) and status of signatory(ies)

.....
.....
.....
.....

• D1. Holder of bank account information.

Beneficiary Organisation Legal Name	Eesti Pollumajandusuelikool (Estonian Agricultural University)		
Street Name and No	Kreutzwaldi 64		
PO Box		**Post Code**	51014
City	Tartu	**Country**	Estonia Eesti

• D1. Beneficiary banking information

Name of the bank *:	Eesti Uehispank		
Street Name and No:	Tornimaee 2		
PO Box [9]:		**Post Code [10]:**	15010
City *:	Tallinn	**Country * [12]:**	Estonia Eesti
Telephone No [13]:	(372−6)655100	**Fax No [14]:**	(372−6)655102
Account number *[15]:	10220005636223		

• D1. Date and Signature

Date of signature *:	16/04/0001
Title of the Signer [16]:	Dr
Family name of the Signer *[16]:	Koppel
First name of the Signer *[16]:	Andres
Signature:	

• A0. General information. [18]

Reference:	LIFE00 ENV/EE/000924
Acronym [17]:	Estwaste
Project Official Title [19]:	Sustainable wastewater purification in Estonian small municipalities
Project English Title [20]:	Sustainable wastewater purification in Estonian small municipalities
Project Start Date [22]:	01/01/2002
Project End Date [23]:	31/12/2005
Duration [24]:	48
Policy Area [31]:	PG2.3...Waste water treatment.
Nace Code [32]:	73.1....Research and experimental development on natural sciences and

• A1. Benefiting Region Location. [34]

Estonia Eesti	
	Associated Estonia (EE)

• A2. Participants Summary Information.

Role [36]	Short Name [38]	Legal Status [39]	Confirmation status [40]	
Beneficary	EAU	Public institution	Yes	
Partner	Kadrina	Public authority	Yes	
Partner	Kambja	Private structure	Yes	
Total: 3				

42

• A3 Beneficary Profile Information −.

Short Name [43]:	EAU	**Confirmation Status [40]:**	Yes

• Legal Information on the Beneficary.

Legal Name [45]:	Eesti Pollumajandusuelikool (Estonian Agricultural University)
VAT No [47]:	EE100018015
Legal Registration No [48]:	24006177
Business area (NACE) [49]:	80.3....Higher education
Legal Status [46]:	Public institution

• Legal address of the Beneficary.

Street Name:	Kreutzwaldi 64		
PO Box [50]:		**Post Code [51]:**	51014
Town/City:	Tartu	**Country Name [53]:**	Estonia Eesti

• Address of the main department of the Beneficary carrying out the Proposal.

Department [68]:	Institute of Zoology and Botany		
Street Name:	Riia 181		
PO Box [64]:		**Post Code [65]:**	51014
Town/City:	Tartu	**Country Name [67]:**	Estonia Eesti

• Beneficary contact person information.

Title [54]:	Mr.	**Function [55]:**	Vice−rector
Family Name:	Koppel	**First Name:**	Andres
Department [56]:			
Street Name:	Kreutzwaldi 64		
PO Box [57]:		**Post Code [58]:**	51014
Town/City:	Tartu	**Country Name [60]:**	Estonia Eesti
Phone [61]:	(372−7)313044	**Fax [62]:**	(372−7)313068
Email [63]:	akoppel@eau.ee		

• Beneficary details.

Year [69]:	2000	**Currency:**	EUR.....Euro
Annual turnover [70]:		**Annual Balance Sheet Total [71]:**	
Number of employees [72]:	900		
Number of employees in department conducting Proposal [73]:		135	
Is Your Organisation independent [74]:		Yes	
If No, please indicate legal name(s) of owner(s) who own 25% or more [75]:			

• Eventual consultant of Beneficary.

Consultant Legal Name [78]:	–

79

• A4 Partner Profile Information −.

Short Name [80]:	Kadrina	**Confirmation Status [40]:**	Yes

• Legal Information on the Partner.

Legal Name [82]:	Kadrina Vallavalitsus
VAT No [84]:	
Legal Registration No [85]:	75007824
Business area (NACE) [86]:	75.2....Provision of services to the community as a whole
Legal Status [83]:	Public authority

• Legal address of the Partner.

Street Name:	Rakvere tee 14		
PO Box [87]:		**Post Code [88]:**	45201
Town/City:	Kadrina	**Country Name [90]:**	Estonia Eesti

• Address of the main department of the Partner carrying out the Proposal.

Department [105]:	Environmental department		
Street Name:	Rakvere tee 14		
PO Box [101]:		**Post Code [102]:**	45201
Town/City:	Kadrina	**Country Name [104]:**	Estonia Eesti

• Partner contact person information.

Title [91]:		**Function [92]:**	Manager of the environmental department
Family Name:	Poldaas	**First Name:**	Arvi
Department [93]:	Environmental department		
Street Name:	Rakvere tee 14		
PO Box [94]:		**Post Code [95]:**	45201
Town/City:	Kadrina	**Country Name [97]:**	Estonia Eesti
Phone [98]:	(372−32)25620	**Fax [99]:**	(372−32)25601
Email [100]:	arvipoldaas@kadrina.ee		

• Partner details.

Year [106]:	2000	**Currency:**	EUR.....Euro
Annual turnover [107]:	1420000	**Annual Balance Sheet Total [108]:**	1420000
Number of employees [109]:	28		
Number of employees in department conducting Proposal [110]:		2	
Is Your Organisation independent [111]:		Yes	
If No, please indicate legal name(s) of owner(s) who own 25% or more [112]:			

79

• A4 Partner Profile Information −.

Short Name 80:	Kambja	**Confirmation Status 40:**	Yes

• Legal Information on the Partner.

Legal Name 82:	Kambja Vallavalitsus
VAT No 84:	
Legal Registration No 85:	75009544
Business area (NACE) 86:	75.2....Provision of services to the community as a whole
Legal Status 83:	Private structure

• Legal address of the Partner.

Street Name:	Kesk 4		
PO Box 87:		**Post Code 88:**	62001
Town/City:	Kambja	**Country Name 90:**	Estonia Eesti

• Address of the main department of the Partner carrying out the Proposal.

Department 105:			
Street Name:	Kesk 4		
PO Box 101:		**Post Code 102:**	62001
Town/City:	Kambja	**Country Name 104:**	Estonia Eesti

• Partner contact person information.

Title 91:		**Function 92:**	Municipal leader
Family Name:	Tedrema	**First Name:**	Ivar
Department 93:			
Street Name:	Kesk 4		
PO Box 94:		**Post Code 95:**	62001
Town/City:	Kambja	**Country Name 97:**	Estonia Eesti
Phone 98:	(372−7)416450	**Fax 99:**	(372−7)416335
Email 100:	vald@kambja.ee		

• Partner details.

Year 106:	2000	**Currency:**	EUR.....Euro
Annual turnover 107:	1100000	**Annual Balance Sheet Total 108:**	1100000
Number of employees 109:	14		
Number of employees in department conducting Proposal 110:		2	
Is Your Organisation independent 111:		Yes	
If No, please indicate legal name(s) of owner(s) who own 25% or more 112:			

140

• T0. Project Summary: Objectives ¯.

Currently most of wastewater purification systems in Estonian small municipalities do not work or work very poorly. Nitrogen (N) and phosphorus (P) in water discharged are pollutants in lakes and rivers being a serious environmental problem not only in Estonia but also in the neighboring countries. According to Estonian laws the content of N and P in purified water has to be diminished in next years. Instead of conventional chemical procedures a more sustainable method, vegetation filters to purify the wastewater, could be used. Besides to more efficient usage of natural resources the latter method is also economically beneficial. Moreover, establishment of sustainable wastewater purification system could give employment to rural population. The production of vegetation filters will be used as a local renewable source of energy.

• T0. Project Summary: Description of the work ¯.

The main aims of the project are:
· To build different prototypes of wastewater purification systems (WWPS) into two rural communities of Estonia
· To present the sustainable waste water purifying system as a way for solving local environmental/energy supply problems in Estonia

Two WWPS will be established in Kadrina Community, northern Estonia. Two villages in this community, Kihlevere and Vohnja, discharge their wastewater (concentrations of N and P up to 65 and 10 mg/l respectively) to Loobu River approximately 30 km from its outlet into the Baltic Sea. The groundwater table is very high (4…5 m) in both places. Therefore the WWPS should consist of a) mechanical treatment, b) activated sludge treatment and c) willow vegetation filter. The activated sludge treatment diminishes the potential risk of environmental pollution by pathogens and decreases the amount of N in wastewater by at least one third. The rest of N amount down to concentration 15 mg/l will be filtered by willow plantation. The area of the plantation and the establishment density will be planned according to the amount of wastewater and to the area of riparian buffer zone between plantation and river afterwards in both locations. The wastewater will be transported to the plantation via pipe system. The maximum amount of N added with wastewater is 200 kg/ha. As vegetation system functions only during the vegetation period, large ponds will be created in both sites to store the wintertime water discharge.

The third WWPS will be established in Kambja, southern Estonia. In this village, a large riparian buffer zone between the willow plantation and watersheds is present. Thus, during the vegetation period wastewater will be purified only by using willow plantation. The activated sludge treatment will be carried out during winter to diminish potential risks for pathogen leakage from the reservoirs. The production of willow plantations will be used in Kambja heat power plant operating on wood−chips.

140

• T0. Project Summary: Expected results ¯.

Expected results
· The concentration of nutrients in wastewater discharged to watersheds is lower than threshold imposed by Estonian laws (15 and 2.0 mg/l for N and P respectively)
· More information about efficient and inexpensive method of wastewater purification is gained and disseminated to the municipalities and planners of wastewater plants
· Demonstration project will gain experience of producing and local use of renewable energy for local use.

• T1. Technical: Beneficiary/partnership presentation ¯.

141

1. Estonian Agricultural University. The University is one out of the six public universities in Estonia. EAU is involved in teaching (graduate and post−graduate. levels) and studies in agriculture, forestry, veterinary, and rural development etc. EAU has 7 faculties, 6 associated research institutes and 5 experimental sites. EAU was established in 1951 and at present it has 900 employees (400 research and teaching staff) and 3000 students. Institute of Water Management , the Faculty Rural Engineering, Estonian Agricultural University. The institute is the leading institution in Estonia, dealing with the problems of water management, including water purification and waste management. The researchers of institute have co−operation with scientists from different countries.
− The tasks of the Institute of Water Management within the project are the following:
− planning of activated sludge treatment plants
− calculations and planning of waste water transport systems for plantations
− dissemination of knowledge within the lecture courses at EAU
Institute of Zoology and Botany, Estonian Agricultural University is one of the research institutes associated with EAU. It was established in 1947 and carries out research in fundamental and applied ecology, botany, mycology, zoology and hydrobiology. Department of Botany has 15 staff members and does research in fundamental and applied botany and plant ecology. The institute has a co−operation agreement with the Swedish University of Agricultural Sciences on short rotation forestry since 1993. Six willow plantations locating in different soil/nutrient conditions have been established in Estonia, two of them in combination with wastewater purification. Researchers of the Department of Botany have been working in Swedish University of Agricultural Sciences as guest researchers and have run experiments in Swedish short rotation plantations. Currently two PhD students dealing with different aspects of short rotation forestry are supervised in co−operation of Estonian and Swedish universities. The tasks of IZB within the project are the following:
− Co−ordination of the project
− know−how on the willow vegetation filters
− control over the water purification
− data management and analysis of results
− dissemination of the knowledge
2. Kambja municipality. A municipality in Tartu County, southeastern Estonia. The area of the municipality is 191 km2, the population − 2400. The center of municipality, township Kambja has the population of 1000. Establishment of activated sludge treatment plant
− Land−preparation, planting and weed control in the plantation
− Establishment of activated sludge treatment plant
− Harvesting of the plantation
− End use of the harvested biomass in the local boiler
3. Kadrina municipality. A municipality in West−Virumaa County, Northern Estonia. The area of Kadrina municipality is 333 km², the population − 5400. Vohnja and Kihlevere are the second and third largest villages in the county. Part of Kadrina municipality belongs to the first Estonian National Park. The tasks of Kadrina municipality within the project are the following:
− Establishment of activated sludge treatment plant
− Land−preparation, planting and weed control in the plantation
− Harvesting of the plantation

• T2. Technical: Environmental problem, project objectives and environmental results envisaged −.

The life standard for people living in the Baltic Sea Region depend largely on the environment in the sea In spite of that, the surrounding countries continue the disposal of municipal and farm residuals directly to streams, lakes and rivers so that the pollutants often end up in the sea. Countries like Sweden and Finland have constructed advanced and expensive sewage treatment systems, while others like the Baltic States, Russia and Poland have only recently realised the problem and are on their way in building or reconstructing the water purification plants. In Estonia, new legislation, tightening the limits for nutrients discharged to watersheds were adopted recently (for nitrogen N and phosphorus P 15 and 2 mg/l, respectively), resulting in urgent need modern, well−performing wastewater purifying systems. Inexpensive but efficient solutions are attractive in these countries due to economic reasons. One inexpensive method to purify wastewater in combination with simultaneous utilisation of its nutrient potential is to use wastewater for enhancing the growth potential of short rotation forests as an energy source.

Estonian Agricultural University has established efficient co−operation with the Swedish University of Agricultural Sciences in basic and applied research in short rotation forestry, including research into vegetation filters for wastewater treatment methods suitable in Estonian conditions. The calculations of the Swedish colleagues show that the usage of willow plantation filter in the third stage of wastewater purification (after the mechanical and biological ones) is almost by a third cheaper than the chemical treatment of N and P. Plantation filter can not be used during wintertime in northern climate. However, in small villages and farms the sewage may be stored over winter period in special ponds.

Our experiments show that the vegetation filters can be used also for the purification of non−treated sewage. Well−isolated willow plantation of 200 m2 decreased the biological oxygen demand of wastewater (BOD5) originating from an elderly home of 25 people by about 80%. At the same time the concentration of N and P decreased by 34 and 15%, respectively. By enlarging the area of vegetation filter the purification capacity can be enhanced and the willow plantation can purify most of the nutrients from the wastewater. Willow vegetation filter is capable to purify sewage in at least three different ways:
− willow plants take up the dissolved nutrients and reduce the volume of sewage water via enhanced evapotranspiration
− soil microorganisms break down the organic substances of sewage, making them available for plant uptake
− soil particles filter out the solid components of sewage and trap the major part of dissolved substances.

Wastewater purifying willow plantations can also be used as resources of renewable energy. The annual wood production in our experimental plantations in the first rotation cycle was over 5 tons of dry wood per hectare in poor soil conditions. Fertilisation increased the yield twofold. Usage of sewage instead of mineral fertilisers decreases the cost of plantation management and reduces fertiliser leakage and runoff. On the other hand, as the shortage of water is one of the limiting factors for willow growth in our climate, sewage treatment will probably increase the wood yield not only due to improved nutrition but also due to improved water availability. Besides the direct economic benefit, replacing the fossil fuels, mainly used in heat production in Estonia with wood, produced in the vegetation filters has other positive effects.

This replacement:
− reduces sulphur emissions from the heat power plants
− has neutral carbon dioxide emission, i.e. the willow plantations take up the carbon dioxide released during combustion
− shortens the fuel transport distances
− creates new job opportunities for rural population
− contributes positively to the local trade balance.

Three wastewater treatment systems planned in current project purify sewage of three villages/townships in Estonia. The size and location of particular community will be taken account in plant layout and establishment. The treatment of activated sludge process will be carried out before the wastewater is discharged into the plantation in two villages (Vohnja and Kihlevere). In Kambja, activated sludge process will be carried out only during winter. The size of willow plantation and the density of plants/pipes in a particular site will be calculated on the basis of the N load. Maximum amount of nitrogen spread to the plantation is 200 kg N per hectare.

Currently the three villages, belonging to our project discharge annually more than 3 tons of nitrogen and about 0.5 tons of phosphorus with the sewage into the watersheds. The wastewater purifying systems is planned to reduce the average annual concentration of N and P in their wastewater to 15 and 2 mg/l, respectively. Decrease in nutrient amount will prevent eutrophication and oxygen shortage in the watersheds.

The wood production of plantations will be harvested at least every fourth year. The wood−chips obtained will be used as renewable fuel for local heat production.

143

• T3. Technical: Work programme and phasing −.

The duration of the project is planned to be four years (48 months). Such long period is needed to establish willow plantations suitable for wastewater purification. During the first growing year of plants sewage can not be spread to a plantation due to a large risk for pathogen/nutrient leakage into the ground water.

The work program will consist of number of activities:
1. Vegetation filter planning
2. Land preparation
3. Planning of active sludge treatment plants
4. Construction of active sludge treatment plants
5. Weed control in plantations
6. Planting of willows to the plantations
7. Purification of sewage with active sludge process
8. Establishment of pipes and pumps network
9. Purification of wastewater in the plantation
10. Monitoring of purification efficiency
11. Monitoring of plantation state
12. Dissemination of knowledge
13. Reports

Beneficiary and the partners are responsible for the tasks:
1. Institute of Zoology and Botany of EAU
2. Kambja municipality at Kambja plantation, Kadrina municipality at Vohnja and Kihlevere plantations
3. Institute of Water Economy of EAU
4. Kambja municipality at Kambja, Kadrina municipality at Vohnja and Kihlevere
5. Kambja municipality at Kambja plantation, Kadrina municipality at Vohnja and Kihlevere plantations
6. Kambja municipality at Kambja plantation, Kadrina municipality at Vohnja and Kihlevere plantations
7. Kambja municipality at Kambja, Kadrina municipality at Vohnja and Kihlevere
8. Kambja municipality at Kambja plantation, Kadrina municipality at Vohnja and Kihlevere plantations
9. Kambja municipality at Kambja plantation, Kadrina municipality at Vohnja and Kihlevere plantations
10. Institute of Water Economy of EAU, Institute of Zoology and Botany of EAU
11. Institute of Zoology and Botany of EAU
12. Institute of Zoology and Botany of EAU; Institute of Water Economy of EAU,
13. Institute of Zoology and Botany of EAU; Institute of Water Economy of EAU,

The schematic timetable is represented in annex 4 (will be sent by e−mail). Notes:

− The actual period of wastewater purification in the plantation and usage of active sewage process will depend on the local climate condition in a particular year and on the load of pollutants in the wastewater

− The progress reports will be made in every 6 months and sent to EU in next 14 days after the project period.

• T4. Technical: State−of−the−art and innovation 144 −.

The aim of the project is to establish three sustainable and economical wastewater purification systems in Estonia. Some trials have been conducted in Estonia to use riparian buffer zones and vegetation filters for sewage purification. The process of wastewater purification by a vegetation filter consists of 3 different stages:
− green plants take up nutrients and reduce the volume of sewage by enhanced evapotranspiration
− microorganisms break down organic substances of wastewater into plant−available nutrients
− soil particles filter out the solid components of the wastewater and trap the major part of dissolved substances
The use of natural vegetation filters (riparian buffer zones, wetlands) has limited possibilities, since both soil and plants will be saturated with nutrients (mainly with phosphorus) and after saturation the purification capacity of natural vegetation filters decreases. In willow vegetation filters the considerable part of nutrients (mainly nitrogen and phosphorus) will be removed from the filter by regular harvesting of the biomass. The wood biomass from the vegetation filter will be used in local heat power boilers. The use of local renewable biofuel instead of fossil fuels reduces sulfur emission into the atmosphere and is neutral in terms of greenhouse gases, since the growing willow plantation takes up the carbon dioxide released during combustion. Local biofuel reduces the energy costs for fuel transport.

It has been shown that in Swedish conditions the usage of vegetation filters instead of conventional chemical treatment reduces the cost of purification by a third. However, in northern climate the vegetation filters are able to purify wastewater only during the vegetation period and additional expenditure to establish reservoir ponds for wintertime is needed. The size and the cost of ponds depend on the number of local population and the amount of water used. In small communities, however, the cost of vegetation filter system as well that of ponds remain still lower in comparison with the conventional biological and chemical treatment of the sewage.

Another technical innovation of our project is associated with the wastewater distribution into the willow vegetation filter. Usually the free−flow wastewater distribution into riparian buffer zones/vegetation filters has been used. This is the cheapest method, but also it includes environmental risks and biological drawbacks. The uneven distribution of wastewater causes leaks of pollutants into groundwater and uneven growth of plants. The network of pipes and pumps in the vegetation filter allows even distribution of wastewater over the plantation area. The amount of wastewater discharged into the plantation will depend on the climate − larger amount of wastewater could be spread in sunny summer days than in rainy days.

The main know−how concerning the willow vegetation filters and the practical courses of application has been gained within the Swedish−Estonian co−operation established between the Department of Short Rotation Forestry of the Swedish University of Agricultural Sciences and Estonian researchers. In 1993 one small−scale vegetation filter was established in Estonia within this co−operation. There are several differences between Estonian and Swedish legislation on environment, making impossible the direct transformation of the Swedish know−how on vegetation filters into Estonian practice:

− according to the Swedish legislation the threshold for nutrient concentration in discharged wastewater is set on the annual average values, in Estonia on the actual values. This means that in Estonia the wastewater can not be discharged into vegetation filters in winter, but it has to be stored.
− willow vegetation filters in Sweden usually function together with the conventional sewage treatment plant. This results in the different composition of wastewater used in vegetation filters in two countries. The comparison of willow vegetation filters established in two countries helps to understand the limits and possibilities of vegetation filters. It renders to find the maximum amount of wastewater that can be distributed to the plantation area and also the factors that influence the functional capacity of vegetation filters.

• T5. Technical: Demonstration character and dissemination plan ¯.

The current project is planned to result in the first full−scale application of sustainable wastewater purification systems in Estonia. Three prototypes for wastewater treatment will be established in different parts of Estonia. The prototypes will be different depending on local nature, geology and environmental/technical demands. In all three prototypes intensive monitoring will be carried out concerning:
− economical background, needed for further planning of this type of wastewater purification systems;
− groundwater quality in order to control the environmental effects of the prototypes
− capacity of willow vegetation filters for wastewater purification in order to evaluate the reasonable size of vegetation filter in Estonian conditions
− nutrient amount stored in vegetation/soil in order to model and optimise the density of plants/pipes in the filter

The databases of all these measurements will enable to evaluate the project efficiency and will form the basic information for economically and environmentally optimal establishment of vegetation filter−based wastewater purification systems in Estonia.

Students of the Estonian Agricultural University will be involved in the monitoring. The results will be used during the lecture courses for forestry, ecology and water economy students at EAU. Students interested in this topic will use the data for course paper/thesis. Training courses and seminars will be organised for the community administrators, environment officers, wastewater purification system engineers, farmers, etc.

Close contacts between EAU and local municipalities will result in tight co−operation to disseminate the project results. In all three wastewater purification systems the local municipality consultant will be trained for guiding the excursions. In Kadrina municipality additional training course will be held) for the guides of the national nature conservation system, represented by the Lahemaa National Park, northern Estonia.

Knowledge on sustainable development and nature protection will be spread among schoolchildren. In all the three locations local schools will be involved in the dissemination of the project results. The current project will be a good example to demonstrate the possibilities of waste recycling and environmental technologies on the GLOCAL scale, that combines both the global environmental hazards and the local solutions for the problem solving.

The results of the demonstration project will be disseminated as papers in national and international magazines. Seminars will be organised on the local and international scale using existing regular contacts and dissemination routines. Special attention will be paid to dissemination of the experience to the other Baltic States (Latvia and Lithuania) and also to the representatives of the Northwestern Russia (Sankt−Petersburg and Pskov regions). Scientific co−operation with the researchers of the Swedish University of Agricultural Sciences will be extended. In all the three localities the basic information, concerning the project will be displayed close to the demonstration sites.

• T6. Technical: Reproduction potential and transferability ¯.

The reproduction potential of the current project concerning sustainable wastewater purification system in Estonia is high. According to the newly adopted Estonian law sewage from communities exceeding1000 personal equivalents has to be purified by the end of next decade. At present most of the wastewater treatment plants in Estonian villages/townships are either lacking or inadequate. The need to modernise the existing plants and to establish the new purification systems is urgent. Conventional biological and chemical treatments are expensive and not always suitable for small municipalities.

Demonstrating cheap and effective wastewater purification systems serve as a catalyst for establishing these sustainable systems in other Estonian villages.

Inadequate wastewater treatment is currently a major problem in all of former Soviet republics as well in other East−European countries. Economical constraints in these countries impose a need to find efficient and inexpensive solution to the problem. Ecological and sustainable solutions to purify wastewater have a large applicability in these countries. Due to the short distance and existing contacts the demonstration results have a good potential to be transferred to Latvia, Lithuania and North−western Russia.

• T7. Technical: Value for money − environmental cost/benefit ratio ¯.

147

It is difficult to calculate the environmental cost/benefit ratio of the sustainable wastewater purification system project in the present Estonian situation. Firstly, small communities in Estonia pay no tax for discharging unpurified wastewater into watersheds at present. The rapid changes in environmental legislation and economic environment complicate the actual assessment of cost/benefit ratio. The same is valid for the assessment of the benefit gained by the reduction of CO2 emissions, caused by implementation of locally produced renewable energy for heat production. Both water purification and reduction of CO2 emission into the atmosphere have positive impact on much wider scale than the local community. The conventional sewage purification system consists of three treatments: 1) mechanical, 2) biological, 3) chemical. Willow plantation filters can be used instead of the chemical, in some cases also instead of biological sewage treatment. It has been shown, that the usage of willow plantation filter decreases the cost of purification (Rosenqvist et al., 1997. Biomass and Bioenergy, vol.12, p.1−8). Moreover, nitrogen and phosphorus released in the willow plantation are fertilizers, which increase the productivity of plants and thereby decrease the cost of renewable biofuel.

• T8. Technical Added value of international approach and employment implications −.

There are no international partners planned to be directly the members of the project concerning sustainable wastewater purification in Estonian small municipalities since the objective is to create a demonstration wastewater purification systems in Estonia. However, the coordinator of the project, Estonian Agricultural University has numerous international contacts that will be used at all the stages of project implementation.

In the initial phase, several companies and institutions will be consulted:
· technical solution of wastewater distribution (Rosenquist Mek Verkstad AB, Sweden),
· harvesting machinery (Wilstrand Innovation AB, Sweden),
· community −related problems (Hedemora municipality, Sweden),
· biological problems of plantation establishment (Swedish University of Agricultural Sciences),
· technical problems of discontinuous active sludge system usage (Swedish University of Technical Sciences),
· clone selection (Hvisted Energy Forest, Taars, Denmark).
Also, the contacts within the International Energy Agency (IEA) Task 18 (Energy from Biomass) will be used for project implementation and dissemination of the experience gained within the project.

During the dissemination phase the present contacts with several institutions from Latvia (Latvian Forest Research Institute "Silava", Salaspils and Talsu Bio−Energija Ltd, Talal), Lithuania (Lithuanian Forest Research Institute, Girionys; and Lithuanian wastewater purification company "Kauno Vandenys", Kaunas), Poland (Polytechnical University of Gdansk, Gdansk) and North−Western Russia (St Petersburg State Forest Techical Acadmy, St Petersburg) will be used.
At present two PhD students of Institute of Zoology and Botany, EAU, dealing with the problems of short rotation forestry and wastewater purification are involved in sandwich−program between the Baltic States and Swedish Universities and study half−time in Sweden.

The number of working positions in the two communities concerned will be 6 at the initial phase. By the end of the project the number of employed people will increase. The number of working positions indirectly related to the project (e.g. extension officers) is difficult to predict at the planning stage.

• F1 Other Source of Funding Summary.

	Project partners [189]			
Co−Financiers [186]	**1 EAU**	**2 KAD**	**3 KAM**	**Total**
European Commission	119,658	91,818	113,858	325,334
Total:	119,658	91,818	113,858	325,334

1 − EAU **2** − Kadrina **3** − Kambja

• List of participants without affiliation.

Short Name
Kadrina
Kambja

• Affiliations Information.

Short Name	Affiliation with	Character	Sub−Contrator
EAU	Kadrina	D	

D: Direct control.
DS: Direct control with a sub−contractor.
I: Indirect control.
IS: Indirect control with a sub−contractor.

LIFE−Environment demonstration projects		
	EUROPEAN COMMISSION ENVIRONMENT DG	**LIFE00 ENV/EE/000924**
Project Acronym:	Estwaste	

Project Fundings Summary

Global Summary

Contribution	Amount in Euro		% of Total	
			Real	Eligible
Requested Community contribution [167]	**325334**		**45.74%**	**50.00%**
	Real Costs	Eligible Costs	Real	Eligible
Participants contribution [168] (Sum of A + B + C + D below)	**385934**	**325334**	**54.26%**	**50.00%**
TOTAL (Sum above)	**711268**	**650668**	**100%**	

Participants Breakdown Summary

Participants contribution breakdown		Amount in Euro		% of Total	
		Real Costs	Eligible Costs	Real	Eligible
A	F00. Beneficiary own contribution [169]	**119657**	**119657**	**31.00%**	**36.78%**
B	F00. Partners own contribution [170]	**266277**	**205677**	**69.00%**	**63.22%**
C	F01. Other public funding [171]	**0**	**0**	**0.00%**	**0.00%**
D	F01. Other private funding [172]	**0**	**0**	**0.00%**	**0.00%**

Participants Breakdown Details

P.R.	S.N.	Calculus ==>	A Costs	B Own	B/(A/100) % Own	C O.C.	C/(A/100) % O.C.	B+C T.P.C.	(B+C)/(A/100) % T.P.	D R.C.C.	D/(A/100) % R.C.C.
BEN	**EAU**	Real	239315	119657	50.00%	0	0.00%	119657	50.00%	119658	50.00%
		Eligible	239315	119657	50.00%	0	0.00%	119657	50.00%	119658	50.00%
PAR	**Kadrina**	Real	205711	113893	55.37%	0	0.00%	113893	55.37%	91818	44.63%
		Eligible	183636	91818	50.00%	0	0.00%	91818	50.00%	91818	50.00%
PAR	**Kambja**	Real	266242	152384	57.24%	0	0.00%	152384	57.24%	113858	42.76%
		Eligible	227717	113859	50.00%	0	0.00%	113859	50.00%	113858	50.00%
	TOTAL for Project :	Real	**711268**	**385934**	**54.26%**	**0**	**0.00%**	**385934**	**54.26%**	**325334**	**45.74%**
		Eligible	**650668**	**325334**	**50.00%**	**0**	**0.00%**	**325334**	**50.00%**	**325334**	**50.00%**

Legend

P.R. : Participant Role [192]
Costs : Costs [195]
% Own : % Own Contribution [197]
% O.C. : % Other Contribution [199]
% T.P. : % Total Participant [201]
% R.C.C. : % Request Community Contribution [203]

S.N. : Short Name [194]
Own : Own Contribution [196]
O.C. : Other Contribution [198]
T.P.C. : Total Participant Contribution [200]
R.C.C. : Request Community Contribution [202]

LIFE−Environment demonstration projects		
	EUROPEAN COMMISSION ENVIRONMENT DG	**LIFE00 ENV/EE/000924**
Project Acronym:	Estwaste	

Project Budget Summary

Global Summary

Budget breakdown categories	Eligible amount in Euro [173]		% of Total	
			Real	Eligible
F05. Personnel [174]	**292740**		**41.1 %**	**44.9 %**
F06. Travel and subsistence [175]	**51600**		**7.25 %**	**7.93 %**
F07. External assistance [176]	**89600**		**12.6 %**	**13.7 %**
Durable goods [176]	Real costs	Eligible cost		
F08. Infrastructure [178]	**36000**	**9000**	**5.06 %**	**1.38 %**
F09. Equipment [179]	**67200**	**33600**	**9.45 %**	**5.16 %**
F10. Prototypes [180]	**118600**		**16.6 %**	**18.2 %**
F11. Consumables [181]	**20400**		**2.87 %**	**3.14 %**
F12. Other Costs [182]	**10234**		**1.44 %**	**1.57 %**
F13. Overheads [183]	**24894**		**3.50 %**	**3.83 %**
	Real costs	Eligible cost	Real	Eligible
TOTAL	**711268**	**650668**	**100%**	

Participants Breakdown Details (Part 1/2)

Calculus ==>			A	B	C		D	E
P.R.	**S.N.**	**N.P.M.**	**P.C.**	**T.S.**	**E.A.**		**INF.**	**EQU.**
BEN	EAU	174	175140	42000	0	Real	0	0
						Eligible	0	0
PAR	Kadrina	144	58800	4800	40200	Real	14500	22400
						Eligible	3625	11200
PAR	Kambja	144	58800	4800	49400	Real	21500	44800
						Eligible	5375	22400
TOTAL ==>		**462**	**292740**	**51600**	**89600**	Real	**36000**	**67200**
						Eligible	**9000**	**33600**

Participants Breakdown Details (Part 2/2)

Calculus ==>		F	G	H	I	I/T %	T=Sum(A...I)	
P.R.	**S.N.**	**PROTO.**	**CONSU.**	**OTHER.**	**OVER.**	**% OV.**	**T.P.C.**	**% T.P.C.**
BEN	EAU	0	13000	2000	7175	**3.00 %**	239315	33.65 %
PAR	Kadrina	51300	3700	2578	7433	**3.61 %**	205711	28.92 %
PAR	Kambja	67300	3700	5656	10286	**3.86 %**	266242	37.43 %
TOTAL ==>		**118600**	**20400**	**10234**	**24894**	**3.50 %**	**711268**	**100%**

Legend

P.R. : Participant Role [204]
N.P.M. : Number of Person Months [207]
T.S. : Travel and Subsistence [209]
INF. : Infrastructure [211]
PROTO. : Prototypes [216]
OTHER. : Other costs [218]
% OV. : % Overheads To Total Participant Costs [220]
% T.P.C. : % Total Participant Costs [222]
S.N. : Short Name [205]
P.C. : Personnel Costs [208]
E.A. : External Assistance [210]
EQU. : Equipment [212]
CONSU. : Consumables [217]
OVER. : Overheads [219]
T.P.C. : Total Participant Costs [221]

F05 Direct personnel costs

			Calculus ==>	A	B	C = B / Productive days per month	A x B		
P.R.	**S.N.**	**CAT.**	**D.R.**	**N.P.D.**	**N.P.M.**	**D.P.C.**	**% of T.P.C.P.**	
BEN	EAU	Project manager	81	840	48	68040	23.24%	
BEN	EAU	Senior scientist	60	525	30	31500	10.76%	
BEN	EAU	Junior scientist	45	1680	96	75600	25.82%	
PAR	Kadrina	Technican	30	840	48	25200	8.61%	
PAR	Kadrina	Worker	20	1680	96	33600	11.48%	
PAR	Kambja	Technican	30	840	48	25200	8.61%	
PAR	Kambja	Worker	20	1680	96	33600	11.48%	
			TOTAL (sum above) ==>	**8085**	**462**	**292740**	**100%**	

Legend

P.R. : Participant Role 223
CAT. : Category 226
N.P.D. : Number of Person Days 228
D.P.C. : Direct Personnel Costs 230
S.N. : Short Name 225
D.R. : Day Rate 227
N.P.M. : Number of Person Months 229
T.P.C.P. : Total Personnel Costs for Project 231

F06 Travel and subsistence costs in Euro [232]

					Calculus ==>	A	B	A + B		
P.R.	**S.N.**	**DEST.**	**O.E.**	**R.F.T.**		**T.C.**	**S.C.**	**T.T.S.**	**% of T.P.T.S.C.**	
BEN	EAU	Sweden (Uppsala, Malmö)	N	Co−operation, dissemination		4000	8000	12000	23.26%	
BEN	EAU	The Netherlands (Amsterdam)	N	Dissemination		400	1000	1400	2.71%	
BEN	EAU	Germany (Munich)	N	Co−operation−dissemination		1200	2800	4000	7.75%	
BEN	EAU	Belgium (Brussels)	N	Dissemination		2700	6300	9000	17.44%	
BEN	EAU	Estonian site areas, Tallinn	N	Monitoring, dissemination		10000	5600	15600	30.23%	
PAR	Kadrina	Sweden (Uppsala, Malmö)	N	Co−operation, dissemination		600	1000	1600	3.10%	
PAR	Kadrina	Estonian site areas, Tartu, Tallinn	N	Co−operation, dissemination		2600	600	3200	6.20%	
PAR	Kambja	Sweden (Uppsala, Linköping)	N	Co−operation, dissemination		600	1000	1600	3.10%	
PAR	Kambja	Estonian study sites, Tartu, Tallinn	N	Co−operation, dissemination		2600	600	3200	6.20%	
					TOTAL (sum above) ==>	**24700**	**26900**	**51600**	**100%**	

Legend

P.R. : Participant Role [233]
O.E. : Outside Europe (Y/N) [236]
T.C. : Travel Costs [238]
T.T.S. : Total Travel and Subsistence [240]
DEST. : Destination [235]
R.F.T. : Reason for Travel [237]
S.C. : Subsistence Costs [239]
T.P.T.S.C. : Total Project Travel and Subsistence Costs [241]

F07 External assistance costs in Euro [242]

P.R.	S.N.	P./P.	DESC.	Costs	T.P.E.A.C.	
PAR	Kadrina	Private company –	Building of pumps and pipes network; cleaning and isolation of ponds	25300	28.24%	
PAR	Kadrina	Private company "Kobras", Estonia –	Project of active sludge system	12300	13.73%	
PAR	Kadrina	Construction expertise office –	Construction project expertise	1300	1.45%	
PAR	Kadrina	Environmental expertise office –	Environmental expertise of project	1300	1.45%	
PAR	Kambja	Private company "Kobras", Estonia –	Project of active sludge system	10000	11.16%	
PAR	Kambja	Construction expertise office –	Construction project expertise	1000	1.12%	
PAR	Kambja	Environmental expertise office	Environmental expertise of project	1000	1.12%	

		–				
PAR	Kambja	Private company –	Building of pumps and pipes network, cleaning and isolation of ponds	37400	41.74%	
			TOTAL (sum above) ==>	**89600**	**100%**	

Legend

P.R. : Participant Role [243]
DESC. : Description [246]
P./P. : Provider/Procedure [245]
Costs : Costs [247]
T.P.E.A.C. : Total Project External Assistance Costs [248]

	EUROPEAN COMMISSION ENVIRONMENT DG	**LIFE00 ENV/EE/000924**
Project Acronym:	Estwaste	

F08 Infrastructure costs in Euro [249]

			Calculus ==>	**A**	**A x 0.25**		
P.R.	**S.N.**	**S./P.**	**DESC.**	**R.C.**	**E.C.**	**% of T.P.I.C.**	
PAR	Kadrina	Commune of West−Estonia –	housing of equipment	12000	3000	33.33%	
PAR	Kadrina	Commune of West−Estonia –	planning of filter area	2500	625	6.94%	
PAR	Kambja	Tartu County –	housing of equipment	15000	3750	41.67%	
PAR	Kambja	Tartu County –	planning of filter area	6500	1625	18.06%	
			TOTAL (sum above) ==>	**36000**	**9000**	**100%**	

Legend

P.R. : Participant Role [250]
DESC. : Description [253]
E.C. : Eligible Costs [255]
S./P. : Supplier/Procedure [252]
R.C. : Real Costs [254]
T.P.I.C. : Total Project Infrastructure Costs [256]

EUROPEAN COMMISSION
ENVIRONMENT DG

LIFE00 ENV/EE/000924

Project Acronym: Estwaste

F09 Equipment costs in Euro [257]

				Calculus ==>	A	A x 0.50		
P.R.	**S.N.**	**S./P.**	**DESC.**		**R.C.**	**E.C.**	**% of T.P.E.C.**	
PAR	Kadrina	Private tender –	Mechanical wastewater filters		3000	1500	4.46%	
PAR	Kadrina	Private tender –	Pumps and mixers for active sludge system		19400	9700	28.87%	
PAR	Kambja	Private tender –	Mechanical wastewater filters		5000	2500	7.44%	
PAR	Kambja	Private tender –	Pumps and mixers for active sludge system		39800	19900	59.23%	
				TOTAL (sum above) ==>	**67200**	**33600**	**100%**	

Legend

P.R. : Participant Role [258]
DESC. : Description [261]
E.C. : Eligible Costs [263]
S./P. : Supplier/Procedure [260]
R.C. : Real Costs [262]
T.P.E.C. : Total Project Equipment Costs [264]

F10 Prototype costs in Euro [265]

P.R.	S.N.	S./P.	DESC.	Costs	% of T.P.P.C.	
PAR	Kadrina	Estonian private tender –	pipes for wastewater distribution in vegetation filter prototype	12000	10.12%	
PAR	Kadrina	Estonian private tender –	sand and gravel for isolation of the vegetation filter prototype	4300	3.63%	
PAR	Kadrina	Estonian private tender (A.Roosvald) –	planting material to the vegetation filter prototype	13000	10.96%	
PAR	Kadrina	Estonian private tender –	pumps for wastewater distribution in vegetation filter prototype prototype	10000	8.43%	
PAR	Kadrina	Estonian private tender –	isolation material for reservoir ponds	12000	10.12%	
PAR	Kambja	Estonian private tender –	pipes for wastewater distribution in vegetation filter prototype	14000	11.80%	
PAR	Kambja	Estonian private tender –	sand and gravel for isolation of the vegetation filter prototype	3300	2.78%	
PAR	Kambja	Estonian private tender (A.Roosvald) –	planting material to the vegetation filter prototype	20000	16.86%	

PAR	Kambja	Estonian private tender –	pumps for wastewater distribution in vegetation filter prototype	15000	12.65%	
PAR	Kambja	Estonian private tender –	isolation material for reservoir ponds	15000	12.65%	
			TOTAL (sum above) ==>	**118600**	**100%**	

Legend

P.R. : Participant Role [266]
DESC. : Description [269]
S./P. : Supplier/Procedure [268]
Costs : Costs [270]
T.P.P.C. : Total Project Prototype Costs [271]

F11 Consumables costs in Euro [272]

P.R.	S.N.	S./P.	DESC.	Costs	% of T.P.C.C.	
BEN	EAU	private tenders –	Dissemination materials	5000	24.51%	
BEN	EAU	private tenders –	Stationery	5000	24.51%	
BEN	EAU	private tenders –	Special clothes	3000	14.71%	
PAR	Kadrina	private tenders –	Dissemination materials	1500	7.35%	
PAR	Kadrina	private tenders –	Stationery	1200	5.88%	
PAR	Kadrina	private tenders –	Special clothes	1000	4.90%	
PAR	Kambja	private tenders –	Dissemination materials	1500	7.35%	
PAR	Kambja	private tenders –	Stationery	1200	5.88%	

PAR	Kambja	private tenders –	Special clothes	1000	4.90%	
			TOTAL (sum above) ==>	**20400**	**100%**	

Legend

P.R. : Participant Role [273]
DESC. : Description [276]
S./P. : Supplier/Procedure [275]
Costs : Costs [277]
T.P.C.C. : Total Project Consumables Costs [278]

	EUROPEAN COMMISSION ENVIRONMENT DG	**LIFE00 ENV/EE/000924**
Project Acronym:	Estwaste	

F12 Other costs in Euro [279]

P.R.	S.N.	S./P.	DESC.	Costs	% of T.P.O.C.	
BEN	EAU	Audit company –	audit	2000	19.54%	
PAR	Kadrina	local farmers –	land rent	2578	25.19%	
PAR	Kambja	local farmers –	land rent	5656	55.27%	
			TOTAL (sum above) ==>	**10234**	**100%**	

Legend

P.R. : Participant Role [280]
DESC. : Description [283]
S./P. : Supplier/Procedure [282]
Costs : Costs [284]
T.P.O.C. : Total Project Other Costs [285]

	EUROPEAN COMMISSION ENVIRONMENT DG	**LIFE00 ENV/EE/000924**
Project Acronym:	Estwaste	

F13 Overheads in Euro

P.R.	S.N.	DESC.	Costs	% of T.P.O.	
BEN	EAU	Bookkeeping service	4000	16.07%	
BEN	EAU	Room renting for researchers	2000	8.03%	
BEN	EAU	Communication and office costs	1175	4.72%	
PAR	Kadrina	Bookkeeping service	4000	16.07%	
PAR	Kadrina	Room renting for technical equipment needed for research. From April to November each year	1500	6.03%	
PAR	Kadrina	Communication and office costs	1933	7.76%	
PAR	Kambja	Bookkeeping service	4000	16.07%	
PAR	Kambja	Room renting for equipment needed for research and courses. From March to November each year	3500	14.06%	
PAR	Kambja	Communication and office costs	2786	11.19%	
		TOTAL (sum above) ==>	**24894**	**100%**	

Legend

P.R. : Participant Role [286]
Costs : Costs [289]
DESC. : Description [288]
T.P.O. : Total Project Overheads [290]