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Final Activity Report

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Start date of project	1 Apr 2007	Duration	24 Month
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SECTION 1

Project objectives and major achievements during the reporting period

1. Objectives of the Project

Low and middle income countries are confronted with a lot of problems in the field of solid waste management, such as increasing amount of waste quantities, unknown quantities of hazardous wastes, and lack of infrastructure for solid waste management. The untreated waste is leading to severe problems, such as water pollution, health risks and poverty. Wild dumpsites are cases of inherited pollution which future generations are left to deal with.

However, in these countries waste management plays a secondary role both in politics as well as in the awareness of the population. In some countries missing institutional, legal and political basic capacities are an essential restraint for sustainable waste management. The waste management is often limited to the import of cost-intensive highly sophisticated technologies, which at the end must be closed due to lack of capacities or due to their maintenance. Thus negative experiences make the implementation of sustainable adapted strategies and technologies more difficult.

To counter such developments it is essential to know the framework as well as the national demand of research and the access these countries have to European research and technologies.

On the other hand, the European development politics have defined objectives for the sustainable rationing of natural resources and have established the Environmental Technologies Action Plan for the development and spread of environmental technologies. Stated aim of the EU is to achieve the Millennium Goals. The European Community works out recommendations for best available technologies. These measures are basically oriented towards the transfer of high technology and for this reason are not affordable for developing countries. All of these action plans and networks however ignore the potential importance of sustainable adapted waste management strategies and technologies in low and middle income countries for the fulfilment of development objectives and the Millennium Goals.

Based on this background information, the main objective of WasteNet was to support international research and co-operation in the area of sustainable solid waste management with a particular focus on appropriate technologies, policy constraints of dissemination and implementation and success-oriented concepts for low and middle income countries.

Table N°1: Specific Objectives of WasteNet

Objective 1	Strengthening international research co-operation between Latin America and the European Union
Objective 2	Evaluation of the research demand in the target countries which are linked to the development policies of the EU
Objective 3	Identification of barriers in decision making processes and application of technology standards (environmental policies, socio-economic aspects, lack of funding etc.)
Objective 4	Establishing a database of sustainable and appropriate waste projects in Latin America (e.g. appropriate waste to energy projects and or research)
Objective 5	Dissemination of the outcome of the WasteNet (e.g. internet platform) for capacity building, awareness of waste, education, training programmes
Objective 6	Development of a new co-operative research strategy for FP7

WasteNet wanted to act as a communication platform to intensify multilateral exchange of experiences and knowledge in the field of waste management. WasteNet aimed at activating international research and specifying the demand of research in the field of sustainable adapted solid waste management. European measures can thereby be adapted to the actual technological demand and to the present requirements concerning development politics.

With the establishment of WasteNet, it was intended to contribute to the general improvement of regional co-operation strategies, the elaboration of concepts towards a sustainable development, and societal innovation. Social dimensions, such as gender roles, ethics and social equity constituted an important part of the project in order to assure a positive impact. The network also sought to support and reinforce cooperation between actors from various projects and thus enlarge the exchange field of knowledge. Joint actions have the aim to contribute in a concrete form to sustainable solid waste development by implementing initiatives that extend beyond the scope of the INCO program. They aim to encourage the development of innovative approaches for analyzing and solving problems across several low and middle-income countries.

On the other hand, the project aimed to open up the European Research Area to the international community, promoting the export of European knowledge and focusing on sustainable development topics in the areas of education, training and research. Therefore the project sought to reinforce development cooperation between European and the target countries, contributing to an equitable and mutually beneficial research co-operation.

2. Structure of the Project

In order to achieve this objective, WasteNet worked on the bases of mutual cooperation between its different partners and third cooperation members. WasteNet brought together 12 partners from three continents with the aim to strengthen the international co-operation through sharing skills, knowledge, experiences and resources in the area of sustainable solid waste management.

Project Co-ordination

Universität Stuttgart
Institute for Sanitary Engineering, Water Quality and Solid Waste Management

Project Management

Ingenieurbüro Holz & Partner, Landcover Research and Project Management

Consortium Members

Tampere University of Technology
Institute of Environmental Engineering and Biotechnology (IEEB)

Middle East University Ankara
Environmental Engineering Department

Universidad de Costa Rica San Pedro de Montes de Oca.
Centre of Electro-chemics and Chemical Energy,
Chemical School and Post-Graduate Program Chemistry

Centro Integrado de Tecnologia e Educação Profissional da Cidade Industrial de Curitiba

Catholic Bolivian University “San Pablo”
Department of Civil Engineering

Technical University Federico Santa María
Department of Chemical, Biotechnological and Environmental Processes

Los Andes University
Department of Civil and Environmental Engineering/
Research Centre of Environmental Engineering

Tongji University
State Key Laboratory of Pollution Control and Resource Reuse

King Mongkut’s Institute of Technology North Bankok
The Waste Incineration Research Center,
Department of Mechanical Engineering, Faculty of Engineering

University Sains Malaysia
Environmental Technology Programme,
School of Industrial Technology

2.1 Co-ordination and Project Management

WasteNet opted for a very straightforward project management system. The organization, management and decision-making structures of the project were focused on both to support the communication and exchange activities within the consortium and to promote the external contacts.

In WasteNet, the Scientific Co-ordination and the Administrative and Financial Affairs along with the Operative Project Management were kept separated. The Scientific Co-ordination was mainly the task of the Coordinator (Participant 1) and the members of the steering board. Financial accountability, preparation of cost statements, execution of EU accounting rules, etc. were the responsibility of the administrator of each partner.

Due to its extensive experience in large multidisciplinary projects, the overall coordination was provided by the ISWA – University of Stuttgart. The co-coordinator's responsibility included the scientific as well as the administrative management of the project. However, the Coordinator was assisted by Participant 2 (Ingenieurbüro Holz & Partner, Project Management and Land-cover Research). The Coordinator was thus responsible for all the contacts with the commission regarding the project and was in charge to chair the Steering Board and the General Assembly.

2.2 Work packages

WasteNet was divided into five work packages, which worked in a parallel way:

- 2 Work packages were assigned for the construction of the infrastructure (Platform), which was planed to be maintained after the project ends
- 2 Work packages were designated for the structuring of the content
- 1 Work package was destined for dissemination
- 1 additional Work package was assigned for project management and scientific and administrative coordination of WasteNet

Table N°2: Work Packages

	Title of Work Package	Leader
WP0	Project Management	P2
WP1	Building the International WasteNet Platform	P1
WP2	Latin American Network	P12
WP3	Research Areas and Demand	P4, P8, P13
WP4	Awareness and Barriers	P10
WP5	Dissemination	P1

Based on the overall objectives of WasteNet to support the European Development strategies and to strengthen the research (RTD) between the European Union and in the first step with Latin America, the following table shows the focus of the work packages to the particular project objectives:

Table N°3: Project Objectives and Focus of Work packages

	WP1	WP2	WP3	WP4	WP5
Objective 1: Strengthening of international research cooperation between the target countries (Latin America and Asia) and the European Union	X	X			X
Objective 2: Evaluation of the research demand in the target countries which are linked to the development policies of the EU		X	X		
Objective 3: Identification of barriers in decision making processes and application of technology standards (environmental policies, socio-economic aspects, lack of funding etc.)		X		X	
Objective 4: Establishment of a database concerning sustainable and appropriate waste projects in the target countries (e.g. appropriate waste to energy projects and/or research)		X	X		
Objective 5: Dissemination of the outcome of the WasteNet (e.g. internet platform) for capacity building, awareness of waste, education, training programmes	X	X			X
Objective 6: Development of a new co-operative research strategy for FP7	X	X			X

In accordance with the overall work program each work package team defined its work program and generated an individual task list. The “WP Concept” was agreed among all the work package team members in the initial phase of the work period.

Every work package had a work package leader who was responsible for the correct execution of the tasks, the deliverables and reporting to the coordinator and Project Coordination Group. The leaders coordinated the activities of the work packages and assembled the reports of the different tasks. They also represented the work package during meetings of the steering board, giving short reports of the overall activities of the work package.

SECTION 2

Work Package Progress

3. Work Packages' Progress

During the duration of the project all work packages evolved positively, being able to address all the planed objectives successfully.

Work Package 1

The WasteNet website www.wastenet.de was designed and technically realized as a web-based interactive communication platform. The platform was established during the first six months of the project and extended progressively since the inauguration. The communication tools and the project file-system allowed an active internal communication and access to all intermediate results, the necessary project documents and sources of information that were useful for the work progress of consortium members. This internal sector of the website was protected by a user administration, which controlled the access for project members only through a personal login. A second semi-public sector provided extended project information to registered WasteNet members, who were identified as important networkers in the area of sustainable solid waste management. The public sector allowed to make knowledge in the area available to the interested public in the world and to couple WasteNet to other existing international networks. The aim was to improve the scientific and technological co-operation, working as a window of the project for other interested parties and stakeholders.

The site was technically designed by P02 and realized as Typo3-Application by Websolut, subcontractor of P01. Typo3-Application enabled to have a powerful content management system, which supported all the project management activities, allowing a continuous growth of the information pools and publications.

A discussion group was established in Facebook, with the intention to promote our network and link other interested actors to the project. The pilot phase of this discussion group was till the end of the third working period. The results obtained during this time showed that this media was not good enough to hold discussions at a high level of knowledge or to exchange information properly. Based on these results, it was agreed to open a discussion forum on the project's website after the Second Regional Workshop in La Paz. This forum was coordinated by Partner P06, who initiated discussions through questions or comments related to waste management in Latin American countries.

Apart from this a photo gallery has been opened with the idea to give a closer insight into the vast field of waste management. All consortium members had the opportunity to share pictures of equipments, processes and other interesting topics.

An important part of the communication platform was the examples of Best Practice Projects that permitted to exchange experiences, promote pilot projects, and disseminate successful technology transfer experiences. Additionally, these examples helped to increase awareness about the importance of sustainable technologies in low and middle income countries.

Another part of the International Platform was the country specific studies, which tried to reflect the state of the art in the field of solid waste management in all our partner countries, allowing setting priorities for research demand that was considered during the elaboration of the final RTD Strategy Paper.

The consortium members continuously enlarged the number of contacts with the aim to establish more links between WasteNet and other websites. As a result it was possible to contact more than 40 organisations and to couple WasteNet to the website of these organizations, establishing important contacts with potential future co-operation partners.

During the project's time the platform permitted:

- To attract interested stakeholders to the project
- To promote multilateral exchange of experiences and knowledge in the field of waste management.
- To establish links with other interesting networks and organizations which were accessible through www.wastenet.de
- To implement a forum for the exchange of ideas, knowledge and experiences

Three Plenary Meetings and two Regional Workshops (Colombia, October 2007 and Bolivia, September 2008) were organized during the whole project time.

The first meeting in Stuttgart, Germany (April, 2007) was organized by members of P01 and P02. Every partner country sent at least one representative to the meeting, who made a presentation on behalf of their countries. This helped the project members to know each other and to get a first insight of the different countries. During this open session, interested public was able to attend the lectures.

The second Plenary Meeting of International character took place in Valparaíso, Chile (March 2008). It was organized by P01 and P11 who hosted the event. It was a successful meeting with lectures from Europe, Asia and Latin America. The event included several participants from local interested parties that participated actively during the event. During this it was possible to expand contacts to further relevant actors related to waste management in Latin America and see the problems that this continent is facing in the field of solid waste management.

Third international Plenary Meeting was held in Curitiba, Brazil, which was also the closure event of the project. This meeting was organized by P01 and P08 who hosted the event. The internal meeting took place in Morretes and had the objective to present the final results of the different work packages and discuss the missing information to accomplish all the tasks. The international seminar took place in the installations of SENAI and brought together many actors, stakeholders and other professionals working on solid waste management as well as general public interested in the topic. The presentations covered diverse areas in the field of waste management and presented the state of the art of Latin American, European and Asian countries. The large participation in the discussion sessions enriched the information presented during the lectures.

The demand for further research was discussed during the RTD-sessions that were carried out in all the workshops (of international and regional character). In parallel, there was a continuous input by the partners of the consortium during the whole project. The results of these intensive discussion processes and information papers were synthesized in the RTD Strategy Paper. Besides this, potential topics for international research co-operation in the 7th FP of the European Commission have been discussed and developed.

The results of this deliverable showed that there is a general environmental legislation available in almost all participating countries. However, specific regulations are still missing, and implementation and control procedures need to be improved.

Furthermore, since environmental education is not being covered properly in schools and in the public media, many population groups show very little knowledge regarding environmental issues. Environmental knowledge and environmental acting is quite different. Only few universities offer degree courses in environmental technology, and environmental management. Therefore only few specialists in environmental science and engineering are available. Vocational training in environmental topics also needs to be improved.

Waste management is widely financed through public budgets. Only few countries showed a clear fee structure; generally fees are not related to waste or to the amount of waste, which is produced.

It was possible to see that big cities generally have high collection rates. This situation varies however in rural areas, where waste collection and treatment is inadequate or absent at all. A separate collection of recyclables can only be observed in some cases; generally it is carried out in the informal sector. There is no information regarding collection of recyclables in rural areas. Hazardous industrial waste is partially collected and adequately treated, however there is no or only less information regarding hazardous wastes coming from households and handicrafts in rural areas. Hospital wastes are often mixed up with the household waste stream, lacking adequate treatment. The main disposal option is landfilling. There is no real waste treatment, only some approaches of biowaste composting and recycling. For the treatment of special waste, there are only few incineration plants. In some cases co-incineration is carried out with the cement industry. There is only little information regarding waste treatment in rural areas.

Based on the results obtained during the first year, special attention has been paid to development projects in rural areas. In this sense, P01 analyzed the development of decentralized biogas plants in China, using it as a potential option for the treatment of household waste in developing countries. A further point that was analyzed is the trade with carbon dioxide certificates.

During the last RTD session in Curitiba further discussion were carried out, with the objective to determine the priorities of the participating Latin American countries. Representatives of Chile explained that in their country there are a lot of environmental education programs, but they have not been consolidated. Furthermore most of these projects have been focussed on management issues than on technology development. Other countries commented a similar situation in their countries, where environmental educational programs in terms of waste management are still in process.

Another point was to discard MBT plants as waste management option for Latin American countries. At a first instance these processes are based on expensive technologies, having no real recovery of resources. It was also discussed that this kind of technology is only worth when there is no separation at source. In this case, a good quality RDF can be produced.

In order to determine the real priorities of every participating country, the representatives chose among all proposed measures the most important ones for their respective country.

The result of these analysis showed that all of the participating countries think that the development of cooperation models like Twinning Projects with European institutions and universities would be very helpful to intensify the knowledge transfer between the countries.

A further important point is the creation of a centre for technical assistance in the field of waste management. All representatives commented on the less support regarding waste management and environmental issues in general. Therefore a centre with all necessary equipment and well trained

personnel in topics related to management issues and technical assistance would be of great importance for the further development of the waste management situation in all participating countries.

Work Package 2

This Work Package brought the Latin American Partners closer. Additionally, it served as a space to search key partners from the waste management sector and as an interaction platform. It also focused on determining the state of art in waste management in Latin-American countries from a technological, administrative and scientific perspective.

Waste management in Latin America (LA), as in most developing countries, is at a very early stage of development, in comparison to industrialized nations. This low state of development is evident through the lack of sustainable waste management systems at urban and rural level. In most towns and cities in LA formal waste management is restricted to the collection of wastes and their disposal on land. Neither of these two activities is carried out in reality in an efficient and environmentally sound manner. The collection and transportation of wastes, which takes place without separate collection of valuable materials, residual wastes and hazardous components, conveys the materials to central facilities, leading to misuse of environmental, economic and human resources. Landfilling of wastes is a harmful activity because the technical requirements of safe landfilling are not fulfilled, and the waste disposed is generally untreated. Furthermore, waste management in LA is highly unsustainable in social terms because large number of people is dependent for their livelihood on the informal recovery of recyclable materials from waste putting their health and safety at risk. Most efforts to introduce separate collection of wastes for recycling have either failed or have been inefficient in recovering valuable materials. Finally, the implementation of treatment technologies that reduce the environmental impact of waste, valorise biomass and other materials, and recover energy have proven to be unviable in most of the cases. This overview of the situation in LA is a result of the Country Specific Reports carried out for five countries members of the LA Network.

For a network like WasteNet to be successful, it must grow organically and in a systemic and integral manner. This is why the first step towards the expansion of the LA network was to exploit the natural partners that each WasteNet member from LA has achieved over the years. Complementing the workshop in Bogota and La Paz, a review of each partner's strategic allies, including an analysis of their potential contributions to the network, was carried out. A directory of the international and multilateral agencies active in the field of waste management in LA was compiled; since these organizations bridge technical, scientific and administrative knowledge from countries were sustainable waste management has been successfully implemented to LA.

Large part of the efforts of WP2 concentrated towards the planning and execution of the first Regional Workshop (RW1) in Bogota, with the presence of several Colombian guests who are relevant for waste management in the country. RW1 was extremely productive because it allowed the WasteNet members of the Latin American (LA) Platform to come together and to exchange ideas and view-points regarding the waste management situation in each LA country, including state of the art, research demand, and cultural and social barriers. During the RW1 these different areas were evaluated by qualitatively using a scoring matrix. As a result, the relative importance of the different aspects that affect or even restrain the achievement of an effective and sustainable waste management in each country were determined. Additionally, during the RW1 an extensive discussion, based on a causal model, took place and it covered the causes of the inappropriate waste disposal and handling in LA. Networking activities continued during the International Workshops in Valparaíso and Curitiba, and the second Regional Workshop held in La Paz (RW2), local organizations were contacted and their insight on waste management in LA and their perception on the needs for research,knowledge and technology transfer were valuable inputs.

From a scientific perspective, a review of peer-reviewed literature was carried out in order to identify which areas within the field of waste management have been the focuses of attention in research in LA. Additionally, technical and scientific conferences, which took place in LA covering aspects of waste management, were assessed. The topics dealt during these conferences spanned from sanitation, integrated waste management, anaerobic digestion, landfill technology, life cycle management, to informal recycling sector. Furthermore, research and technological institutions working in the field of solid waste management in different countries in the continent were surveyed and a directory of contacts was assembled.

From the work carried out in WP2, it may be concluded that waste management in LA is at a very early stage in its quest of contributing to the environmental, social, and economic sustainability of the region. Knowledge about waste treatment technologies and waste management systems is limited. Research is focused mainly on technological and operative aspects, while systemic and integrated approach covering technical, social, economic and environmental aspects is neglected. From a social perspective waste pickers are not included as key actors in the management of wastes and are marginalized by society, making them a vulnerable group. In terms of institutions, lack of knowhow of appropriate financial and judicial instruments to regulate waste management in many cases lead to the inefficient use of resources and allocation of budgets. Additionally, national, regional and international institutions work in a non-coordinated manner, allowing the potential synergetic effect of cooperation between academia, public administration, civil society, development cooperation, and industry to be lost. This whole situation is intensified by increasing population growth and urbanization, which puts a strain on the existing waste management structures, leading to additional negative environmental, social and economic impacts. However, there is hope that through the interaction initiated by the LA Network of WasteNet, further cooperation transfer of experiences from practice and research between countries in LA will change the trend of unsustainable waste management to sustainable and efficient use of resources from wastes.

Work Package 3

Work package 3 covered the topic "Research Areas and Demand", which demanded the active participation of all consortium members. The information regarding research demand was discussed and worked out on all regional and international meetings. Several tools were used to record this information. Based on the "CSS – Country Specific Study of each country" an analysis was made for the "state of the art" and in particular of the "research demand". P08 (Brazil) made a comparative analysis between the demands expressed by each member of Latin America, Asia and Europe, achieving some preliminary information to determine the future research demand in Latin America.

Since networking and benchmarking are one of the objectives of WasteNet, it was important to determine the working fields that have further been developed in the different partner countries in order to seek for new technologies, training and assessment options for developing countries.

In every occasion, it was important to search for strategies and models for projects that are suited to the realities of each country and that consider the technical and financial feasibility, making their implementation more effective.

Based on the information of each country the following conclusions could be made:

- With respect to waste generation, Latin America shows lower rates per capita (30 to 50% lower), compared to Asia and Europe.
- The deficiencies in the area of waste collection and transport are almost common in Latin America and Asia and even in some regions of Europe.
- The existence of laws regarding recycling and waste avoidance is virtually nonexistent in Latin America.
- In terms of organic wastes, Latin America is largely addressed to composting processes; Asian countries mostly consider the use of landfills; and European countries address their management towards energy recovery.
- One of the main concerns that must be highlighted is the fact that approximately 50% of the municipal waste in Latin America and Asia is disposed off in open dumps, which is leading to soil and water impacts.
- Landfills still predominate in Latin America as final destination, in contrast to other continents, where thermal treatment is mainly practiced.
- In the three continents, the predominant treatment for hospital waste is thermal treatment.
- Another worrying situation in Latin America and Asia concerns the final destination of WEE, where the majority is disposed off in landfills together with household waste.
- Energy from landfills is still very low in Latin America and Asia, while in Europe the general rule is the reduction of waste to be landfilled.

The results with regard the priorities for future research demand in Latin America, Asia and Europe showed:

- In the three continents there are gaps in terms of environmental education and the respective programs that are used in the different educational levels.
- One of the needs highlighted in the studies is how to increase the use of less harmful products to the environment (biodegradable products, organic compounds, etc.), in order to replace chemical fertilizers and pesticides.
- It is necessary to establish waste management systems in rural areas, considering adequate transportation and logistic, avoiding major environmental risks.
- With respect to waste avoidance in Latin America and Asia, there is an extremely strong demand to introduce minimization, reuse and recycling options as well as cleaner production technologies, which can be driven through specific legislation.
- In Latin American and Asian countries it is necessary to investigate how to reduce the amount of waste disposed off in landfills, assure better leachate management and energy recovery, based on the proven experiences in Europe.
- In relation to organic waste, Asia and Latin America still need to develop the market for organic compounds, which currently is very low.
- In terms of recycling in Latin America and Asia, it became evident that there is a need to increase plastic recycling.
- In Europe there is demand regarding the use of renewable energy sources (wind, solar, etc.).
- In relation to waste treatment processes, it is necessary to identify low cost processes, which also implicate lower water consumption.
- Regarding final waste disposal in Europe there is a need to assess in a better way impacts on human beings and the climate.
- Regarding contaminated sites, both Latin America and Europe highlighted the need to map contaminated sites, in order to take appropriate measures. Asia identified the need to develop appropriate technologies for the remediation of degraded areas.
- With respect to hazardous waste, all continents identified the need to define the best way for responsible manufacturers, using new laws.

- With respect to hazardous waste management in Latin America, the major demand seems to be the elaboration of a waste catalogue, according to the hazardousness, in order to determine appropriate treatment options. The demand in Asia is the development of standards for the operation of hazardous waste treatment plants. In Europe the demand is referred to the creation of a database regarding the impact of waste on human health and the environment.
- In Asia, there is research demand for studying the use of plasma technology as hazardous waste treatment option.

From the above information it was possible to conclude, that the demands of Latin America were in many cases very similar to those of Asia, and that in various situations these demands were already in practice in Europe.

Apart from this, it was possible to determine that the fields for future research demand in Latin America include topics, such as the need to integrate the issues related to management of solid waste from the curriculum of vocational training courses, including degree courses, promotion of waste management in rural areas and small towns involving all types of solid waste (domestic, rural, hazardous, health, etc.), prioritizing actions to reduce, reuse and recycling.

It was also a clear need to establish laws that give greater responsibility on manufacturers, in reverse logistics for their products, increasing their responsibility in the process of recycling, seeking technologies for cleaner production. With regard to the transport of waste there is demand to improve the equipment, which enables optimizing the process of collection of different types of waste, implying less impacts to the environment and public health.

In the case of the Asian countries, the most important research demands are similar to those of Latin America. An emphasis can be made for the introduction of "Waste Management" in the curriculum of various courses, integrated solid waste management in rural areas, development of the market for organic compounds and cleaner production.

In Europe, there are partner countries that are highly developed (e.g., Germany and Finland), however research demand till exists in other countries, like Turkey. It is necessary to clarify the responsibilities of all involved actors in waste management, and to optimize the waste collection (transport) process and enlarge the use of renewable energy sources, such as wind, solar, biomass, and biogas.

On the basis of the different discussions held between WasteNet members and considering the state of the art of each country, it is possible to conclude that in the three analyzed continents the future research demand should take into account social barriers, and the economic, political and cultural background of each country. It is necessary to seek for sustainable projects and actions that obey criteria of social and environmental responsibility. One of the major actual environmental concerns is related to the global warming, where solid waste management also plays a role. In order to minimize the overall environmental impacts in relation to this topic, it is necessary to consider and introduce management systems that minimize emissions of greenhouse gases, promoting their use as energy sources.

Another demand with high priority is the management of critical waste types, such as E-waste. The first problem is related to the big volumes that are currently generated around the world and the second constrain are the limited treatment options, or even nonexistent treatments in some countries.

The fusion and the exchange of experiences between all WasteNet member countries have been very important to find joint solutions to the problems related to waste management. WasteNet also permitted to identify and establish contacts with potential partner countries, for future developing projects.

Work Package 4

The topic covered in Work Package 4 was one of the most difficult topics that had to be covered during the project. One of the obstacles was the complexity of the topic and another was the absence of sociologists, anthropologists, historians, and other specialists of human behaviour, whose participation had to be cancelled due to the shortage of the original budget. As a consequence, the investigation performed in this work package encountered limitations that were very difficult to overcome. In many cases, the local conditions were difficult to compare, and in others, the causes of the problems had different characteristics, making impossible to assume a common denominator. However, based on literature and the experience of the participating partners it was possible to identify diverse barriers in the gender and socio- cultural context with the aim to make a cross-country analysis.

From the first meeting in Stuttgart till the end of the first year, the main activities concentrated in understanding the relationship between the technical development of solid waste management and the socio-cultural and gender barriers. This work took a lot of time since those kinds of barriers were very difficult to identify. The biggest difficulty that had to be overcome was the lack of information in the different Latin American countries and the way these countries try to explain how these problems affect their societies. The First Regional Workshop of Bogotá and the Second International Workshop of Valparaiso helped to understand in a better way the nature of socio-cultural and gender barriers in Latin American countries, through the information that was provided by the different members of the project. During the last working periods the work concentrated in the analysis of the information and the elaboration of a cross-country overview.

The elaboration of the country specific studies also permitted to get an insight into the programs to promote public awareness, educational programs, governmental programs, and non-governmental programs in each country.

The results of the analysis show that socio-economic and gender barriers that may affect the proper development of technologies in the field of solid waste management in Latin America have a common origin: the customs and traditions of the original people, the combination of these traditions with those that have been incorporated by the western idiosyncrasy during and after the colony, and the extreme poverty persuaded by the lack of work that many immigrants experience.

At the same time, it was possible to attribute this improper technology development to the inhabitants of the cities who lacked the habits that favour a sustainable waste management in terms of waste separation at source, recycling, composting, and treatment

It was possible to conclude that the topic confronts barriers created by man with a complexity that varies from country to country. Just considering the scale factor in terms of extension and population, the problems of Brazil are different from those of Bolivia, or those of Chile and Costa Rica. There were different causes associated with each of the countries. Causes and solutions were very variable, depending on local conditions, policies, economic and social issues. Furthermore, the inclusion of the remaining Latin American countries would increase the complexity of the topic. The development of a single solution for all Latin American countries is therefore, impossible and unrealistic. As a consequence, in order to introduce systems for sustainable waste management, it is necessary to consider the differences that exist in the different countries, since every country has its own problems, barriers and needs.

Work Package 5

Since the start of the project there was a continuous work in terms of dissemination. In the first instance flyers (in English and Spanish) were prepared and distributed electronically by all consortium members, especially P01, with the intention to invite and present WasteNet to networks working in the field of waste management and to invite other interested actors to join the WasteNet community. These flyers were also used by the P12, P11, P10 and P08 teams as accompanying material of the personal invitations that were sent to organizations and stakeholders working in the field of solid waste management asking for their participation in the workshops. Apart from this all host countries prepared further public relation material during the organization of the respective workshops.

Furthermore, Partners P03 and P14 made publicity for the project during some international events. P14 introduced WasteNet during the 7th high Temperature Air Combustion and Gasification Symposium which was organized in January 2008 in Phuket, Thailand; and P03 made publicity during a seminar on waste derived energy, at Poznan University, Poznan, Poland as well as distributed info and recruited WasteNet members from University of Wroclaw of Economics. P03 also distributed flyers at the Solid Waste Management Annual Meeting in Finland 2007. P06 organized in November 2008 a workshop with the four public universities of Costa Rica with the aim to discuss the management of different waste streams and a model for social barriers. The possibility to create a WasteNet group in Costa Rica was also proposed during this event.

Apart from this, articles about WasteNet have been prepared by P01 team in different languages of the consortium for their publication in university newsletters or bulletins to promote the project in these countries. The intention was to expand the number of members of the network by delivering a effective way of messages at the local level. With the help of all consortium members WasteNet was promoted in different countries of the consortium. Additionally, an article about the project was prepared by P01 team, which was published in the scientific magazine “Wasser und Abfall” (Germany) on March 2009.

Till the end of the project eight newsletters were prepared, published on the website and distributed among all the project partners and further interested public that registered through direct email contact or through the web page. These newsletters considered four main topics: Global Thinking, Upcoming WasteNet Events, Conferences, and Spot Light.

Global Thinking provided a space where people in the area of environment were able and welcome to express their interest on sustainable environmental projects, new innovation technologies, including discussions on environmental workshops, seminars and projects.

Upcoming WasteNet Events showed the upcoming events of WasteNet, which were announced with relevant background information. This provided an opportunity for a group of individuals with common interests to come together, to share their knowledge and to grow the WasteNet network.

Conferences had the objective to keep an updated schedule of world wide conferences, workshops, and seminars in the area of sustainable solid waste management.

Spot light aimed to acknowledge and raise awareness on sustainable solid waste management by promoting news of new voice organizations or interested actors in the private and public sector. With this, it was intended to create a stable and continuously growing WasteNet community.

All consortium members participated actively in the elaboration of these newsletters by providing international information regarding projects in the field of waste management and environmental protection.

4. Description of the Milestones

Table N°4: Milestone M1: Kick-off Meeting Stuttgart, Germany

Date	Objective	Verification	WP
April 23 – 26th 2007	To submit the synthesis of the meeting in Stuttgart To prepare electronic dissemination material	All partners were invited to Stuttgart and at least one representative of each institution was present at the workshop.	1
		A flyer was elaborated and distributed electronically.	1
		Partners introduced themselves and gave a short presentation on the current state of national research and explained their priorities for future research regarding waste management.	All
		Work packages were discussed and redefined whenever it was necessary.	All
		Work package leaders were elected.	All
		The first steering board session took place in Stuttgart.	WP leaders
		A synthesis of the meeting was elaborated made available on the website.	1, 5

Table N°5: Milestone M2: First Regional Workshop Bogotá, Colombia

Date	Objective	Verification	WP
October 1 – 5th 2007	To submit the synthesis/abstracts of the workshop To submit reports of WP 2, 3 and 4 To prepare electronic dissemination material	Set-up of public relation pages and communication tools for the international platform on the projects' website.	1, 5
		Relevant networks were identified and contacts were established through direct communication in order to couple them to WasteNet.	1
		The internet platform was installed and expanded in order to make available more information and to attract interested actors.	1
		Flyers and posters of the project were distributed to interested actors.	5
		A template for the evaluation of relevant research and demonstration projects was elaborated.	2
		The information gained up to the first regional workshop for the country specific reports was analyzed.	3
		Information on the WP4 topics gained up to the first regional workshop was analyzed.	4
		A contribution for the WasteNet website was submitted previously to the workshop.	4
		A flyer for the first regional workshop was prepared and distributed.	5
		Preparation of the first regional workshop - invitation of experts and stakeholders relevant to the first regional workshop.	2
		WP leaders prepared short presentation and tasks of every work package were checked.	All
		The second steering board session took place in Bogotá.	WP leaders
		A synthesis of the workshop and the respective presentation abstracts were elaborated made available on the website.	1, 5
		The first RTD strategy paper based on the discussions held in the workshop was elaborated and made available.	1, 5

Table N°6: Milestone M3: First International Workshop Valparaiso, Chile

Date	Objective	Verification	WP
March 10 – 14th 2008	To submit the synthesis/abstracts of the workshop To have the internet platform installed To prepare electronic dissemination material	The first RTD strategy paper was circulated for further discussion.	1
		The third steering board session took place through the internet in November 2007.	WP leaders
		More relevant networks were identified and contacts were established through direct communication in order to couple them to WasteNet.	1
		Template for best practice projects was elaborated and circulated.	1
		Each partner submitted two examples for best practice projects in their countries.	1
		Newsletters were published.	5
		A template for WP2 relevant information was elaborated and circulated.	2
		Information of WP2 topics - including new contacts was collected and analyzed	2
		A template for the country specific reports was elaborated and circulated.	3
		The results obtained through the country specific papers were analyzed.	3
		A template for WP4 relevant information was elaborated and circulated.	4
		The information gained during this period was analyzed.	4
		Preparation of the first international workshop - invitation of experts and stakeholders relevant to the first international workshop.	1
		WP leaders gave short reports of their duties.	All
		RTD paper was discussed.	All
		The forth steering board session took place.	WP leaders
		The new RTD strategy paper was elaborated on the basis of the discussion and made available.	1, 5

Table N°7: Milestone M4: Second Regional Workshop La Paz, Bolivia

Date	Objective	Verification	WP
September 14 – 18th 2008	To submit the synthesis/abstracts of the workshop To prepare electronic dissemination material To submit and discuss the final reports of work packages 2, 3 and 4	A further RTD strategy paper was prepared and discussed during the workshop	1
		A steering board session took place through the internet in April 2008.	WP leaders
		A steering board session took place in Bangkok in May 2008 with the Asian partners.	WP leaders
		More relevant networks were identified and contacts were established through direct communication in order to couple them to WasteNet.	1
		Best practice projects were elaborated.	All
		Newsletters were published.	5
		The country specific reports were finished and discussed during the workshop.	All
		The information gained during this period was analyzed and relevant missing information identified.	2, 3, 4
		Preparation of the second regional workshop - invitation of experts and stakeholders relevant to the workshop.	1
		Public relation material was prepared.	5
		WP leaders gave short reports of their duties.	All
		RTD paper was discussed.	1
		The seventh steering board session took place during the workshop.	WP leaders
		The new RTD strategy paper was elaborated on the basis of the discussion and made available.	1

Table N°8: Milestone M5: Second International Workshop Curitiba, Brazil

Date	Objective	Verification	WP
March 2nd – 6th 2009	To submit the synthesis/abstracts of the workshop To prepare electronic dissemination material To submit reports of work packages 1 and 5 and complete missing information in all work packages To discuss future of the WasteNet network	Proposals for the final RTD strategy paper were prepared	1
		A steering board session took place through the internet in December 2008.	WP leaders
		More relevant networks were identified and contacts were established through direct communication in order to couple them to WasteNet.	1
		Newsletters were published.	5
		Country specific summaries were prepared.	All
		Relevant missing information was identified for the completion of the final reports.	1, 2, 3, 4, 5
		Preparation of the final international workshop - invitation of experts and stakeholders relevant to the workshop.	1
		Public relation material was prepared and articles about WasteNet published.	5 All
		WP leaders gave short reports of their duties.	All
		RTD paper was discussed.	1
		The final steering board session took place during the workshop.	WP leaders
		The final RTD strategy paper was elaborated.	1
		Completion of all work package reports.	WP leaders

Table N°8: Milestone M6: Cost- Statements and Reports submitted to EC

Date	Objective	Verification	WP
March and April 2009	To submit all the final reports and cost statements to the European Commission	All work package final reports were delivered.	WP leaders
		Cost statements and final reports were sent to the EC.	

5. Steering Board Sessions

Since the start of the project (April 2007) the steering board came together nine times, in order to take administrative and organizational decisions. There was one steering board session in every meeting/workshop, but there were also several online sessions and a meeting with the Asian Work Package Leaders.

Session Meeting in Stuttgart (24th of April 2007)

During the meeting in Stuttgart the first steering board session was held. As a first step the Work Package leaders who should compose the board were nominated. Afterwards the steering board was introduced to all participants. The decision taken in this time was to change the 1st International Workshop/ 2nd Plenary Meeting from Curitiba (Brazil) to Valparaiso (Chile).

Session Regional Workshop in Bogotá (1st of October 2007)

The second session was held on the first day of the workshop in Bogotá, Colombia. The decisions taken in this occasion included the agreement to hold all regional meetings in Spanish (with simultaneous translation into English/German), in order to facilitate the exchange among the Latin American participants. It was also decided to change the responsibility of the Work Package leaders and agreed that every participating country had to make a country specific study. Since only Latin American partners were present in this occasion, these decisions were communicated to the rest of European and Asian Partners during a Skype session.

Skype Session (19th of November 2007)

The session in this occasion was first hold with the European and Asian partners and hours later with the Latin American ones. The reason for this was the big difference in time that did not permit a simultaneous session. During this it was decided to introduce financial penalties due to delays, which consisted in partial or no-reimbursement of travel costs.

Session International Workshop in Valparaiso (14th of March 2008)

During the fourth steering board session in Valparaiso all partners, with exception to the Chinese and Malaysian representatives came together. On this occasion the board decided to annul the decision taken during the third session, because this meant contractual changes that were leading to internal conflicts with the administration department of some partners and to possible withdrawal of them from the consortium. It was also decided to have the next steering board session on the 9th of April 2008 via Google, to fix the Second Regional Workshop in La Paz, Bolivia on October 10th -19th 2008 and the Second International Workshop in Curitiba, Brazil on March 2nd -6th 2009. The board also decided that Work Package 2 Leader is only MSc. Nicolás Escalante (P12), and that the Work Package 3 Co-Leaders are Dr. Raghida Lepistö (P4), Elcio Herbst, Luciano Avila, Eng. Carlos Waltrick (P8) and Dr. Somrat Kerdsuwan (P14). A further decision was to have an Editor Board for the revision of all documents that are going to be published, composed of members of Prof. Dr. Aysel Atimtay (P5), Dr. René Espinoza (P10), M.Sc. Nicolás Escalante (P12) and Dr. Somrat Kerdsuwan (P14) with Dr. Raghida Lepistö (P4) as Chief Editor.

Google - Skype Session (9th of April 2008)

This session was mainly for trying new communication tools with google and skype. E-conferences with new software have some problems. In moment not more than 4 partners can be connected successfully. Steering board sessions are possible, but they have to be done in two or three steps. New technologies will be tested, as far as they are available. Nevertheless e-conferences can be used to fasten decisions and to improve the cooperation.

Session Meeting in Bangkok (26th of May 2008)

During this occasion the Asian partners and the Coordinator of the project came together in order to talk about the waste management situation in these countries. Based on the Chinese experience with small scale anaerobic digesters, it was also discussed if this low-tech technology could be transferred to Latin American countries.

Session Regional Workshop in La Paz (18th of September 2008)

During the sessions in La Paz, the participants determined the delivery dates for the final reports of all the work packages and their corresponding revision periods. The steering board also confirmed to support the coordinator in supervising the auditing process.

Google - Skype Session (1st of December 2008)

This session was mainly for preparing the International Workshop in Curitiba, discussing the schedule, the contributions of the partners and PR material

Session International Workshop in Curitiba (3rd of March 2009)

During the session in Curitiba the principal topic was the future of WasteNet. Therefore all the participants exposed their future view of the network and the possibility to continue the information exchange. All the members manifested their interest to continue with WasteNet and to deliver information for its publication in the electronic newsletters. P01 offered to continue with the edition of the newsletters for the first instance.

Apart from this, a discussion regarding the final conclusions of the RTD strategy was held in order to define the priorities for all the participating Latin American countries. Besides this, P02 explained the financial issues for the reporting.

SECTION 3

Consortium management

6. Consortium Management

All tasks of the Consortium were successfully fulfilled. The network has been established, the website installed, the meetings were carried out successfully and the discussions regarding the RTD strategy evolved positively during the whole project time, especially during the workshop sessions. Based on all the discussions and the information exchange during these years, it was possible to prepare a RTD-strategy that reflects the situation in the participating Latin American countries and determine the most important demands.

The small delays in the delivery of some tasks during the first working periods were accomplished later with success. They did not affect the progress of the project and did not represent changes in the timetable. Therefore the front lined bar-chart stayed equal.

In terms of responsibilities, some changes took place. The board decided that Work Package 2 Leader is only M.Sc. Nicolás Escalante (P12), and that the Work Package 3 Co-Leaders are Dr. Raghida Lepistö (P4), Elcio Herbst, Luciano Avila, Eng. Carlos Waltrick (P8) and Dr. Somrat Kerdsuwan (P14). Since Luciano Avila left SENAI in November 2008 he also left the consortium. Although some small changes occurred, the consortium itself did not present any changes.

The coordination was confronted with time and distance related problems. The differences in time were so big, that a simultaneous videoconference with all consortium members was never possible, especially between Latin America and Asia. However, this did not affect the relation ship among the consortium members. All partners stayed permanently in contact and each of them stayed in continuous contact with the coordinator. The good relationship that developed among all the consortium members was partly based on the regional and international meetings in which the partners had the opportunities to share professional and personal experiences. This always permitted to create a good working atmosphere.

During the first year of the project, it became evident that co-ordination work was taking much more time than expected. Especially the contacts to the Asian partners needed to be improved through an extra visit of the coordinator to the partners in Thailand and Malaysia. As a consequence, the work load planned at the beginning exceeded the original work plan by 4,75 person months accumulated during both years.

Besides of this, and with the intention to support the RTD strategy, P01 initiated a study on the potential of energy production from solid household waste using small scale biogas plants based on the Chinese experiences in this field. The results of this study were summarized and presented at the International workshop in Curitiba (March 2009). Additionally a second study was initiated by P01 about Carbon Credits, which can be earned by improving the waste management systems. This study collected examples from Latin America, such as reducing the emissions of greenhouse gases from landfills by using the biogas as a source for energy production or the possibilities to carry out pre-treatment of the solid waste before landfilling. Results were presented in La Paz and Curitiba.

Contacts to other projects and institutions have also been established. The establishment of further contacts and the further development of the network were the main activities of the second year of the project. As seen in the WP1 Report, more than 40 potential partners for future projects were identified and contacted. Besides this, good contacts were established during the different meetings.

The consortium members agreed during the workshop in Curitiba to stay in contact after the project ends with the intention to develop further partnerships and if possible carry out projects together in the field of solid waste management. It was also agreed to continue with the edition of newsletters. Therefore WasteNet will continue after closing the project.

SECTION 4

Plan for using and disseminating the knowledge

7. Dissemination of knowledge

The project contemplated in its structure an own work package for dissemination issues. In this sense, one of the deliverables was the elaboration of 2-monthly newsletters, which were distributed to all registered members and published on the project's website. These newsletters were elaborated with the support of all consortium members who delivered international articles in the field of waste management and other environmental related topics.

Besides of this different public relation materials were prepared for the Regional and International Workshops, for conferences and other public events. In this sense, there was a continuous dissemination procedure that contemplated the elaboration of flyers, posters, banners, and articles for press release among others.

Some Consortium members made also publicity for the project during some international events, like P14 during the 7th high Temperature Air Combustion and Gasification Symposium which was organized in January 2008 in Phuket, Thailand; and P03 during a seminar on waste derived energy, at Poznan University, Poznan, Poland as well in the University of Wroclaw of Economics and the Solid Waste Management Annual Meeting in Finland 2007. P10 carried out several dissemination activities in the cities of La Paz, Cochabamba and Santa Cruz in Bolivia and organized a short seminar before the regional workshop in La Paz. More over, P06 organized in November 2008 a workshop with the four public universities of Costa Rica with the aim to discuss waste management issues and to create a WasteNet group in Costa Rica.

Table Nº9: Overview of the dissemination activities

Planned/ actual Dates	Type	Type of audience	Countries addressed	Size of audience	Partner responsible /involved
Apr 2007 – up to date	Project web-site	Higher education Research General public Industry (environment – waste management)	Any	Public	ISWA – Germany IRLO – Germany
Sep 2008	Press release	Higher education Research General public	Bolivia	Public	UCB – Bolivia
Mar 2009	Press release	Higher education Research General public Industry (environment - waste management)	Brazil	Public	SENAI – Brazil
May 2008	Press release	Higher education Research General public	Chile	Public	UTFSM – Chile

Planned/ actual Dates	Type	Type of audience	Countries addressed	Size of audience	Partner responsible /involved
Mar 2009	Press release	Higher education Research General public	Colombia	Public	Uniandes – Colombia
Dec 2008	Press release	Higher education Research General public	Costa Rica	Public	UCR – Costa Rica
Mar 2009	Publication	Higher education Research Industry (environment - waste management)	Germany	Public	ISWA – Germany
Sep 2008	Press release	Higher education Research Industry (environment - waste management) General public	Thailand	Public	
Sep 2008	Posters	Higher education General public	Bolivia	Public	UCB – Bolivia
Feb 2009	Posters	Higher education Industry (environment - waste management) General public	Brazil	Public	SENAI – Brazil
Apr 2008	Posters	Higher education Industry (environment - waste management) General public	Germany (IFAT)	Public	ISWA –Germany
Sep 2007	Posters	Higher education Industry (environment - waste management) General public	Germany	Public	ISWA – Germany
Sep 2007	Flyers	Higher education Research Industry (environment - waste management)	Germany Finland Turkey China Malaysia Thailand	Public Potential Future Cooperation Partners	ISWA – Germany
Sep 2007	Flyers	Higher education Research Industry (environment - waste management)	Bolivia Brazil Chile Colombia Costa Rica	Public Potential Future Cooperation Partners	ISWA – Germany
Jan 2008	Conference	Higher education Research Industry (environment - waste management)	Thailand	Public	KMITNB – Thailand
Oct 2007	Conference	Higher education Research Industry	Poland	Public	TUT – Finalnd

Planned/ actual Dates	Type	Type of audience	Countries addressed	Size of audience	Partner responsible /involved
		(environment - waste management)			
Oct 2007	Conference	Higher education Research Industry (environment - waste management)	Poland	Public	TUT – Finalnd
Dec 2007	Conference	Higher education Research Industry (environment - waste management)	Finland	Public	TUT – Finalnd
Nov 2008	Conference	Higher education Research Industry (environment - waste management)	Costa Rica	Public	UCR – Costa Rica
Oct 2007	Conference	Higher education Research Industry (environment - waste management)	Colombia	Public	Uni Andes – Colombia ISWA – Germany
Mar 2008	Conference	Higher education Research Industry (environment - waste management)	Chile	Public	UTFSM – Chile ISWA – Germany
Sep 2008	Conference	Higher education Research Industry (environment - waste management)	Bolivia	Public	UCB – Bolivia ISWA – Germany
Mar 2009	Conference	Higher education Research Industry (environment - waste management)	Brazil	Public	SENAI – Brazil ISWA – Germany
Jan 2008	Publication (Newsletter)	Higher education Research Industry (environment - waste management) General public	Any	Public	ISWA – Germany
Mar 2008	Publication (Newsletter)	Higher education Research Industry (environment - waste management) General public	Any	Public	ISWA – Germany
Jun 2008	Publication (Newsletter)	Higher education Research Industry (environment - waste	Any	Public	ISWA – Germany

Planned/ actual Dates	Type	Type of audience	Countries addressed	Size of audience	Partner responsible /involved
		management) General public			
Jul 2008	Publication (Newsletter)	Higher education Research Industry (environment - waste management) General public	Any	Public	ISWA – Germany
Sep 2008	Publication (Newsletter)	Higher education Research Industry (environment - waste management) General public	Any	Public	ISWA – Germany
Nov 2008	Publication (Newsletter)	Higher education Research Industry (environment - waste management) General public	Any	Public	ISWA – Germany
Jan 2009	Publication (Newsletter)	Higher education Research Industry (environment - waste management) General public	Any	Public	ISWA – Germany
Mar 2009	Publication (Newsletter)	Higher education Research Industry (environment - waste management) General public	Any	Public	ISWA – Germany
May 2007 - Mar 2009	Direct e-mailing	Higher education Research Industry (environment - waste management) NGO's Gov. Organizations	Latin American, Countries Germany Thailand China Malaysia	Potential Future Cooperation Partners	All Consortium members

Although the project ended in March 2009, all consortium members agreed to continue in the future with the edition of newsletters. There is a great interest of working together in future projects and keep the network ongoing.