Best LIFE Environment Projects 2010

EUROPEAN COMMISSION

environment

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Herlinde Vanhoutte
LIFE Environment "Best of the Best" coordinator 2010
Belgian Federal Public Service "Health,
Food Chain Safety and Environment"

This is the seventh year that the LIFE Environment Awards have taken place, rewarding the most outstanding LIFE projects that were completed by the end of 2010. The aim of the awards is to put the focus on those projects that are just that little bit better than the rest and can act as an example to others of what a successful, innovative, well-designed and well-executed project should look like.

The same procedure as in previous years has been applied. Following an initial review carried out by its external monitoring team, the Commission selected the most outstanding LIFE Environment projects. The Member States then reviewed these top 13 "Best" projects, using criteria focusing on real environmental benefit, long-term sustainability, transferability and innovativeness. This selection process resulted in a top four, "Best of the Best" projects, each of which has applied a novel approach to tackling some of the biggest environmental challenges Europe faces: using organic waste from agriculture to mitigate climate change and to generate energy from biomass (Seq-Cure and BIOAGRO); recycling mixed material beverage cartons in a closed loop process (CLEAN); and reducing waste and raw material consumption in the ceramics industry through a new ultrasound tile-cutting technology (UME).

I was responsible for coordinating this selection process, a process made much easier by the work of my colleagues from 22 other Member States. It is to their great credit that, in addition their work as National Contact Points, they are willing to take up these evaluations and I would like to thank them all. I'm very happy to see so many National Contact Points participating and maintaining their engagement, making the work easier and more valuable. I hope they will remain convinced – as I am – that by reading the actual results of those excellent projects, they can pass this knowledge to new applicants, resulting into what LIFE+ is today: a very well managed programme, converting its funding as efficiently as possible into meaningful projects.

To highlight the excellent work of these four "Best of the Best" and nine "Best" projects, this year the LIFE Environment awards were presented at the European Parliament in Brussels (25 May 2011) in front of more than 300 people who were taking part in the "**LIFE for our environment: success stories and future challenges**" conference, an event organised alongside Green Week. I would like to echo the words of the LIFE unit's Alban de Villepin in thanking the project beneficiaries and their partners for their excellent work in favour of the environment.

The higher profile that the best projects receive through these awards ensures that more people know about the LIFE+ programme and the projects it sponsors. Whilst I will hand over responsibility for coordinating the LIFE Environment awards to the Polish Contact Point next year, I sincerely hope that the awards continue to grow in stature and range in the coming years.

Herlinde Vanhoutte

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Introduction

For the last seven years, EU Member States represented on the LIFE Committee and the European Commission's LIFE Unit have selected the best LIFE Environment Projects for special attention. For the 2011 Awards, Member States chose 13 projects that represent the most recent successful LIFE Environment projects in terms of contribution to immediate and long-term environmental, economic and social improvements; degree of innovation and transferability; relevance to policy; and cost-effectiveness. These projects are featured in this publication.

Photo: Andre Close

The winners of the Best LIFE Environment 2010 held as part of the "LIFE for our environment: success stories and future challenges" conference in the European Parliament

The 13 winners were presented with awards by Alban de Villepin from the LIFE Environment and Eco-innovation Unit, at a special awards ceremony held in Brussels during Green Week 2011 as part of the "LIFE for our environment: success stories and future challenges" conference in the European Parliament. "We are fully aware of the hard work involved in all the projects," observed Mr de Villepin.

The seventh Best LIFE Environment Projects exercise is the product of an established identification and evaluation process based on a set of best practice criteria, developed by EU Member States in collaboration with the European Commission. The projects with 'beneficiaries', or project holders, from across the EU27, cover a wide range of important environmental themes: reducing noise, air and water pollution; developing environmental management systems; pioneering bioenergy chains for agriculture and industry; recycling raw materials and ending harmful emis-

sions. Mitigating the effects of climate change is a particular focus of a number of the most successful of this year's projects, illustrating the link between LIFE projects and wider EU policy.

Speaking at the "LIFE for our environment" conference, Janez Potočnik, the European Commissioner for the Environment, said that "We believe there is a strong case for maintaining a specific financial instrument in the service of environment [and] climate policy and we believe LIFE's impact on policies should be increased."

Photo: Andre Close

Janez Potočnik - European Commissioner for the Environment

SELECTION CRITERIA

The objective of the awards programme is to help improve the transmission of LIFE Environment project results by using a set of criteria to identify those projects with the highest potential for long-term environmental improvement. From the 13 projects that concluded in 2010/2011 and that have been selected as 'Best' projects, four have been awarded the title, 'Best of the Best'.

Scoring of completed LIFE Environment projects was launched in the summer of 2004. The system was introduced by the Commission, following an initiative taken by Sweden and the Netherlands. After a meeting at The Hague in May 2004, a set of 'best practice' criteria was developed in co-operation with the Member States. The criteria adopted were: projects' contribution to immediate and long-term environmental, economic and social improvements; their degree of innovation and transferability; their relevance to policy; and their cost-effectiveness. In view of the importance of these criteria to the success of a project, beneficiaries are also required to provide an 'After-LIFE Communication Plan' and an analysis of the long-term benefits of the project with their final report. This information forms an integral part of the evaluation process.

Projects were initially technically assessed by the LIFE Unit's external monitoring team, provided by the Astrale consortium. The monitors ranked all the projects that ended by December 2010 to produce a first list. The final selection was undertaken by the Member States under the coordination of Herlinde Vanhoutte (from the Belgian Federal Public Service "Health,Food Chain Safety and Environment") using the agreed set of criteria to identify the projects to receive awards.

Mr Bodini and Ms Santori present the results of the LIFE Kolisoon at the Best LIFE Environment 2010 awards ceremony

Photo: Andre Close

Best of the best 2010

Environment

Italy: **Finding a Seq-Cure for climate change**

The Seq-Cure project provided a practical demonstration of how agriculture can contribute to mitigating climate change by turning organic residues into biomass for energy and by sequestering carbon dioxide in soil organic carbon.

The Emilia-Romagna region of Italy is both an important agricultural area and a significant producer of greenhouse gases (an estimated 41 million tonnes/yr of CO_2 equivalents). Concerns over the effects of climate change and future energy supply have led to calls for the agricultural sector to take a leading role in promoting the use of energy from biomass and applying farming practices that increase the organic matter present in soil, thereby increasing carbon sequestration whilst reducing desertification.

The LIFE Seq-Cure project (**LIFE06 ENV/IT/000266**) set out to demonstrate how organic residues, such as manure and digestate, can be used in the agricultural production of plant biomass as a source of renewable energy.

Specific aims were threefold: to start up short bioenergy production chains that are economically and environmentally sustainable; to reuse the residues from the production chains to fertilise crops, thus increasing the organic matter in the soil and the sequestration of carbon from the atmosphere; and to develop a method for calculating greenhouse gas emissions and carbon sequestration deriving from changes in the soil.

TESTING WAYS TO CLOSE THE LOOP

The project developed 39 trial sites at 13 demonstration farms where various biomass crops were grown using different organic waste residues.

The aim was to test the different biomass crops and determine which ones would generate the greatest energy supply. “We had to consider sustainability in the long-term,” explains project manager, Marco Ligabue. “This means crop rotation (which prevents soil depletion whilst enhancing soil quality) and productivity both in environmental and economical terms.”

In total, the project tested three short production chains for renewable energy – biogas, wood and raw vegetable oil. “Our intention was to close the loop of the energy production chain thus making it economically sustainable,” says Mr Ligabue.

THE BIOGAS CHAIN

Two crops - sorghum and triticale - were tested for the biogas production chain. The project team planted sorghum at three pilot farms in Emilia-Romagna, focusing on varieties of the crop that are best suited for energy production, such as sweet and fibre sorghums. Sorghum is preferred to maize in the summer season because of its higher resistance to drought. Combined with the almost total absence of pests, this increases the harvest.

Triticale, on the other hand, is preferred in the autumn/winter season because of its hardiness and high yields. It is also a perfect soil cover in winter, thus reducing groundwater pollution from nitrate leaching. In the course of the LIFE project, the sorghum and triticale yields reached 13 tonnes dry matter per hectare (tDM/ha) on average, whilst the nitrogen uptake levels exceeded 200g N/ha in some cases.

The Seq-Cure project also tested the energy efficiency and reliability of different biogas production plants: one that ran only on pig slurry and some that could run on a mixed system of silage from maize, triticale and sorghum, agro-industrial products and livestock manure. The organic matter is converted into organic compounds (acetic acid and others) by an anaerobic biological process and then into a mixture of methane and CO_2 (biogas).

The rate of conversion of organic matter into methane was similar in the different types of plant. However, in the mixed plants it was possible to install a co-generator with a higher electrical yield, leading to greater efficiency. Another advantage of the mixed plants in the region where the project took place was a more consistent supply of raw materials: pig slurry was not always available, affecting the ability of the first plant to produce energy.

The biogas can be converted into both electrical and thermal energy (co-generation) or refined into biomethane, which, in future, could be injected into the gas grid. Aside from biogas, a second by-product of the process is the digestate (a liquid with physical/chemical characteristics similar to livestock slurries), which can be used as a fertiliser by the farm. “The guidelines that were created on the use of the digestate during the LIFE project, have helped the region of Emilia Romagna to formulate a first decree on this matter,” notes Mr. Ligabue.

The poplar harvest produced 17 tonnes of chips that were converted into 48 MWht of thermal energy

TESTING WOOD FIBRE

The Seq-Cure project developed a second energy production chain using chipwood from short rotation forestry (poplar) on the Stuards farm in the Province of Parma. The farm planted 1.5 ha of poplars that produced, during the third year of the project, some 17 tonnes of poplar wood chips that were converted into 48 MWht of thermal energy.

The project found that there were several drawbacks to using poplar: it can be used only for thermal energy production as there are still some technological barriers to the small-scale production of electricity; it cannot be transported long distances for use; and the ashes that are produced are classified as waste in Italy. However, as Mr. Ligabue explains, “the ashes are rich in minerals and could well be sold to cement works or fertiliser manufacturers. We hope that

through further research we may be able to demonstrate this and influence legislation."

TESTING RAW VEGETABLE OIL

Farmers in Ancona cultivating sunflowers (and some rapeseed) took part in trials that led to the demonstration of Italy's first complete vegetable oil energy production chain.

The farmer's seeds are processed and converted into energy by Komaros Agroenergie of Osimo, which mechanically presses them to produce vegetable oil and oil cake. The process generates approximately 420kWe of electricity (sold to the grid), whilst the thermal energy (amounting to 40-50% of the gross energy) is sold to a local sports centre for hot water and heating. A constant volume of seeds is needed to operate the processing and refining centre. Another consideration is the need to find a use for the oil cake - two-thirds of the seeds end up as cake, with only one-third becoming vegetable oil. "Anyone setting up such an energy chain must take these constraints into consideration and find a market for and ways of valorising the seed cake," says Mr. Ligabue. The protein rich cake could be used as animal feed, but it has a short shelf life, so there would need to be interest from cattle and pig breeders close to the energy plant.

The oil cake produced from the vegetable oil energy chain can be used as animal feed

Komaros Agroenergie's vegetable oil plant continues to operate after LIFE. At the end of the project, the plant had an energy efficiency of 70% and work is being carried out to improve that figure.

ASSESSING THE RESULTS

The project concluded that the most efficient system for a short energy production chain was the biogas one: it had the highest energy efficiency for the system as a whole. As Mr. Ligabue notes, "this type of short energy chain creates enthusiasm amongst farmers, because small-to-medium-sized farms can adopt these plants, use the biomass to produce their own energy and sell the excess to the grid. Furthermore, the digestate that is produced as an end product of the biogas production chain can be used to fertilise the crops."

The project focused on many dissemination activities, including the creation of four helpdesks: one specialised in each of the bionergy production chains plus one focused on transversal issues such as legislation, green certificates and incentives. The beneficiary also set up a European Orientation Group (EOG), comprising experts in bioenergy from seven EU Member States. "This was fundamental for our work," believes Mr. Ligabue, "as we were able to exchange information and experiences and validate working methods that would be applicable to other countries and to different socio-economic and agricultural scenarios". The collaborations that started during the LIFE project are continuing today and are proving to be valuable for the future work of the beneficiary in the bioenergy field.

THE WAY AHEAD

CRPA is working with regional and national authorities on the legislation and economic incentives for bioenergy. "We are continuing with our research and with other projects in order to produce results that will feed into future legislation with the aim of reinforcing the bioenergy sector," says Mr. Ligabue. "LIFE funding was fundamental in giving us the opportunity to develop such a complex project."

CARBON SEQUESTRATION ON FARMS

The other aspect of the Seq-Cure project was the development of a carbon sequestration and N_2O emissions model. This model, produced in partnership with the Max Planck Institute (Jena, Germany), is available as a free web-based service for farmers, technicians and administrators. The user only needs to identify the location of the farm, its soil characteristics, crop rotation and fertiliser applications in order to generate a simulation in a matter of minutes. The system shows the long-term loss or accumulation of carbon in the soil from the application of certain crop rotations or practices.
http://servlet.agrishare.com/seqcure/

ITALY

Project number: LIFE06 ENV/IT/000266

Title: Seq-Cure - Integrated systems to enhance sequestration of carbon, producing energy crops by using organic residues

Beneficiary: Centro Ricerche Produzioni Animali - CRPA S.p.A.

Contact: Marco Ligabue

Email: m.ligabue@crpa.it

Website: http://www.crpa.it/seqcure

Period: Dec-2006 to Jun-2010

Total budget: €1 917 000

LIFE contribution: €956 000

Spain: **A CLEAN way to recycle drinks cartons 100%**

A LIFE project has established the world's first installation that can fully recycle used beverage cartons. Based on technologies developed at laboratory scale, the project has shown how the 158 billion cartons produced worldwide each year could be recycled with zero waste.

Since Tetra Pak launched its innovative packaging concept for liquid foods in Sweden in the 1950s, it has become the market leader in its field. Its Tetra Briks - and other styles of carton - are used in over 170 countries all over the world to "make food safe and available, everywhere." The cartons have been so successful because they are cheaper, lighter and more easily stacked than alternative metal and glass containers, with no loss of storage quality.

The design started with the concept of a paperboard carton as a cheaper alternative to metal and glass containers. To make the cartons airtight, the Tetra products use a plastic coating on the inside of the cardboard. A plastic layer is also used on the outside of the container to protect the paperboard from outside moisture. In cartons for perishable goods, which can go off if subjected to heat or light, there is also an aluminium layer on the inside of the cardboard to create aseptic packaging.

THE BENEFITS AND CHALLENGES OF TETRA BRIK

Tetra's liquid packaging board (LPB) products bring many environmental and economic benefits. They avoid the need for cooling during transportation and storage, since the products can be stored at room temperature. They have a very low package-to-content ratio, are light and stack easily, thus minimising transportation costs. The prolonged shelf-life of packaged food reduces waste in the food industry.

The project developed an industrial-scale recycling plant

In 1998, Stora Enso - a Finnish pulp and paper producer - started using paper fibres recycled from Tetra Briks at its Barcelona mill in Spain to manufacture packaging board for products such as cereal boxes. By that time, collection and sorting of waste at municipal and regional levels had just started and it was possible to obtain the first meaningful quantities of sorted cartons for treatment – obtained relatively cheaply from not-for-profit organisations that collected the waste from across Spain, Portugal and southern France.

Tetra cartons provided excellent paper fibres because they are usually made from virgin fibre for food-safety reasons. Furthermore, the paperboard content of the LPB could be relatively easily recycled by placing the cartons in water heated to 60°C and stirring for 10-20 minutes until the paper fibres separate. However, there was a problem – the vast majority of the Tetra Briks Stora Enso Barcelona was recycling contained a composite layer of plastic-aluminium (needed to preserve long-life products, such as orange juice). The manufacturing process left the plastic-aluminium bag on the inside of the original carton as a waste product, which no one could exploit. "The aluminium industry was not interested in this waste because the plastic content was too high. The plastic industry was not interested because the aluminium content was too high," explains project leader Hans Cool. The waste was simply sent to landfill, creating an environmental problem and a cost for Stora Enso Barcelona.

By 2001, the paper mill recycled some 2 500 tonnes of Tetra cartons each year. Given that the cartons include 20% plastic and 5% aluminium, it was thus faced with 625 tonnes/yr of leftover aluminium-plastic residue had to be dealt with. Stora Enso Barcelona therefore started looking for solutions: it obtained some regional funding and conducted experiments in a pilot installation. However, because the paper mill had no existing expertise in plastics or metals, it remained a long way from delivering a workable solution.

BUILDING TOWARDS A LIFE SOLUTION

The LIFE CLEAN project was the result of a series of inter-related coincidences. Around the same time that Stora Enso Barcelona was conducting its experiments in the pilot installation, Carlos Ludlow of the Department of Chemical Engineering and Biotechnology at the University of Cambridge was conducting laboratory-scale experiments for his PhD research using pyrolysis to separate plastic and metal components from Tetra cartons. A group of MBA students from the IESE Business School knew of this work and developed a business plan around recycling the material.

Two students from the school decided to take the plan forward and created their own company, Alucha Recycling Technologies, for this purpose in 2004. They decided to contact a paper mill to find out if it would be interested in co-operating in a process to develop solutions for Tetra Brik recycling. Hans Cool, one of the founders of Alucha, recalls, “It was a complete surprise when we found out that the Barcelona paper mill had already been trying to develop a pilot installation for separating the plastic and aluminium components.”

Stora Enso’s Barcelona mill was very interested in working with the entrepreneurs to explore solutions to its waste-management problem. By this time, the mill had already increased its recycling rate substantially and was planning to go up to 30 000 tonnes/yr of Tetra cartons. In co-operation with Mr. Ludlow, they conducted tests and continually modified and updated the procedures at a small-scale installation at the paper mill from 2004-2006. They found that they were able to obtain clean aluminium in flakes and collect the separated plastic in liquid (oils) and gas forms. The Alucha team also observed that the relatively homogenous nature of the input product helped make good quality output materials.

Encouraged that their process could work, the researchers started drafting a plan to develop their model for industrial use. The plan involved closing the system so that the gas and oils produced could be used within the recycling or paper production processes. It was at this point that Stora Enso Barcelona decided to apply for LIFE funding with the aim of demonstrating a solution for industrial scale recycling of plastic-aluminium laminate.

TOTAL RECYCLING OF TETRA BRIKS

The beneficiary, together with project partner Alucha, set up the company PALWaste Recycling as a separate entity to build and run the installation. Other partners from Germany, Austria and the Netherlands brought expertise in aluminium recycling, generating energy from complex gases and the promotion of carton recycling. Unfortunately, one of the first barriers that the project encountered was administrative. Obtaining the necessary environmental permit should have taken around six months, but there was a change in local government during the application. “The whole process took almost two years,” recalls Mr. Cool. “There were moments when we thought the project would collapse.”

The project took a small risk and ordered the equipment for the first stage of the industrial process before the permit was formally obtained. The beneficiary was clear that this would be useful to the company even if the worst happened and the

The pressed aluminium-plastic mix is shredded and a centrifuge is used to remove all paper fibres

rest of the project had to be abandoned. In early 2008, the project team started implementing this first stage - removing the last paper fibres and drying the laminate. This revealed some unexpected problems from impurities present in the supplied bales of Tetra Brik, which the team was able to solve before the rest of the system was introduced.

The authorities awarded the environmental permit later in 2008, enabling construction of the new plant to go ahead the following year.

THE CLEAN PROCESS

The PALWaste plant started operating in 2010 and works as follows: Tetra Briks arrive in bales. They are broken down and a magnet and water tank used to separate magnetic and heavy impurities. The Tetra Brik material passes through a "hydropulper' where the paper fibres and the laminate are separated out.

The aluminium-plastic mix is shredded and a centrifuge is used to remove all paper fibres. The aluminium-plastic pieces are then dried ready for the pyrolysis reactor. Pyrolysis is a system of breaking down organic material using high temperatures in the absence of oxygen. In this case, pyrolysis breaks down the long carbon chains into shorter carbon chains, which in real terms means that the plastic part separates into a gas, leaving behind the aluminium.

It is crucial that oxygen is all but absent in the system as any oxygen leads to combustion and oxidisation of the aluminium. This is not simple to achieve and creates challenges at both ends of the process. An innovative approach was required to solve these problems, explains project engineer, Anna Salvatella: The project had to create a two-stage escape mechanism for the aluminium - similar to that used by astronauts to leave a space shuttle - to ensure a vacuum was retained within the system.

The gases are drawn off and channelled through a cyclonic separator to remove any solid particles that have been carried away in the flow. Next the gases pass through a two-stage condenser, which gradually reduces the gas temperature to enable a stable transition to an oil or gas state at ambient temperature. To ensure the closed-loop nature of the process, the oils and gases are burnt as a heat source for the reactor and used to create steam for use in the paper mill. The PALWaste plant already provides 20% of the energy needs of the mill, reducing its consumption of natural gas.

Anna Salvatella with the bales of Tetra Brik drinks cartons

ONGOING DEVELOPMENTS

Since the end of the project, the team has continued to optimise the process. Anna Salvatella again: "We have introduced a method of cleaning the parts of the system that are most likely to block up without stopping the process. We have achieved 70% up-time and have been able to run the process continually for two weeks." The overall objective is that the process will be able to run continually, stopping only one day a month for cleaning and maintenance. This will increase the percentage of the paper mill's energy needs generated by the recycling process.

Another ongoing challenge is to ensure and increase the purity of the aluminium end product. If the temperature in the reactor becomes too high, the pyrolysis breaks the carbon chains down to pure carbon, contaminating the aluminium; if the temperature is too low, the plastic does not break down enough and remains attached to the aluminium. The PALWaste plant's engineers are still perfecting this balancing act to ensure the maximum potential value of the metal.

The potential environmental and economic advantages of using this process are substantial and many. Benefits for Stora Enso include the removal of all costs associated with sending the laminate to landfill, as well as additional income from selling the aluminium generated. The paper producer also gains an energy supply from the gases and oils generated - which are petro-chemical products - thus reducing its consumption of natural gas. Considering the whole product cycle, some of the major benefits come from replacing the need to extract and produce new aluminium, which is a highly energy-intensive process.

The CLEAN project has developed a process that could have a tremendous impact worldwide: the sheer volume of LPB cartons consumed across the globe make the potential benefits of the technology almost incalculable.

Furthermore, Alucha is already exploring other applications of the pyrolysis approach. A new project, eMinerals, is looking at how to treat paper sludge using a version of this technology. As Jens Ruijg, Senior Engineer at Alucha, highlights, "Paper sludge is a representative waste type. If we can demonstrate the technology here, we can look at many other forms of waste in the future."

SPAIN

Project number: LIFE06 ENV/E/000010

Title: CLEAN – Converting Laminates into Energy and Aluminium for the benefit of Nature.

Beneficiary: Stora Enso Barcelona

Contact: Julio López

Email: julio.lopez@storaenso.com

Website: http://projectclean.eu

Period: May-2006 to Apr-2010

Total budget: €5 455 000

LIFE contribution: €918 000

Italy: **Using ultrasound technology for sustainable tiles**

With LIFE's support, the UME project has developed an ultrasound system for cutting tiles that could significantly reduce consumption of raw materials and waste in the ceramics industry.

The small ceramic tiles that are sold for use in homes, businesses and public facilities are typically cut from larger ceramic slabs (60 x 60 cm or 60 x 120 cm). There are a number of different mainstream industry processes for cutting the tiles, but each of these comes with environmental drawbacks (see box: standard tile production processes). Furthermore, the traditional processes cannot be used with all types of ceramic tile.

"We wanted to find a system that could help us to produce at the same levels but with a decrease in the use of our resources," explains Iride Srl's quality manager for the LIFE UME project, Enrico Fiorini. In particular, the Italian company wanted to develop a process that could reduce the amount of waste material generated by the cutting or breaking phase and possibly eliminate water consumption.

AN ULTRASOUND SOLUTION

To achieve these goals, Iride secured LIFE co-funding for the UME ("Ultrasound microcut ecosustainable") project, which set out to apply an ultrasound system created in collaboration with the University of Modena to the tile production process, initially at a pilot-scale. The UME system adapts the standard tile cracking process (see box p.13). As with that system,

the tile is transported by conveyor belt and blocked in position whilst an incision is made to act as a guideline for the breaking process. The innovation comes during the next stage with the use of two ultrasound transducers to 'tune' the knife to the correct frequency for the material to be cut, so that the fracture spreads in the right way ("straight, without branching and with smooth fracture surfaces", explains the beneficiary).

The main challenges faced by the project technicians concerned the positioning of the ultrasonic transmitters (sonotrodes) to achieve the best results, defining of the most suitable frequencies for the type of ceramic material used and calculating the correct power to be applied in each case.

"After having set up the prototype we started testing it with tiles of around 3-5 mm thick," recalls Mr. Fiorini. "The results that we obtained were astonishing – the cuts were nearly always perfect, with hardly ever a need to proceed to the rectification phase," he says.

As a consequence, many of the negative environmental impacts associated with the cutting and calibration of ceramic tiles have been removed or reduced by the UME process. "The sludge from the cutting phase was totally eliminated, which also meant a 100% elimination of the process water. Furthermore, the sludge from the rectification stage was also reduced by 90%," points out Mr. Fiorini. This equates to a reduction of some 7 000 tonnes/yr of cutting sludge and 2 100 tonnes/yr of grinding (rectification) sludge, as well as a water saving of some 12 000 m^3/yr.

STANDARD TILE PRODUCTION PROCESSES

Standard cutting process: The ceramic slab slides along the conveyor belt and is cut by a rotating disk longitudinally. The cut removes material with the same dimension as the blade of the disk (not less than 2 mm). The rotating disks need to be continually cooled with large amounts of water (some 3 litres per m of product). The cooling water also removes the material that was abraded from the tile, thus producing sludge. The sludge is then filtered and there is a partial recovery of the process water.

Since the tile is moving when it is cut, the product requires rectification to ensure that it is perfectly orthogonal. The rectification is done with abrasive wheels that are also cooled down with water and that remove other material from the tile. The cutting and rectification phases together produce some 1.7 kg/m^2 of sludge. The process also consumes large amounts of energy.

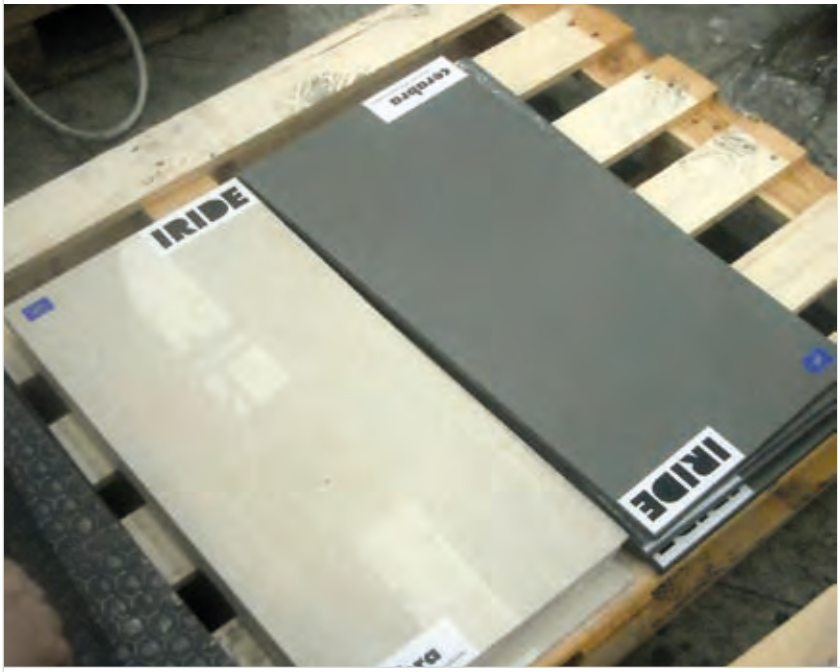
Standard cracking process: The ceramic slab is transported along a conveyor belt and is then blocked in a predefined position, at which point an engraver incises a line along the whole length of the slab. This incision is fundamental for the next stage as it facilitates the breaking of the tile when it is hit by a knife. Although this dry process does not produce any sludge, the cut of the tile is less precise, leading to more discards and greater rectification when the fracture line does not follow the engraved line.

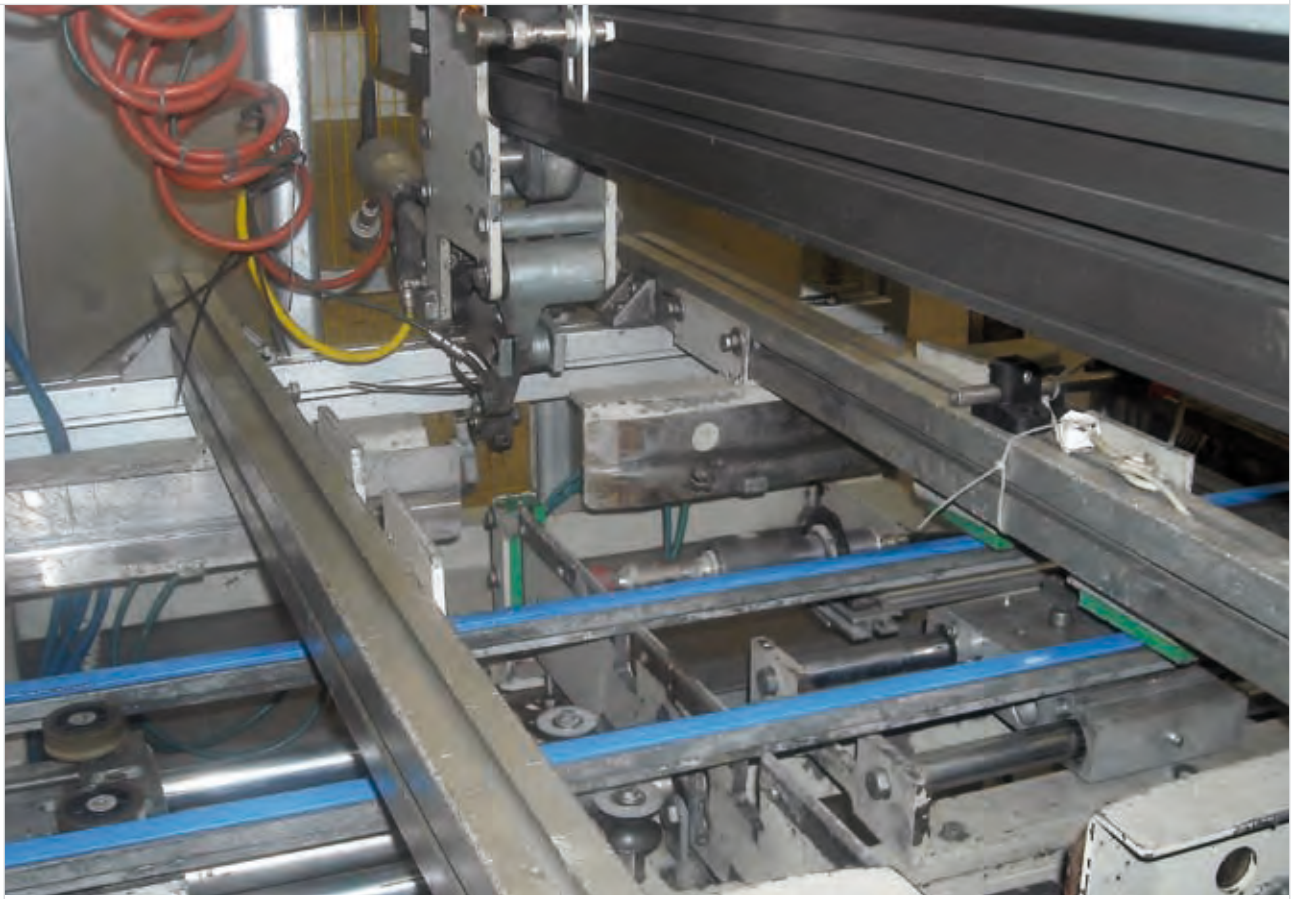
The improved accuracy of the new process enables an 84% reduction (or some 4 800 tonnes/yr) of rejects. In addition, energy consumption (0.5 kWh/m^2 with the traditional methods) has been reduced by 98%, whilst the process also eliminates the need for grinding wheels, which are considered hazardous waste – a saving of some 2 700 wheels per year.

The project also promises improved working conditions (noise pollution decreases from 70 dB with traditional methods to less than 45 dB with the UME process) and raised awareness among ceramics workers of the environmental impacts of tile production (resource efficiency, water and energy consumption, noise pollution) and of how finding innovative solutions to deal with these problems can also bring considerable economic savings (in waste disposal, water, energy and cutting wheel costs).

The beneficiary calculates that its new manufacturing process delivers cost savings of up to 18% - or more than €100 000/yr - in comparison with traditional methods. That's equivalent to €0.16 per square metre of product.

Different tile types could be used with the ultrasound technology





The innovative handling and blocking system for cutting tiles using ultrasound technology

THE FUTURE

The beneficiary aims to invest in its new tile manufacturing concept and take it to an industrial level. "This will be very feasible," believes Mr. Fiorini. "Thanks to LIFE funding we have demonstrated outstanding results, however, before taking it to an industrial level, more tests have to be conducted so that the process can be optimised for all types of ceramic material." This includes perfecting the UME method for thicker (10 mm) tiles, as well as different-shaped tiles.

Iride's goal is to replace the 10 traditional cutting lines it currently operates with new UME lines at a rate of two per year.

The company will use the networks established during the LIFE project by GMCB/Associate Brandpoint.eu to continue to disseminate the results to other operators in the ceramic tile and natural stones industries, as well as to relevant authorities across the EU. New events will be planned in order to keep alive the spirit of the project and its effects on extending knowledge of the environmental issues involved. Sector operators will be constantly updated on methods developed and training and awareness activities will continue after-LIFE.

"Knowledge (may) change attitudes, changed attitudes (may) change behaviour" is the LIFE project beneficiary's motto. "It is not only when you put into practice big actions that change happens," believes Mr. Fiorini. "Changing habits and mentalities at a more local and daily level can also bring big changes."

The UME technology reduces cutting and grinding sludge, whilst ensuring high water savings

ITALY

Project number: LIFE06 ENV/IT/000254

Title: UME - Ultrasound micro-cut ecosustainable

Beneficiary: Iride Srl

Contact: Roberto Ternale

Email: roberto.ternali@iridedue.com

Website: http://www.iridedue.com/index.html

Period: Oct-2006 to Sept-2009

Total budget: €3 849 000

LIFE contribution: €920 000

Sweden: **Making energy from agricultural waste**

The LIFE BIOAGRO project has overcome significant obstacles to turn a waste problem into a new source of energy and income.

Swedish seed producer Skånefrö AB is a small, family-owned company based in Tommarp, a village in Österlen, the southeastern part of the southern province of Scania. Established in 1928 by the grandfather of the current managing director, Sven-Olof Bernhoff, the firm, which employs some 30 people, has an annual turnover of 13 million euros. Skånefrö produces 16 000 tonnes/yr of seeds (crop seeds, forage grass, rape seeds and turf seeds) and has around 10% of the market for certified seeds in Sweden.

"Residues from cleaning the seeds were really a big problem for us," explains Mr. Bernhoff. "We had to pay a lot of landfill taxes to get rid of the waste. We tried composting but this generated a lot of the greenhouse gas, methane."

Sweden has a well-established market for pellets made from biomass that are burned for energy. However, increasing demand for sawdust and woodchips, the raw material used to make these pellets, is putting up costs and stretching supply chains in unsustainable ways (e.g. raw material is being imported from Russia to make pellets). Skånefrö saw an opportunity to exploit the untapped potential of its seed residues as a raw material for pellet production. As a result, in May 2005, the company applied for LIFE funding to develop a full-scale plant for turning its waste into biopellets that could be effectively burned to generate energy for its own factory and the local community.

BRINGING BIOAGRO TO LIFE

The BIOAGRO project (**LIFE06 ENV/S/000517**) was a complex project that involved a number of partners. These included the HOTAB Gruppen, a furnace manufacturer with many years of experience in supplying systems for burning wood pellets and agri-residues, which provided the project with 250 KW and 1.25 MW boilers. With this engineering know-how on board, Mr. Bernhoff explains that "the LIFE project became most focused on solving the problems of optimising the pellet recipe and returning the ash to the field for use as fertiliser." Ecoera, a startup based at the Chalmers University of Technology (Gothenburg), was responsible for developing pellet formulas in the lab. These were then tested at pilot-scale by another project partner, ÄFAB.

The tests revealed a potential problem: burning the beneficiary's residues could generate excessive amounts of sulphuric

acid, hydrochloric acid and sulphur dioxide. As a result, Ecoera modified the pellet formulas with additives to keep emissions within acceptable limits.

Whilst pellet testing took place, the project was faced with an unexpected setback: objections from neighbours led to a four-month delay before planning permission was granted for the building of the new plant. Once construction started, there were further concerns about whether the equipment would fit into the footprint of the building. With help from project partner Westrup, this was achieved. Another delay was caused by the need to install a large transformer unit. "We had so many big problems we had to solve - it wasn't plain sailing," recalls Mr. Bernhoff. "We had to have a good and positive team ethic to succeed, as well as good partners and subcontractors."

LIFE support (both financial and from the monitoring team) was also crucial, he believes: "If we hadn't got the 22% [of the total project cost] we wouldn't have done the project - I'm 100% sure."

Despite the difficulties experienced along the way, the BIOAGRO plant started up in August 2008 and following a trial period, it was officially inaugurated on 30 November 2009 in a ceremony attended by some 150 guests. The new facility consists of 13 seed residue silos (including six repurposed from elsewhere on site), a hammer mill to make the residues a uniform size, four small additives silos, mixing and pellet manufacturing zones, pellet furnaces, four silos for the final product and a silo for ash (to be returned to the fields). Pellet recipes are formulated in the control room adjacent to the manufacturing area, from where an operator watches over the automated process.

Sven-Olof Bernhoff: "We had to have a good and positive team ethic to succeed, as well as good partners and subcontractors."

POSITIVE RESULTS

"Our goal was to produce 3 000 kg/hr of pellets," recalls Mr. Bernhoff. "We have now achieved that, but it took time," he explained in summer 2011. "After two weeks we were producing 175 kg/

The BIOAGRO project successfully started up an industrial-scale plant that turns agricultural residues into pellets for energy

hr when we hit a bottleneck." Teething problems centred on the ability of the pelleting system to cope with a variety of raw materials with a wide variation in density and weight. "There are small differences in the quality of pellets produced with seasonal variants of the same crop (e.g. winter wheat versus spring wheat)," notes Mr. Bernhoff. "The big differences are between pellets from different crops (e.g. wheat versus barley)." As a result, some aspects of the furnaces were then modified to improve the efficiency of the combustion process and improve performance under different loads. "We had to work hard to overcome the problems, but, as a consequence, we now have lots of knowledge of the process," says Mr. Bernhoff. Today, the company's pellets typically have an energy profile of 90% of wood pellet energy content - 4.2-4.4 MWh/tonne (wood pellets generate 4.5-4.8 Mwh/tonne).

Thanks to its new facility, the project beneficiary has now reduced waste from its seed screening operation by 100% and achieved totally fossil-fuel free seed drying and heating with minimised acid emissions. LIFE BIOAGRO has thus contributed to a reduction in carbon dioxide emissions of 540 tonnes/yr (replacing oil used for seed drying and heating of buildings); and a 95% reduction in Skånefrö's heating costs. Other benefits include a 100% reduction in methane emissions and the ending of truck journeys to landfill sites. Importantly, the project should also lead to knock-on effects for the beneficiary and wider society. Fully implemented, the method has the potential to reduce the discharge of greenhouse gases in Sweden by 10% and in the EU by 2.5%.

BUILDING ON LIFE BIOAGRO

The LIFE beneficiary has disseminated the results of its project widely, including welcoming visitors from 48 countries to its new plant to date. "We have had a lot of interest in the technology – in particular from Poland, the United States and China," says Mr. Bernhoff.

Skånefrö AB is hoping to put the knowledge it has gained from its LIFE project to good use and has formed a new company, BIOAGRO Energy Österlen AB, to apply the results of the project commercially.

The beneficiary aims to build on its LIFE project to industrialise biochar production

BIOAGRO Energy will concentrate on three business areas: the production and sale of its own pellets; renting its pellet production line and IT infrastructure for tracking pellet recipes to universities and businesses carrying out research and development (R&D); and marketing the complete BIOAGRO concept (hardware, intellectual property and know-how) as a system solution for anyone seeking to valorise agricultural residues.

Mr. Bernhoff says the new company has already hired its technology out for R&D purposes once, with a second client due to use the facility in autumn 2011. Production and sale of "Bioagropellets™" will likely focus on large-scale district heating clients because the product generates a higher ash content than wood pellets, making it initially more suited to industrial than domestic use. Companies in Sweden and abroad have already conducted trials of BIOAGRO Energy's pellets, which Mr. Bernhoff hopes will lead to a supply contract.

For the moment though, plans to sell pellets have been put on the back burner whilst BIOAGRO Energy links up its factory to Tommarp's district heating network. The company is already supplying heat to other seed-drying businesses in the village, as well as the church hall, with the rest of the 175 household community set to benefit from the renewable energy source later this year. This is the first of two "expansions" for BIOAGRO Energy, says Mr. Bernhoff. The second will see the company, together with Ecoera, starting to industrialise biochar[1] production from specific Bioagropellet formulas. Initial field trials on dry sandy soil in 2010 showed "a 17% increased crop yield when spreading 2 kg of biochar per m^2 and a 33% increased yield with 3 kg/m^2," he notes. Mr. Bernhoff sees a big potential as an agricultural fertiliser for this new way of sequestering carbon dioxide from the atmosphere. "We are constantly innovating around new developments for the BIOAGRO Energy concept to stay ahead."

In conclusion, he is very enthusiastic about the benefits of his small company's LIFE project. "It was really expensive for us but I'm sure in the future we will make money from it. I'm really glad we have done it. We are also already having discussions with foreign companies for export of the BIOAGRO Energy system to spread the concept across the world."

1 Biochar is charcoal created by pyrolysis of biomass. Its primary uses are carbon sequestration or bio-energy with carbon capture and storage. It can improve water quality, increase soil fertility and raise agricultural productivity.

SWEDEN

Project number: LIFE06 ENV/S/000517

Title: BIOAGRO - Innovative method for reduction of emissions of green house gases and waste from the agriculture sector

Beneficiary: Skånefrö AB

Contact: Sven-Olof Bernhoff

Email: sob@skanefro.se

Website: http://www.bioagrolife.com
http://www.bioagroenergy.com

Period: Jan-2006 to Nov-2009

Total budget: €5 227 000

LIFE contribution: €1 212 000

Best projects

Environment 2010

Italy: New technology reduces the threat of E. coli

With LIFE's support, an automated online detection system for wastewater treatment plants is providing an early warning against the potentially fatal consequences of E. coli.

Escherechia coli (E. coli) bacteria can cause serious illness and, in extreme cases, death. Since harmful strains of E. coli are spread through faecal-oral transmission, it is of vital importance to EU citizens' health that levels of the bacteria in wastewater are carefully monitored.

Traditional wastewater treatment plants using chlorine keep harmful bacteria in check, but can also be toxic to aquatic life. As a result, alternative wastewater treatment technologies have been developed using oxidising systems based on UV rays, ozonization or peracetic acid.

The efficiency of these processes is guaranteed by monitoring the "indicator microbe", E. coli. However, standard methods of E. coli monitoring typically take 24-48 hours, a potentially dangerous delay.

To counter this threat, the LIFE Kolisoon project, led by the Italian research institute, ISRIM, set out to design and implement an automated on-line E. coli detection system capable of providing quasi real-time analysis of bacteria levels in wastewater effluent. The aim of the project was thus to provide an efficient tool to prevent a serious contamination of bathing waters in the event of the sudden breakdown of a wastewater treatment plant.

BATHING IN SUCCESS

The project team began by constructing a prototype measurement device capable both of E. coli detection and of providing a feedback tool to the disinfection process. The equipment consists of an autosampler, automatic filtration apparatus, reagents distribution system and fluorimeter, as well as software for managing the process. Following a series of lab trials, the device was installed in semi-automated mode at a wastewater treatment plant in Robecco sul Naviglio, Italy. There, field trials were conducted on effluents from five different treatment plants to evaluate the performance of the Kolisoon technology on samples treated with chlorine, ozone and peracetic acid, as well as on non-disinfected effluent.

These trials proved successful and the beneficiary has thus achieved its aim of providing wastewater treatment operators and regulators with a tool for monitoring sudden variations of microbial contamination of effluent that is capable of providing an early warning in the event of unexpected failures. Rapid analysis (one or a few hours depending on the type of treatment) of the microbial quality of water bodies significantly reduces the threat to public health from E. coli, particularly where bathing waters are concerned. The new system also provides a feedback tool to the disinfection process, enabling parameters such as the quantity of disinfectants required to be finely regulated.

The beneficiary has disseminated details of its technology throughout the EU, including through training workshops in Spain and Romania. It has also conducted a transferability study to estimate the market potential of the Kolisoon device, concluding that its microbiological analysis could realistically be used for seawater and freshwater, as well as wastewater. Potential end-users include wastewater treatment plants, environmental agencies, farmers (crop irrigation) and the disinfection industry.

ITALY

Kolisoon
LIFE 06 ENV/IT/235

Project number: LIFE06 ENV/IT/000235

Title: Kolisoon – A new automated method for the analysis of *Escherichia coli* in wastewater effluent

Beneficiary: Istituto Superiore di Ricerca e Formazione sui Materiali speciali per le Technologie Avanzate - ISRIM SCarl

Contact: Francesca Santori

Email: f.santori@isrim.it

Website: http://www.lifekolisoon.it

Period: Dec-2006 to Sept-2009

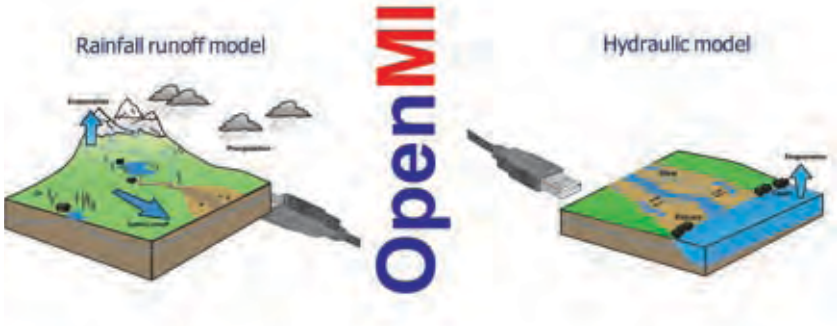
Total budget: €597 000

LIFE contribution: €299 000

United Kingdom: **Bringing the OpenMI to life**

LIFE co-funding has enabled this UK-led project to take a research output, the open modelling interface (OpenMI) – a software standard for the exchange of data between computer software in environmental management – and to test, demonstrate and evaluate its use on real-world problems.

The OpenMI project's rationale lies in the demand of the EU Water Framework Directive (WFD) for an integrated approach to water management. This requires an ability to predict the way catchment processes will interact. In most contexts, it is not feasible to build a single predictive model that adequately represents all the processes; therefore, there is a requirement for a means of linking models of individual processes. This requirement is met by the FP5 HamonIT project's innovative solution, the OpenMI.



The OpenMi project developed a standard interface, which allows models to exchange data with each other and with other modelling tools

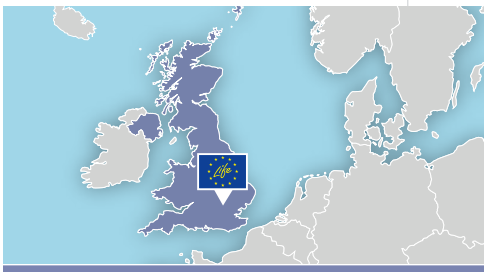
The purpose of the subsequent LIFE project was to transform the software standard from research output to a sustainable operational product: to build the capacity to use the software and to demonstrate it in real life situations. Another objective was to disseminate information about OpenMi to users (e.g. water companies, competent national and regional water authorities, research organisations and consultants).

The project tested and evaluated the OpenMI under operational conditions in two river basins: the international Scheldt river basin on the Franco-Belgian-Dutch border; and the Pinios basin in the region of Thessaly, Greece. A number of scenarios were used, for instance by linking sewage models and river models, or considering the effect of climate change on reservoir reliability. The testing of the software under these operational conditions highlighted key issues, such as making models compliant with OpenMI and problems with model stability once they were linked. The trials also highlighted the importance of providing adequate technical support.

A key element of the project was to make the software open source, so modellers working independently on the project could make changes to the code, thus continuing to develop and strengthen the technology. This led to a number of revisions to the code, with the eventual release of a second version of OpenMI in December 2009, shortly before the end of the project.

OpenMI ASSOCIATION

By the end of the LIFE project the OpenMI was generally viewed as one of the leading integrated modelling standards and was being used globally. To support its continued development, the 'OpenMI Association' was established to take ownership of the standard. Its chief objectives are to maintain and develop the standard, to publish it as open source, to promote its use and hence support the development and application of integrated modelling. The association (www.openmi.org) also provides technical support to both model developers and end users.



UNITED KINGDOM

Project number: LIFE06 ENV/UK/000409

Title: Bringing the OpenMI-Life

Beneficiary: The Centre for Ecology and Hydrology (CEH), UK

Contact: Roger Moore

Email: rvm@bgs.ac.uk

Website: www.openmi.org

www.openmi-life.org

Period: Oct-2006 to Jan-2010

Total budget: €3 977 000

LIFE contribution: €1 989 000

Belgium: **Greening the clean up of ships' hulls**

The ECOTEC-STC project demonstrated a non-toxic antifouling paint for ships' hulls that, together with an underwater maintenance scheme, has the potential to greatly reduce the environmental impact of antifouling.

The fouling of ships' hulls increases drag, thereby causing speed loss and increases in fuel costs of up to 40%. It also makes regular visits to shipyards for hull cleaning necessary. Whilst antifouling paints are an effective and economic means of protecting hulls from corrosion and of preventing aquatic organisms from sticking to them, they commonly have a harmful impact on the environment. In 2001, the International Maritime Organisation (IMO) banned the use of paints containing TBT (tributyltin). Most antifouling paints nevertheless slowly release heavy metals and harmful biocides into the marine environment, where they pollute harbour bottoms, kill sea life and enter the food chain.

The Belgian ECOTEC-STC project sought to address this problem by demonstrating a durable non-toxic antifouling paint that, together with an underwater maintenance scheme, adequately stops ship-hull fouling, whilst also providing a Best Available Technique to minimise the risk of ships transferring non-indigenous marine

species (NIS). The project concept was demonstrated on different types of vessels and in the different waters of the Baltic and Mediterranean seas and the Pacific and Atlantic oceans. The new paint, Ecospeed, was shown to provide a non-toxic alternative to the likes of copper-based paints. It also reduced ships' fuel consumption, thus avoiding emissions of greenhouse gases.

Comparative testing of the new paint showed improvements in terms of environmental performance over the lifespan of a vessel over other paints, such as Foul Release and copper-based SPC. Ecospeed only needs to be applied once every 25 years, meaning that if it was used by 80% of the world fleet it would save an estimated 12 million l/yr of paint (as well as associated transport costs). Using the same assumption, the beneficiary further estimates savings from a switch from biocidal antifoulings to Ecospeed of 28.5 million tonnes/yr of fuel and of 90 million tonnes/yr of CO_2.

Comparison of the same container ship with a conventional biocidal antifouling (left) and Ecospeed (right) after spending a period of 2.5 years operating in the Baltic Sea

The Ecospeed paint needs to be applied once every 25 years and emits 13 times fewer VOCs

The project's studies also showed that significantly smaller amounts of Volatile Organic Compounds (VOCs) are released into the atmosphere with each application of Ecospeed in comparison to traditional antifoulings. It is estimated that over a period of 25 years, nearly 13 times fewer VOCs are emitted with Ecospeed than Foul Release, and more than 23 times fewer VOCs are emitted than with a copper-based SPC coating scheme. Ecospeed is also 100% free of biocides.

ATTRACTING WIDESPREAD INTEREST

One of the main benefits of the new system is that it allows vessels to stay out of drydock for 10 years or longer, rather than three-to-five years with existing antifouling paints. This not only represents a huge cost saving potential, it could also help ease predicted future shortages of drydock space for larger vessels.

Perhaps unsurprisingly therefore, the ECOTEC-STC concept has attracted widespread interest as an antifouling alternative: more than 100 coats of Ecospeed were applied in the course of the LIFE project, of which more than 50 were full hull applications. The beneficiary believes that its concept will create new business opportunities in all major European ports. By the end of the project it had set up service stations in Spain, India, the US and Gabon and signed agreements with external service contractors in many more locations.

BELGIUM

Project number: LIFE06 ENV/B/000362

Title: ECOTEC-STC - Demonstration of a 100% non-toxic hull protection and anti-fouling system contribution to zero emissions to the aquatic environment and saving 3-8% heavy fuels

Beneficiary: Hydrex N.V.(BE)

Contact: Manuel Hof

Email: life@hydrex.be

Website: www.hydrex.be

Period: Jun-2006 to Dec-2009

Total budget: €5 201 000

LIFE contribution: €1 525 000

BEST PROJECTS

Spain: **LIFE helps find a use for waste fibreglass**

The WGF-PP project demonstrated the technical and economic feasibility of a totally new industrial process for recycling waste fibreglass. Starting from a laboratory concept, it created reinforced plastic granules with proven industrial uses and significant potential CO_2 reductions.

Some 150 000 tonnes of glass fibre wastes (GFW) are sent to landfill every year in the EU, leading to considerable emissions of substances into the environment.

The WGF-PP project (**LIFE07 ENV/E/000802**) sought to demonstrate a process for recycling waste from the glass fibre production process and, as a secondary action, to test the possibility of replacing raw materials with reinforced plastic waste coming from used cars.

The main aim of the project was to reduce the need for new glass fibres, the production of which consumes high levels of energy and materials. Indeed, the process consumes as much as 17 GJ of power for every tonne of melted glass and releases significant amounts of carbon dioxide (CO_2), nitrogen oxide and dioxide, sulphur dioxide, chloride, fluoride, volatile organic compounds and particles into the atmosphere.

The WGF-PP project recycled waste from glass fibre and produced reinforced plastic granules with proven industrial uses

RECYCLING FIBREGLASS

The project beneficiary conducted laboratory-scale experiments to inform the design of a semi-industrial process to turn GFW into reinforced plastics granules (rGRP).

Befesa Plásticos tested the best additives to join polypropylene and GFW and to improve certain mechanical properties of the final products, including impact and heat resistance. Preliminary recipes defined by the beneficiary were tested at lab scale together with project partners.

These laboratory-scale actions successfully demonstrated the technical and economic feasibility of incorporating GFW with polypropylene to produce rGRP with acceptable mechanical properties. They also provided valuable input into the process of reproducing the results at semi-industrial scale.

A production plant was designed and built in collaboration with specialist manufacturers. It includes a 90-litre mixer, into which different types of material can be added - including non-virgin fibreglass, polypropylene, additives and dyes - to produce rGRP.

Assessment of the results shows that the WGF-PP project successfully demonstrated on a semi-industrial scale the technical viability of its process for producing GFW-reinforced plastics granules. Several specific final products were validated by possible future users, mainly in the automotive and electro-domestic appliance sectors. The mechanical properties of the end products were found to be around 85-95% of the quality of common primary raw materials and provide a 15-30% economic benefit.

The project marks a breakthrough in reducing the lifecycle impact of fibreglass by providing an alternative to landfilling and avoiding the production of new fibreglass. The beneficiary estimates a saving of 1.46 tonnes of CO_2 emissions/tonne of recycled fibreglass. The project plant itself will reduce CO_2 emissions by 2 920 tonnes/yr.

SPAIN

Project number: LIFE07 ENV/E/000802

Title: WGF-PP - Demonstration of a process to recycle glass fibre waste, placed on rubbish dump, producing Polypropylene composites.

Beneficiary: Befesa Plásticos S.L.

Contact: Isidoro Javier Román López

Email: ij.roman@befesa.abengoa.com

Website: http://www.befesa-gri.com/corp/web/en/Proyectos/Otros_Sectores/proyectos/otros_05.html

Period: Jan-2009 to Dec-2010

Total budget: €5 974 000

LIFE contribution: €2 652 000

BEST PROJECTS

United Kingdom: **Re-using 'brownfield' sites for bio-energy crops**

The large-scale demonstration BioReGen project successfully planted trees and grasses for fuel on 10 brownfield sites in the North East of England, showing, in particular, the suitability, productivity and fuel quality of reed canary grass as an energy crop.

Estimates suggest there are 2-4 million ha of brownfield (former industrial) land across Europe. These sites are typically available for potential re-development. However, they are often contaminated, making them unsuitable for human use and posing a threat to groundwater.

Current on-site remediation practices are energy intensive and costly. Therefore, the soil is often excavated and removed from the site as hazardous waste – a method that merely relocates the polluted soil, leaving the problem of its decontamination unsolved.

Led by a team of researchers from Teesside University, the LIFE BioReGen project's main aim was to demonstrate that it could grow plants in poor soil conditions and thus help clean-up the land, make areas look greener and provide a habitat for wildlife. Furthermore, it targeted the growth of plants that could also be used as biomass crops to generate heat and power, thereby contributing to the mitigation of climate change.

Reed canary grass was shown to be by far the most suitable bio-energy crop for brownfield sites

After conducting small-scale trials, the project team planted potential energy crops on five demonstration-scale former industrial sites of at least 100 m x 100 m, where four crops were tested: regularly cut willow trees (short rotation coppice); elephant grass (*Miscanthus*); reed canary grass; and switchgrass.

The team prepared the larger sites by clearing grass, weeds, bricks and rubble and ploughing green waste compost into the ground. Planting required different methods for each species, based around seed scattering, step- or potato-planting machines. Finally, the sites were rolled to help bury the seeds, stems and rhizomes, and appropriate fencing erected to keep out rabbits.

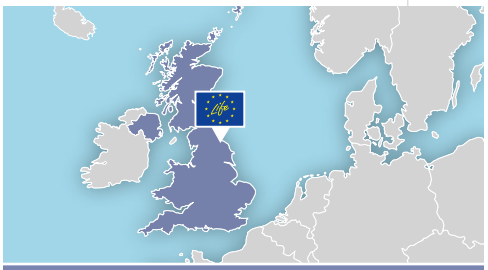
The crops were harvested on at least two occasions and analysed for contamination. Further studies assessed the crops' usefulness as biofuel.

'BEST' BIOFUEL

The project found that reed canary grass was by far the most suitable bio-energy crop for brownfield sites, growing on a range of soil types and planting conditions. It only required 18 months to mature, and could then be harvested annually. The yield was equivalent to around 5 tonnes/yr/ha of dry biomass. The fuel was of good quality, free of contaminants from the soils, but contained 5-12% more ash than traditional wood fuels, so would be most suitable for use with commercial or industrial biomass systems.

Although the other crops struggled to produce impressive yields, all sites were visibly greener with abundant natural habitat for bees, other insects and nesting birds.

Transferring this project's approach across Europe's brownfield sites would bring tremendous benefits in terms of green-waste recycling, management of contaminated soils, and habitat and species biodiversity. It could also supply 2-4 GW of electrical power and three times as much heat without displacing food production.



UNITED KINGDOM

Project number: LIFE05 ENV/UK/000128

Title: BioReGen – Biomass, remediation, re-generation: Re-using brownfields sites for renewable energy crops

Beneficiary: Teesside University

Contact: Dr Richard Lord

Email: r.lord@tees.ac.uk

Website: www.bioregen.eu

Period: Dec-2005 to Apr-2010

Total budget: €1 221 000

LIFE contribution: €610 000

The SPAS project developed an innovative combined noise and fine-dust filter for roadsides, thereby demonstrating an effective method of reducing noise pollution and the impact of roads on human health.

Austria: **Roadside filter system reduces traffic impacts**

Fine-dust or particulate matter is able to penetrate deep into the lungs, triggering not only respiratory diseases but also damaging the cardio-vascular system. Children and elderly people are particularly vulnerable.

Fine dust pollution is caused primarily by local road traffic, specifically combustion-related diesel exhaust emissions and re-suspension of road dust through abrasion of the road surface. Many European cities, including Klagenfurt in Austria, exceed the dust pollution limit recommended in the Air Quality Directive (Directive 2008/50/EC) on more than 35 days during the coldest six months of the year. The limit for particulate matter with a diameter of less than 10 micrometres (PM10) is 50µg/m^3 of air. A previous LIFE project (**LIFE04 ENV/AT/000006**) found that almost 25% of PM10 pollution is due to re-suspension on busy roads. Urban populations are also affected by traffic and roads in the form of noise pollution.

The LIFE project in Klagenfurt developed and tested an innovative combined noise and fine-dust filter for roadsides: the Sound and Particle Absorbing System – SPAS. This unique system was able to reduce fine-dust particles produced by re-suspension at origin by 15-30% and noise by up to 7dB.

The project team tested and optimised fine-dust filters in a laboratory. They identified the best material to provide low filter resistance and high absorption capacity whilst also being recyclable at end of use. A project partner used computer models to calculate the optimum position and alignment of the trial walls so that passing traffic ensured good air flow through the filters.

TESTING FOR SUCCESS

The project used a test bed in a tunnel to assess the performance of more than 20 different filter types. Two different preferred options emerged: a two-stage filter consisting of a coarse filter and a fine filter for roadsides and a single-stage, fire-resistant version for tunnels.

Three trial walls totalling 564 m in length were then installed in Klagenfurt: a totally new roadside filter; a new filter system retrofitted to an existing noise-protection wall; and filters installed on a tunnel roof and sidewalls. The team measured levels of PM10 and nitrogen oxide (NO_x) at the test sites. They also recorded meteorological parameters, traffic data and noise levels behind the walls and filter-maintenance measurements. The SPAS filters reduced PM10 by some 15-31% alongside the roads and by 23% in the tunnel.

At one site, noise levels behind the new integrated filter wall fell by some 7dB. This is equivalent to an 80% decrease in traffic and brought roadside houses and gardens within accepted noise pollution limits. The retrofitted wall, which was raised in height by about 0.5 m, reduced noise by 2.1dB at ground-floor level. Positive results were also achieved at the tunnel site.

The SPAS project demonstrated the benefits of both new and retro-fitted combined noise and fine-dust filters. The project raised awareness of this innovative and easily replicated technology through printed materials, a website, public events, onsite visits and a closing conference that attracted more than 300 participants from 17 countries. Post-LIFE, the beneficiary is testing the filter systems developed at the three sites in Klagenfurt in more detail, particularly for durability.

AUSTRIA

Project number: LIFE06 ENV/A/000345

Title: SPAS - Sound and Particle Absorbing System

Beneficiary: Magistrat der Landeshauptstadt Klagenfurt am Wörthersee

Contact: Wolfgang Hafner

Email: wolfgang.hafner@klagenfurt.at

Website: www.life-spas.at

Period: Oct-2006 to Dec-2009

Total budget: €2 484 000

LIFE contribution: €1 205 000

BEST PROJECTS

Italy: **Creating new bioenergy chains for agriculture**

An Italian LIFE project developed and assessed models for farmers to produce vegetable oil as a clean fuel for transport and energy generation.

Biodiesel is one alternative to greenhouse gas-emitting fossil fuels. However, it has yet to take off in Europe because its feedstock, vegetable oil, is imported from abroad. The LIFE VOICE project (**LIFE06 ENV/IT/000257**) aimed to develop a short bioenergy chain for pure vegetable oil (also known as straight vegetable oil – SVO) that could provide EU farmers – particularly in southern European countries – with new sources of income.

Based in Tuscany, the project aimed to show that farmers have the opportunity to produce a traditional and well-known feedstock (oil seeds) and easily transform it in decentralised mills into two products with a high added value (vegetable oil and seed cake). The oil could be used to produce electrical/thermal energy (in converted systems) or biodiesel, whilst the seed cake would be a protein-rich meal for animal feed.

TESTING, PRODUCING AND USING SVO

Farmers involved in the project cultivated rapeseed, linseed and sunflowers for the purpose of converting into SVO.

The VOICE project developed a short bioenergy chain by transforming rapeseed, linseed and sunflowers

In total, some 97 ha were cultivated with the following results: the average yield of sunflower seeds was 1.32 tonnes/ha (organic and standard cultivation), as compared with a yield of 0.70 tonnes/ha for rapeseed. These results confirm that whilst sunflowers are well adapted to the Tuscan environment, rapeseed is less suited to the territory, especially on sloping fields. The project also found that linseed provides a good substitute for sunflowers, especially on flat areas. The sunflower seeds cultivated by the project were converted into oil at an extraction plant located at Mondeggi farm (Florence). There the seeds were processed using a German screw press (mechanical extraction method) combined with an Italian filtration system. The screw press was able to squeeze 120 kg/hr of sunflower seeds that had been previously washed and dried to 8-9% humidity, generating some 40 kg/h of oil and 80 kg/h of seed cake for animal feed.

In the next phase of the project, the VOICE team investigated a number of different options for use of the SVO it had produced. These included installing and testing small-scale extraction and energy conversion systems at farms taking part in the project. A system for decentralised heat generation was installed at the Mondeggi farm, whilst a combined heat and power (CHP) plant was trialled at the Tommasi farm (Pisa). Impact assessments of these pilot installations studied showed that it is possible to reduce GHG emissions from transportation and energy generation on farms.

Biodiesel tests were carried out on a tractor used for wood maintenance. The results indicated a high level and performance and reliability using the fuel.

COMPLETING THE CHAIN

A key part of the VOICE project was its development of an economic analysis of the whole bioenergy chain. This included an analysis of different fuel taxation options and measures to overcome barriers to uptake, complemented by lifecycle and environmental impact assessments. Finally, the beneficiary worked to define a possible regional supply chain, and to assess national policy for the promotion of SVO and its possible environmental and socio-economic benefits for farmers.

In conclusion, the project demonstrated that the SVO chain is not only suitable for southern EU Member States, but that it is also transferable to other Mediterranean countries.

ITALY

Project number: LIFE06 ENV/IT/000257

Title: VOICE - Vegetable oil initiative for a cleaner environment

Beneficiary: University of Florence Centro Ricerca Energie Alternative e Rinnovabili

Contact: David Chiaramonti

Email: david.chiaramonti@unifi.it

Website: http://crear.bluefactor.it/index.php?module=CMpro&func=viewpage&pageid=14&expsubid=2

Period: Oct-2006 to Dec-2009

Total budget: €3 381 000

LIFE contribution: €1 686 000

France: **Becoming AWARE of the pest of pesticides**

The LIFE AWARE project successfully developed a prototype geo-referenced data recorder for pesticide sprayers. This provided essential information to enable optimal application of pesticides to meet agricultural needs whilst minimising environmental risks.

Pesticides are a major source of water pollution and aquatic environment degradation. Unintended and excessive flows of chemical substances can directly impact species beyond those targeted and pollute the air, soil and water leading to adverse effects on biodiversity.

The Water Framework Directive states that aquatic environments throughout the EU will have to achieve a good ecological status by 2015. However, a major challenge for eliminating chemical pollution is that pesticides also play an important role in reducing threats from pests and weeds, resulting in improved yields and safeguarding the supply of affordable quality food products.

OPTIMISING USE

The LIFE AWARE project (**LIFE05 ENV/F/000058**) sought to optimise the application of pesticides to maximise the agricultural benefits to vineyards whilst minimising the pollution of surface water. The main project site was located in the Vaillele catchment basin in the village of Neffies in Languedoc-Rousillon. The only form of cultivation in the area is viticulture, which covers 70 out of 310 ha, with the rest being scrubland.

The beneficiary, fitted onboard monitoring technology to all pesticide sprayers used on the watershed in Neffies. The information was geo-referenced using GPS and collected in a central database.

To measure typical pesticide losses, a fluorescent tracer product was sprayed using standard viticulture practices. Spectrofluorimetric analysis revealed that losses range from 10-40% at ground level and 30-40% in the air, depending on the crop growth stage.

The AWARE system enabled the project to design and implement a spraying practice improvement plan

The filling station was equipped with a volumeter and anti-return system and tractors fitted with rinsing tanks to avoid point source pollution from tank overflows, unmonitored residual volume and sprayer tank washout. The project installed an automated water sampler at the outfall of the catchment basin. Variability in pesticide quantities detected in the surface water was found to depend mainly on pluviometry, the physic-chemical properties of the pesticides used and the quantities applied.

The AWARE system provided more accurate measurements of pesticide use and enabled the project to design and implement a spraying practice improvement plan. Winegrowers were taught about the problems and causes of pesticide pollution of surface waters. They were trained in good rinsing practice in the field, and in using the system to set optimal flow and volume rates, identify any irregularities in application and avoid spraying on inappropriate days.

The system can prevent much unnecessary and ineffective spraying. The innovative MHYDAS pollution transfer model estimated that it could reduce pesticide use by 50% at the early vegetation stage and 30% with grown vegetation, allowing a 30% reduction in pesticide lost on the ground.

In the final year of the project, trials of the AWARE system also took place in Spain and Italy. The project worked to share its findings on the whole process of pesticide use with farmers operating in other contexts. High costs remain a challenge for take-up of the technology and the private company TIXAD has been set up to develop a cheaper, commercially viable version post-LIFE.

FRANCE

Project number: LIFE05 ENV/F/000058

Title: AWARE - Reducing pesticide-related water pollution by improving crop protection practices: The use of embedded ICT technologies

Beneficiary: CEMAGREF

Contact: Bernadette Ruelle

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Website: http://life_aware.teledetection.fr/web/video/life_aware.swf

Period: Dec-2005 to Feb-2009

Total budget: €1 276 000

LIFE contribution: €629 000

BEST PROJECTS

Italy: Eleven steps towards better public management

The Italian-led partnership project, IDEMS, successfully produced a new methodology for urban environmental management that improves the EMAS instrument for public administrations.

Environmental management has become a priority for Europe's local authorities. Municipalities have three main tools at their disposal: the EU's voluntary eco-management and audit scheme, EMAS; the environmental accountability and budgeting system, CLEAR; and the local governments' environmental management system, ecoBudget. EMAS has tended to be used as the overall system for the three methodologies, as it is the only one among them to have a specific reference law. However, whilst there are overlaps between the three schemes, each is actually quite specific in scope.

The IDEMS project aimed to integrate environmental management systems with environmental accountability and budgeting systems. Specifically, it integrated the three tools to meet the particular requirements of local authorities in preparing their 'Urban Environmental Management Plans' in accordance with the European Commission Communication, "Towards a Thematic Strategy on the Urban Environment" (COM(2004)60).

The project was coordinated by the municipality of Ravenna in the Emilia-Romagna region of Italy – a local authority with extensive experience in environmental management. This was, however, very much a partnership, involving four 'developer' municipalities – Ravenna, Ferrara and Mantua in Italy, as well as Amaroussion in Greece – to develop and pilot the integrated system. Furthermore, these municipalities were supported by three reference cities: Dresden and Heidelberg (Germany); and Växjö (Sweden), who shared their own expertise and experience.

Each developer municipality conducted an audit of its current use of environmental management systems. Gaps between the used and available tools were analysed, and draft guidelines produced for effective and integrated environmental management. The guidelines had 11 points covering issues such as planning, stakeholder engagement, environmental analysis and legal compliance.

To support implementation of the guidelines, the partners created customised work plans for each of the developer municipalities, as well as a training kit. The project also ran training events and organised field visits to the reference cities to better understand what was required. The municipalities used these support tools to carry out demonstration pilot implementation of the guidelines.

LEARNING PROCESS

The lessons from this process and analysis of the results enabled the partners to define the final optimised guidelines – the 'IDEMS model' - for the integration and interaction of the three environmental management tools. The new model is tailored to the needs of public organisations and provides politicians and technicians with guidance for implementing EU environmental policy without gaps and overlaps between multiple systems. The partners also presented the Commission with their proposal for the recently-adopted revision of the EMAS Regulation (EMAS II). The revision aims to facilitate, not only EMAS implementation by local authorities, but also its use with territorial governance processes and in combination with other sustainable development tools.

The IDEMS project produced a new methodology for environmental management by public administrations

ITALY

Project number: LIFE05 ENV/IT/000808

Title: Integration and Development of Environmental Management Systems

Beneficiary: Comune di Ravenna

Contact: Luana Gasparini

Email: lgasparini@comune.ra.it

Website: www.idems.it

Period: Oct-2005 to May-2009

Total budget: €815 000

LIFE contribution: €408 000

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The programme

LIFE+ "**L**'**I**nstrument **F**inancier pour l'**E**nvironnement" / The financial instrument for the environment

Period covered (LIFE+) 2007-2013.

EU funding available approximately EUR 2 143 million

Type of intervention at least 78% of the budget is for co-financing actions in favour of the environment (LIFE+ projects) in the Member States of the European Union and in certain non-EU countries.

LIFE+ projects

> **LIFE+ Nature projects** improve the conservation status of endangered species and natural habitats. They support the implementation of the Birds and Habitats Directives and the Natura 2000 network.
> **LIFE+ Biodiversity projects** improve biodiversity in the EU. They contribute to the implementation of the objectives of the Commission Communication, "*Halting the loss of Biodiversity by 2010 – and beyond*" (COM (2006) 216 final).
> **LIFE+ Environment Policy and Governance projects** contribute to the development and demonstration of innovative policy approaches, technologies, methods and instruments in support of European environmental policy and legislation.
> **LIFE+ Information and Communication projects** are communication and awareness raising campaigns related to the implementation, updating and development of European environmental policy and legislation, including the prevention of forest fires and training for forest fire agents.

Further information further information on LIFE and LIFE+ is available at http://ec.europa.eu/life.

How to apply for LIFE+ funding The European Commission organises annual calls for proposals. Full details are available at http://ec.europa.eu/environment/life/funding/lifeplus.htm

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LIFE Unit – BU-9 02/1 – B-1049 Brussels – Internet: http://ec.europa.eu/life

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