European Commission

LIFE creating green jobs and skills

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LIFE ("*The Financial Instrument for the Environment*") is a programme launched by the European Commission and coordinated by the Environment Directorate-General (LIFE Units - E.3. and E.4.).

The contents of the publication "LIFE creating green jobs and skills" do not necessarily reflect the opinions of the institutions of the European Union.

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Luxembourg: Publications Office of the European Union, 2013

ISBN 978-92-79-29814-1
ISSN 2314-9329
doi:10.2779/33031

Printed in Luxembourg
Printed on recycled paper that has been awarded the EU Ecolabel (http://ec.europa.eu/ecolabel/)

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Foreword

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LIFE is a dedicated EU financial instrument for the environment. Therefore job creation and the development of skills have not been its main objectives. Nevertheless, as this publication illustrates, the programme has played its part in creating permanent jobs and training schemes that have lasted well beyond the duration of LIFE funding.

Launched in 2010, a flagship initiative 'New Skills for New Jobs' within the Europe 2020 strategy for smart, sustainable and inclusive growth aims at creating new job opportunities in the EU. LIFE projects also have demonstrated their ability to contribute to this agenda.

LIFE has stimulated green skills and jobs and contributed to the emergence of a green jobs market where employers and employees can find each other. And in doing this, LIFE projects have promoted the transition to a greener and more sustainable economy where growth does not take place at the cost of the environment and sustainable use and management of our natural capital offer more and more business and job opportunities.

Numerous LIFE projects have demonstrated solutions and developed skills both for those seeking work and for existing employees (from professionals to manual workers), for instance architects and builders in sustainable construction techniques. LIFE projects have also mobilised trainers to improve the skills of farmers towards more environmentally-friendly agricultural techniques and practices.

The outcomes of projects featured in this publication show that LIFE is capable of demonstrating solutions that have promoted green growth. These outcomes illustrate that greener and more resource efficient processes can offer opportunities for socio-economic development and durable job creation.

More innovative solutions also offer new business opportunities and drive pubic organisations and bodies to perform better. Resource efficiency and environmentally-sound practices lead to improved competitiveness and also save money. The featured LIFE projects offer important lessons about how this may be achieved in practice.

Timo Makela

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INTRODUCTION

Greening the EU job market

Europe's transition to a resource efficient, low-carbon economy can lead to significant job creation and new opportunities for the existing workforce. However, a number of obstacles must be overcome in implementing a green jobs and skills agenda.

Europe 2020, the EU's new economic strategy, stresses the need for smart, sustainable and inclusive growth. That means building a competitive, low-carbon, resource-efficient economy and safeguarding the environment.

The main goal under the Europe 2020 strategy is to support businesses and to enable them to improve their competitiveness globally whilst helping them make the shift towards a green economy. To realise this goal, citizens must have the skills and training needed to work in the green economy. One of the Europe 2020 flagship initiatives - the New Skills for New Jobs agenda – is designed to support the transition to a low carbon economy by helping Europe anticipate its future labour market needs in this area and support the dissemination of new training opportunities.

More than 20 million European jobs are already linked to the environment in some way – and as the EU gears up for a greener future, we could see the creation of millions more green jobs, both directly and indirectly through supply chains.

Defining and building green jobs and skills

"Green jobs" are defined as "jobs that reduce the environmental impact of enterprises and economic sectors, ultimately to levels that are sustainable" (UNEP/ILO/IOE/ITUC, 2008). The broadness of the definition means that potentially almost every job can become greener.

Indeed, boundaries between "green" and "non-green" jobs are already becoming blurred. For instance, in some countries "energy auditor" is viewed as a new, green job; in others it is seen as a shift of competences for an existing profession: auditor. This blurring will intensify as more economic spheres improve their resource efficiency.

Photo: LIFE03 ENV/E/000085

LIFE has been creating durable green jobs and skills for over 20 years

"Green skills" already can be found in existing occupations. A green economy affects skills in different ways. For example, it can lead to "green restructuring" - the process by which traditional industries faced with declining markets reorient their production processes and workflows to target markets driven by environmental priorities.

High carbon-emitting sectors - such as the extractive and automotive industries, shipbuilding, fossil fuel-based energy generation, manufacturing, forestry and agriculture - will be most heavily impacted by green structural change. New job opportunities will arise in industries that are expected to grow as economies go green (including renewable energies, green building and waste management). Workers moving from declining 'high carbon' jobs into growing green sectors will require retraining; thus the role of employment services in matching skills to jobs and in providing training will be crucial.

The greening of agriculture will have enormous implications in terms of jobs. Farmers will have to acquire new techniques to adjust to more severe droughts or adopt farming practices that help mitigate climate change. They also will have to learn how to work with Natura 2000 network sites and learn about labelling schemes and certifications. Training programmes are needed at all levels of education to enable people working in agriculture to use their existing competences as a foundation for developing green skills.

The extent of re-skilling required in other sectors can vary considerably. In some cases an occupation can be greened without any re-training at all - e.g. a bus driver is a bus driver, whatever fuel the bus runs on – but in most instances, it will be necessary to build upon existing competences as the job profile for emerging green occupations alters. For example, within the automotive industry, the introduction of new, fuel-efficient technologies means that workers at all levels require training for this aspect of the job. It is important to emphasise that the skills of workers in declining occupations will not necessarily be obsolete. In many cases, with some additional training, they can be put to good use in the resource-efficient occupations of the green economy.

In other areas, the challenge is more the volume of workers involved than the amount of re-skilling needed: this is particularly evident in the construction sector, where the creation of energy-efficient buildings will require large numbers of people to upgrade their skills.

Greening occupations is thus about adding to or subtracting from existing competences. Market innovations and new products will require the same type of management, design, planning and leadership skills as existing roles. New processes will require new technological know-how; other green skills are linked to understanding and being able to implement environmental legislation and regulation.

Some sectors are more affected by the green economy than others, but all sectors will require a certain level of environmental competency and skills. A good example would be the local authority officers who are becoming more and more specialised in the nuances of environmental action in order to regulate areas from waste management to water to forestry.

The way forward

Many countries are integrating environmental issues into their development and growth strategies. However, as yet only one EU Member State (France) has adopted a national plan for the mobilisation of green jobs. Policy-makers need to focus on and invest in programmes aimed at retraining the workforce to ensure Europe lives up to its ambition of having 3 million “green collar” workers by 2020. There is also an urgent need to anticipate future demand for green jobs. As well as a general shortage of scientists and engineers, there are specific skills shortages in certain sectors (e.g. energy efficient buildings); and a need to improve perceptions of the attractiveness of others, such as waste management. It is important to mainstream the environmental aspects of occupation throughout the education and training matrix. This includes vocational education and training (VET) providers improving links with companies to make green industries an attractive end-destination for highly-skilled students. The shortage of teachers and trainers in environmental-awareness subjects and in fast-growing green sectors (such as renewable energy) also needs to be addressed.

For the transition to a green economy to happen, the EU needs to invest in a skilled and trained workforce that can inspire and encourage investment, technical innovation, economic diversification and job creation.

Europe 2020 supports businesses in making the shift towards a greener economy

Photo: LIFE06 ENV/GR/000375

ANALYSIS

Employment lessons from LIFE

A summary of the impact of the LIFE programme in terms of creation of green jobs and development of green skills.

Photo: LIFE06 ENV/S/000517

Universities have an important role to play in transferring green skills

Although it is not a job creation scheme, the LIFE programme has nevertheless helped create employment and develop new environmentally-beneficial skills for the workplace. Since 1992, long before the concept of 'green jobs' became common currency, LIFE-funded projects, using relatively little funding and with simple ideas, have created profitable green businesses with sustainable jobs.

LIFE has not only generated employment during the lifetime of projects, but its financial support has helped foster sustainable and durable jobs, lasting more than 15 years in some cases. For example the 'Eurocrate' and 'Usa e Riusa' projects have created hundreds of jobs in Sweden and Italy respectively, through packaging chains based on the substitution of plastic crates for wood and cardboard ones. These jobs do not require extensive re-skilling; rather the workers need only upgrade certain skills and knowledge to become 'green employees'. And as the project beneficiaries are working with many companies nationwide, their activities have helped to green other sectors as well.

LIFE has also helped create jobs in such areas as waste processing, heavy industry, forestry, agriculture, construction, engineering and aerospace. These positions range from manual labour to highly-skilled professionals. Again most of the jobs created have required a topping up of skills, mirroring the findings of research reports that have identified the need for skilled workers to 'green' their existing knowledge. For example, the 'Forest Fire Prevention' project has required forest engineers to update their knowledge of the impact of climate change processes on forest management and has hired forest engineers with these skills.

As well as job creation, LIFE support is helping to reorient existing production methods or processes to environmental issues-priorities, leading to the 'green restructuring' of heavy industry. For instance, shipbuilders and repairers in Portugal and

Spain are applying their craft to the recycling of end-of-life vessels (see pp. 13-16). In Germany, solderers are being re-trained to practice lead-free soldering (see pp. 45-48). A training centre set-up as a result of the LIFE 'LEADFREE' project is continuing to help workers acquire this sought-after skill.

The 'RCYCL' project, which deals with the management of bulky waste, has not only created 15 jobs directly, but by working with employment services to train unemployed and disadvantaged groups, has led to employment for a further 100 people.

Renewable energy is the main source of green jobs in the EU. However, since structural funds or other targeted programmes (i.e. Intelligent Energy Europe) tend to be more appropriate, LIFE's job creation effect in this sector has been limited, but certainly not negligible. For instance, a number of jobs have been created through projects that have developed biomass production chains (see pp. 59-61).

LIFE greening jobs through skills

Most 'green jobs' are not new *per se*, but are closely tied to the greening of skills. An auditor, for instance, must acquire knowledge on how to conduct an energy audit, or an architect must add on skills on sustainable architecture. As an example of the latter, the 'RENEW BUILDING' project in Austria (pp. 38-41) is providing architects and builders with training in sustainable construction techniques, inside and alongside the S-House, an environmentally-friendly workplace created by a LIFE project a decade ago.

Cleaning companies boosted their business through training programmes for green skills

Photo: LIFE03 ENV/F/000481

Thus, LIFE's greatest contribution to the greening of the EU job market has been through the dissemination of green skills by means of training courses and practical guidelines. Furthermore, given the ease with which project results can be disseminated, there are few barriers to the replication of successful social and employment solutions by other private or public sector employers.

LIFE projects have been exemplary in green skills creation in a number of sectors, from business and industry to agriculture. One lesson from agriculture sector projects is that training needs to be structured and sustained rather than on a 'one-off' basis, with support at regional/national level and the involvement of agronomists. The creation of a profitable market for "sustainable farmed products" is another important driver of the 'green restructuring' of agriculture, one accompanied by a certification/labelling scheme (similar to those for organic farming) that would convince farmers of the economic returns to be had from such a move and that could help them become less dependent on subsidies.

Raising awareness amongst citizens is one way of influencing the market. If you change their customs and redirect their choices you can create increase market demand for particular products, potentially leading to more jobs to meet that demand. For example the beneficiary of the 'Sinergia' project - a public administration - is raising community awareness of organic products, increasing the demand for these products and encouraging more farmers to adopt organic approaches and learn green farming skills.

Conversely, the LIFE 'AgriClimateChange' project demonstrates that farmers will adopt techniques designed specifically to reduce the effects of climate change when there is a financial incentive (e.g. Through the Second Pillar of the Common Agricultural Policy).

Skills for the public sector

LIFE projects have helped to fill in green skills gaps and deficiencies of the public sector, an important outcome that has not been highlighted by earlier studies on the subject of green jobs and skills. Environmental challenges are growing at a faster rate than the capacity of public authorities to keep up with them and to translate the latest scientific knowledge into policy and programming documents.

With LIFE's support, public authorities have leveraged the know-how of external consultants or the scientific data and tools of academia to fill in these skills gaps. In particular, LIFE co-finance has been used to develop the ability in-house to understand the environmental challenges and translate them into norms, legislation and programmes aimed at all of the stakeholders present on their territory who will have to deal with them.

An analysis of the impact of the LIFE projects suggests that public authorities need the support of external experts (consultants/academics) either on a one-off or repeat basis and that they must train people within their organisations to take responsibility for various environmental issues (energy efficiency, Green Public Procurement, forestry etc.). Public administrations also have a wider role to play in the green economy, because it is clear that regulation is a driver of green job creation. Legal and regulatory obligations make it possible to influence a certain market, sector or behaviour and further green job growth.

Drivers of change

LIFE projects illustrate that there are a number of different drivers of green jobs and skills. In some cases policy and regulation orient a sector towards a 'green restructuring', such as the adoption of a proposal for a regulation on end-of-life ships on 23 March 2012 which will certainly influence this sector; or the mandatory environmental requirements that influence construction or the chemical industry (e.g. REACH).

Green jobs and skills can also be market-driven. For example, new markets for recyclable crates or a greater demand for sustainable buildings also foster the development of new sectorial skills. Environmental drivers, such as the ever-increasing importance of climate change issues, are also a factor.

Lessons learnt

LIFE projects have provided some lessons for addressing future employment and skills needs. One of these is that the uptake of green skills requires the support of tertiary education. Universities and other institutions have an important role to play in transferring such skills to public authorities and the private sector. However, they also need to modify their courses to incorporate such elements as forestry management in relation to climate change and sustainable architecture. In addition, the tertiary education sector can play a greater role in 'teaching the teachers' and in providing vocational training to top up the skills of the existing workforce (see the 'SUN EAGLE' project – pp.26-28 – for an example of how this might work in practice).

Photo: LIFE99 ENV/IT/000034

New markets for recyclable crates have been created by LIFE projects

In future, there will be a bigger role for 'green consultants'. For instance, farmers learning sustainable agricultural skills will need the advice and support of professional agronomists on an ongoing basis. As the 'RENEW BUILDING' project demonstrates, such 'continuing education' will also be a feature of the construction sector.

There is also a need for national, regional and local authorities to create programmes and structures to identify skills shortages and to work with higher education institutions to fill in these gaps (the sectoral approach pursued in Scotland – pp. 49-50 – is just one example). The success of the LIFE 'RCYCL' project – pp. 8-9 – shows the benefits of governments

working with employment services to address the needs of employers and the labour market.

How LIFE can produce more green jobs and skills

Although LIFE has produced positive results and good practices in terms of green jobs and skills for more than 20 years, more can be done to strengthen the impact of the programme in this regard. One way could be for projects to think ahead and whenever they foresee the potential for job creation, to also consider what green skills would be required and how they could be delivered within the context of the project (e.g. through their own training programmes, or collaborations with universities, employment services or external training providers).

Once these concrete actions for job creation and skills development have been tested in the project's lifetime, the beneficiaries/partners should capture and disseminate the lessons learned to ensure that interested parties can replicate best practices after LIFE.

A specific job creation/training plan, disseminated as a standard project output, would go a long way towards ensuring that such knowledge is not lost but rather achieves the maximum impact. In many cases, such as projects focusing on industrial applications, job creation is closely linked to the development of a particular technology or innovative green process that requires workers with specialised green skills. In these instances, projects should develop an initial business plan not only with market-related analysis, but also with an analysis of the impact in terms of jobs (i.e. the type, amount and cost of staff needed for its implementation).

To further emphasise the green employment aspect, the beneficiary could include information about job creation and skills development within the required report on the socio-economic impact of the project. This would encourage applicants for LIFE co-finance to consider jobs and skills aspects during the drafting of their project proposal and to identify concrete actions to achieve this aim.

Beneficiaries may wish to highlight green skills development and green jobs aspects within applications, especially for projects targeting sectors where there is a particular need for intervention. Activities of such projects might relate to the design and set-up of training courses, including training the trainers; developing or upgrading the training material; or boosting connections between employers and training/education providers (e.g. universities; training centres). Large-scale projects of this kind could target professions or workforce needs that have been identified by the national programmes as being a priority and in conformity with the 2020 targets. This would enable the projects' results to help strengthen national and regional policies and programmes, as well as identifying practical solutions and satisfying actual needs.

In conclusion, LIFE has demonstrated how it is possible to create green jobs and to green skills. With greater focus on the impact of the training and dissemination activities that it already allows, as well as some small adjustments to the reporting requirements of project beneficiaries, the programme can help in the further greening of the workforce all over the EU.

LIFE projects have provided architects and builders with training in sustainable construction techniques

Photo: LIFE00 ENV/A/000243 and Thomas Mayer

LIFE &

JOB CREATION AND GREEN SKILLS

The following pages contain a selection of LIFE projects that have helped create durable jobs and develop green skills, arranged by sector and theme. There are five projects linked to the resource efficient reuse of waste. Capacity building is the theme of three notable LIFE co-funded initiatives from Greece, Italy and Spain respectively. Six projects highlight LIFE's role in supporting green growth in business and industry, with packaging getting a special nod thanks to the long-lasting impact of exemplary projects from Italy, Sweden and the Netherlands. LIFE's impact on energy production is also highlighted, whilst the publication concludes with features on four ground breaking projects that have helped farmers learn new green skills in support of sustainable agriculture.

WASTE

An award-winning **green social employment scheme**

Now employing 15 people and providing valuable work experience places for 40 different trainees each year, the Belgian social enterprise RCYCL has successfully built on its LIFE-funded foundations and continues to go from strength-to-strength.

Europe's social economy generates millions of jobs and provides a wide range of socially-oriented products and services. Environmental activity is a common focus for many social enterprises and sustainability is frequently integrated within their commercial 'mission'.

Green jobs created by social firms come in various forms and they feature employment in most of the sectors where LIFE operates. A search of the LIFE website's project database, for instance, reveals an interesting collection of co-finance being used to support green jobs in social firm fields as diverse as nature conservation and waste management. A good example of the latter is found in the German-speaking community of Eastern Belgium, where LIFE funding has been used with great effect to help establish a social enterprise trading in the collection and recycling of bulky waste materials.

Jobs from waste

The LIFE 'RCYCL' project (**LIFE99 ENV/B/000640**) started out in 2000 with the aim of using environmental principles as tools for creating jobs and work experience for unemployed people who had difficulty finding occupations.

Our company's core mission has not changed since the start," notes Michael Mockel, who has been involved with RCYCL from its birth. "We are here to help provide jobs and career support in the environmental sector, which we do through running our bulky waste recycling service. The task involves collecting and processing large items of domestic and business waste. We work with all sorts of different bulky waste, such as furniture, plastics, metals, and electrical equipment."

According to Mr Mockel, LIFE funding was "really important" for RCYCL, "Because it helped us to test the potential of our social enterprise. We learned a lot of essential lessons during the LIFE project period. These helped us to not only keep the scheme going after LIFE, but also to grow into being a much bigger and wiser green employer."

One valuable lesson concerned the size of the workforce, as Mr Mockel explains: "When we first started we did not know exactly how many people we needed to work on the project as employees and trainees. We had done research to assess the anticipated de-

mand for bulky waste collection and recycling, but we needed to actually run the scheme to find out if our assessments were accurate, and if no unexpected factors emerged that could affect the scheme's job creation potential."

Similar risks remain inherent during the launch of such ventures and LIFE funds were used by RCYCL to reduce the social firm's exposure to start-up risk. "Happily we found that our LIFE project was able to achieve our objectives and we were able to provide new jobs in the waste management sector," reports Mr Mockel. After initially employing five people to get the project going, the confirmation of strong demand for RCYCL's services allowed the enterprise to recruit trainees to boost staff numbers. "We work closely with Employment Service colleagues and they use us to provide their clients with practical on-the-job training experience," he explains.

Green workforce

"Our workforce now totals 15 permanent staff and we provide full-time training for around 40 unemployed people annually. We recruit men and women, old and young, and we have people from all over the world working with us. These include people who were previously refugees and others who have had to deal with challenges that limit their ability to find work," explains Mr Mockel.

"Most of the green jobs we provide are involved in collecting and processing the bulky waste but we also provide work placements in our administration office. We find that our trainees and employees enjoy working with an environmental business that is run for social reasons. Some of the staff have stayed with us from the beginning," he adds proudly.

Jean Dumbruch is a RCYCL veteran who was with the project during its initial planning phase. Working now as an instructor for the trainees, he points to the job satisfaction he gets from helping provides a green social employment service: "I am an ecological enthusiast and I have always thought that working for the environment is a beneficial job. The other thing I like about my work is the variety here. Everyday is different and in my experience recycling is not a boring job."

Photo: Tim Hudson

Employees have stayed with the project from the beginning

RCYCL skills

One of RCYCL's key goals from the start of the LIFE project "was to maximise the amount of work training provided," notes Mr Mockel. "For some of the trainees this involves developing basic job skills that they didn't have much experience of before. Things like learning about punctuality and team working are useful skills that RCYCL offers to its clients in addition to the knowledge they gain about processing bulky waste," he explains.

"My training here gives me experience that I hope will help make it easier for me to find a job," says Kodzo Badzi, a RCYCL trainee originally from Togo.

Summing up his thoughts on RCYCL's green job support, Mr Mockel notes how, "LIFE gave us the start we needed to prove that this type of environmental social enterprise was viable. Its success led to our RCYCL model being copied by other towns in Belgium. Thus the LIFE project was a key contributor to around 100 or more green jobs like ours overall."

Last year RCYCL's achievements were acknowledged with a regional award for best social enterprise. "This prize will help us move even further forward in providing more green jobs, more training services for people in need, and of course more waste being recycled," concludes Mr Mockel.

Project number: LIFE99 ENV/B/000640

Title: RCYCL – Rcycl

Beneficiary: Ministerium der Deutschsprachigen Gemeinschaft

Contact: Michael Mockel
Email: rcycl@demetec.net
Period: 01-Oct-1999 to 31-Dec-2002
Total budget: €1 611 000
LIFE contribution: €737 000

WASTE

Ensuring a soft landing for old aircraft

An end-of-life aircraft management platform developed with the assistance of the LIFE programme is of major economic and social interest for Europe, creating skilled new jobs through a resource efficient approach.

More than 14 000 aircraft are expected to retire in the next 20 years, making what happens to them at the end of their working life a potential issue.

Addressing these concerns is TARMAC (Tarbes Advanced Recycling & Maintenance Aircraft Company) Aerosave in South West France. Commercial and military aircraft arrive at this storage, maintenance and recycling enterprise via its 3 km-long runway, and largely leave in component form: 92% of the aircraft's weight can be valorised and recycled.

TARMAC Aerosave is the industrial manifestation of 'PAMELA' (Process for Advanced Management of End of Life of Aircraft - **LIFE05 ENV/F/000059**), a LIFE project that ran from 2005 to 2007.. Not only has the company put the aims of the project into practice, but it also created vital economic activity, jobs and skills in the process, with the potential for much more to come, particularly as a new, much larger additional facility is planned for Aragon in Spain.

How it began

The seeds of the project were sown when Airbus was seeking ISO 14001 accreditation and did not fulfil one aspect of the criteria - the end-of-life management of commercial aircraft. LIFE 'PAMELA' was designed to address this and to demonstrate an appropriate and efficient end-of-life management approach, or dismantling processes, aimed at achieving more than 85% recycling and reuse.

Prior to the project, the most likely destination for end-of-life aircraft was a remote airfield, with spare parts removed and reintroduced to the market by

The "smart and safe dismantling" method enables 85% of all aircraft components to be recycled

scrap merchants or small maintenance companies. Not only did this keep recycling levels down at around 50% but there were no procedures for decommissioning aircraft in a safe and environmentally-responsible manner.

Whilst the "smart and safe dismantling" method used during the project was straightforward, it had to respect the aircraft as well as the environment and health and safety regulations. The project demonstration consisted of a succession of trials using available tools for plane deconstruction, adapted to the level of sorting required. All operations were timed and all parts weighed to establish the recycling rate. Thanks to a valorisation ratio of up to 85%, landfill waste has been reduced to less than 15%, instead of a typical 40-50%. Promising results were also achieved for metallic material recycling – especially aluminium.

Move to industrial scale

Once it had been proved that safe, effective procedures were possible, the next step was to develop the project on an industrial scale. This led to the establishment of TARMAC Aerosave, a joint-venture with the other project partners. Since operations began in 2009, more than 100 aircraft have landed at the facility in Tarbes and 30 have been dismantled and recycled.

"LIFE PAMELA focused mainly on older aircraft, such as the Airbus A300," says Airbus LIFE PAMELA project manager Olivier Malavallon. "When the LIFE project finished, we also set up another follow-up project, which we called PAMELA-A380 (2007-2009). This was a self-funded project, aimed at validating the scalability of the PAMELA methodology to newer aircraft (size and materials wise)."

Mr Malavallon explains that before an aircraft can fly, Airbus needs to certify it, which is carried out via a static test cell: a full scale aircraft structure. Once the static test programme is completed the structure has to be discarded. So with PAMELA, Airbus took the opportunity to develop its knowledge of new aircraft dismantling and recycling before they reach the end of their life (in 25 years or so).

"We also use this knowledge to provide feedback to the design office to better design aircraft within the framework of ISO 14001 certification," he adds. "The idea is eventually to move from a linear production mode to a closed circle, or cradle-to-cradle approach."

Photo: AIRBUS S.A.S./E'M COMPANY/PIGEYRE P

TARMAC employees receive in-house training on how to safely dismantle aircraft

The economic and social case for PAMELA is compelling, according to Mr Malavallon: "Both of these PAMELA projects have contributed to the development of new skills, not just within Airbus, but also within our partner organisations, among our suppliers and of course, at TARMAC. PAMELA has also provided a methodology for dismantling and recycling that can be applied to any kind of commercial aircraft."

Job creation

In terms of job creation, some 25 people worked directly on the LIFE PAMELA project at Airbus. Mostly they were recruited from amongst the partner organisations and some people were recruited externally. TARMAC currently employs some 48 people, all of whom receive in-house training. They are trained to dismantle any kind of aircraft, through on-the-job training and some classroom-based learning. The training covers not only dismantling, but also the risks associated with the dismantling process.

"At the end of the project, some people went back to the partner organisations, some went to TARMAC and some went back onto the jobs market," says Mr Malavallon. "The people who went back on the jobs market were mainly those who did not have specific skills or expertise before the project, so the new skills developed did enhance their employment prospects."

Those who remained in the partner organisations and TARMAC also developed new skills. People involved in the project were at the cutting edge in terms of knowledge and skills in this very specialist area, so it has enhanced their career prospects in the long term.

Since 2009, 30 planes have been dismantled and recycled

"The establishment of TARMAC was one of the LIFE project deliverables: to validate the business model developed by the project," explains Mr Malavallon. Job creation was therefore a goal of the project. TARMAC started operation in 2009 and now, four years on, the results are very positive."

The next step

Whilst the TARMAC plant at Tarbes is continuing to grow and develop, it has also participated in a call for tender to create a huge storage and dismantling site for aircraft in Aragon, Spain, in the city of Teruel. This new facility will be able to store up to 250 aircraft, making it almost 10 times the size of the one in Tarbes, and will also engage in the dismantling and recycling of aircraft.

The plant is due to become operational in the second half of 2013. This would be a continuation of TARMAC's activities at Tarbes but on a much bigger scale, with significant potential for further job creation. It will be a 100%-owned subsidiary of TARMAC and will enhance considerably TARMAC's ability to manage end-of-life aircraft, fully respectful of health and safety and environmental regulations, using the same process and business model.

"There are many other companies in the business of dismantling aircraft in Europe," says Mr Malavallon, "but the PAMELA methodology is considered today as a benchmark in the business and today TARMAC recycles/reuses more than 90% of the weight of the aircraft, despite the fact that there is no specific regulation in this area.

"This is a niche business (the weight of commercial aircraft reaching end of life is about 0.4% of the weight of cars reaching end of life in a country such as France); with the capacity TARMAC will add in Tarbes and Spain this will probably [be sufficient] for the western European market," he adds.

TARMAC has demonstrated that, even in a very highly regulated sector, there is still room for a viable and profitable business, without the need for outside funding.

Like any waste

In terms of policy gaps, there is a need to ensure that all relevant regulations are enforced, which is currently not always the case. An aircraft is composed of numerous different components, some of which are regulated and this needs to be enforced. For example, the handling of electronic components is regulated by the WEEE Directive.

"End-of-life aircraft should not be exempted from [a proposed new EC Regulation on end-of-life vehicles] but should be treated like any waste," asserts Mr Malavallon, who adds that wider enforcement would undoubtedly mean, "Room for new jobs and new business opportunities. If people are enforcing the Regulation then most of the current dismantling yards in Europe will have to change the way they are working."

He adds that the implementation of the Regulation would, "Create the need for new skills and new jobs. There will also be a need for more auditing and better trained auditors. But business in Europe is not just driven by regulation: What is important is to provide the relevant services for the business community, something TARMAC is already doing. This is the way business has to go in the future, to save energy, materials and more: It is a strategic choice for businesses today."

Project number: LIFE05 ENV/F/000059

Title: PAMELA - Process for Advanced Management of End of Life of Aircraft

Beneficiary: AIRBUS France

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Period: 01-Mar-2005 to 30-Oct-2007
Total budget: €3 243 000
LIFE contribution: €1 160 000

WASTE

Turning waste ships into a new green economy

'Recyship' is an ongoing LIFE Environment project that is providing a model for the clean, green recycling of end-of-life ships, creating new jobs and giving a new outlet for workers to transfer skills and help revive declining shipyards.

Photo: Justin Toland

Miguel Ángel García Molina, Managing Director of Reciclauto Navarra, with Joao Caçola, one of the workers dismantling the Vandoma

When a ship reaches the end of its working life, it is normally sold as scrap and dismantled. Typically, around 90% of an end-of-life ship consists of high-quality iron or steel that can be recovered and re-used; however the remaining 10% may include significant quantities of dangerous waste. The majority of end-of-life ships are dismantled outside the EU, often in countries where workers lack protection and health and safety standards are lax (e.g. Bangladesh, India, China and Turkey). This is in contravention of the Basilea Agreement, which bans the export of dangerous waste to developing countries. Much of that waste is dumped directly into the environment.

An ongoing LIFE Environment project in the Iberian Peninsula is working to develop an alternative to these harmful practices by demonstrating that it is possible to create a new ship dismantling industry within the EU that adheres to best practices in terms of waste disposal, creating jobs through the 'green restructuring' of dockyards currently specialising in shipbuilding and/or ship repairs.

Led by the the Spanish beneficiary Reciclauto Navarra, the 'Recyship' project (**LIFE07 ENV/E/000787**) is demonstrating its methodology for decontaminating and dismantling 'waste' ships at the Navalria Drydocks in Aveiro, Portugal. Two

ships – the Libertaçao and the Vandoma – have already been safely dismantled in accordance with the project methodology; at least a further three boats are set to be dismantled before the project ends this September.

"The only way to compete with companies outside of Europe is to reduce costs; more technology; more safety. That's the concept in this LIFE project," explains coordinator Miguel Ángel García Molina, Managing Director of Reciclauto Navarra.

Safer, greener processes

A key element of the LIFE project's pioneering role in the creation of a modern ship recycling industry has been through the testing of technological advances that can make the job of dismantling and decontaminating the vessels safer. "We have developed new technology for ship recycling and we want to implement this in shipyards around Europe and perhaps around the world," says Aitor Calderón of Reciclauto Navarra, a technical engineer on the project.

The 'Recyship' team has been validating three prototypes – one for steel cutting, one for paint removal and one for treatment of water and other waste liquids. The paint removal system has been developed because, as Mr Calderón explains, "ships' paint can be toxic – containing TBTs, PCBs, heavy metals etc – the workers inhale this when they remove the paint to cut the ships."

The prototype system instead uses the abrasive corindon (which can be re-used up to five times), together with a vacuum system, so that the operator is not at risk of inhaling potentially toxic particles during the removal work. He or she undergoes "one or two days" training with the developers prior to using the system, explains Navalria's financial director, Victor Figueredo. "We are very clear that people who are going to work in dismantling have to receive complete training and learning," he says. The people doing this work are not only learning new green skills, they have also provided important feedback about the ergonomics of the system that is being used to improve the prototype.

The paint is only removed from areas where the steel is to be cut. For that part of the process, the project is trialling the use of a new, automated steel cutting technology, developed by project partner Tecnalia, and based around the use of electro-magnets. Recyship communications manager Jesus Jiménez highlights the benefits in terms of safety: "With this prototype you program the machine and it makes the cut; if a person is cutting there can be an accident." Mr Jiménez explains that his brother "died in a shipyard accident; that is why I was very keen to work with this project."

The 'Recyship' team trialled this safer paint removal system

The water treatment prototype is designed to remove liquid from the ship's ballast tanks, as well as 'bilge water', an environmentally-unfriendly mix of water, oil and other liquids that collects at the bottom of the inside of the vessel because of leaky equipment. The five-step process sterilises the wastewater so that it can be re-used for cleaning ships.

How it's done

Mafalda Mota is an environmental engineer who is responsible for environmental and safety issues at Navalria Drydocks. "I have worked here two years; before that I worked in waste management. It's different, it's new, it's interesting," she says. Much of her work on the 'Recyship' project has focused on drawing up procedures for the decontamination and dismantling of the end-of-life vessels. The first stage is to decontaminate the ship; removing fuel, water and other waste liquids and venting any dangerous gases; next comes the site inspection to calculate the re-sale value of working equipment and the scrap value of metal parts; finally, a plan of action for dismantling is prepared. "I have to think which piece to cut first, which second, which third and so on," explains Ms Mota. "This work is quite similar to repair work, but the most difficult thing for dismantling ships is the stability of the ship," she explains.

Decontamination and dismantling of the Vandoma – a decommissioned 35 m-long tug boat that was launched in 1944 - was scheduled to take 25-30 days; larger ships with a flatter hull, such as dredgers, can be recycled more quickly. Some 10-12 people were directly involved in the work, from those separating the onboard waste according to EU List of Wastes (LOW) codes, to the person operating the water treatment system; the men cutting up the ship; as well as forklift and other drivers.

João Caçola is one of the men responsible for dismantling the Vandoma. During a break from work, he explains what he is doing: "I am cutting up the bridge into three pieces. The size of the piece depends on the ship. We open the cover and that allows us to see what the risk points are, where the combustible areas are and that enables us to work out where to start and how to cut the ship." With 30 years of experience repairing ships, many of his skills are also relevant to this new green dismantling project. However, there are also some new challenges: "It's more dangerous [than repair work]; you must be more careful. We have to work without making mistakes, because a mistake could be fatal. One problem is knowledge (of the ship). We have to know perfectly what the risk points on the boat are." This is one of the things that Ms Mota addresses in her dismantling plan, in which safety is paramount.

Photo: Justin Toland

Environmental Engineer Mafalda Mota has developed procedures for decontaminating and dismantling end-of-life ships

Another of her tasks is to devise procedures for separating the waste according to the LOW codes and communicate these to the workers. "We can sell things like engines and steel on the second-hand market; other material is recycled internally," explains Mr Calderón. "Nothing goes to landfill," says Mr García proudly.

Mr Caçola is proud to be pioneering a new green industry 30 years into his career. "With regulation, it could be a job path like any other," he believes. "I am absolutely confident that this is a way of the future because if we don't dismantle it this ship will sink and will go to the bottom of the sea and that will be terrible."

"It's very important to close the lifecycle of the vessel," concurs Mr García.

Growing a new sector

"Our activity of dismantling ships is complementary to building ships," stresses Mr Jiménez. "Navalria has demonstrated that it can build ships and dismantle ships at the same time. We want

Navalria Drydock in Aveiro employs more than 100 people and has been in operation since the early 1980s

to translate this model to Cadiz and Castellon. It's an opportunity to create jobs in areas where the unemployment rate is very high. In Spain we have some dry docks that at this moment haven't any use," he notes.

On top of the new roles for existing workers doing the dismantling, the LIFE 'Recyship' project has created a small number of jobs at Reciclauto Navarra, Navalria, mechatronics and robotics specialist Tecnalia, environmental consultants Prysma and project partner, FWD. This is a good start, but Mr García believes the potential outcome in the medium-to-long-term could be as many as 400 jobs in Spain alone, working on some 120 ships per year (around 150 European-flagged vessels are put out of use annually, suggesting further ship recycling opportunities in other Member States). "Spain was leading the world in this industry in the 70s, but dismantling had a bad press: it's a black hole in the harbour; dirty; dangerous; disgusting - necessary, but disgusting, but we are pushing a new mentality, like Formula 1 - all is clean; safe; environmentally responsible. It gives another vision to that type of industry," he says. "It's a new mentality," adds Mr Calderón.

Obstacles to clear

However, there are still barriers to the creation of this new, green sector. One is know-how, which the 'Recyship' team is addressing in several ways on top of the specific on-the-job training for the workers at Navalria. Ms Mota, for instance, plans to present her procedures to a Portuguese engineers, association for approval and dissemination. In addition, as one of the project actions, FWD is in the process of creating an on-line ship recycling training plan aimed at technicians. Another means of dissemination is through a series of lectures and seminars on the 'Recyship' approach by Mr García at the University of Castilla-La Mancha in Spain. Finally, the project has carried out economic feasibility studies to show the potential of a green end-of-life ship recycling sector.

One of the recommendations of these studies is that European legislation is modified so that end-of-life ships are classified as hazardous waste. "A boat out of use is an environmental bomb - we are talking about oil, we are talking about asbestos. This project is very important because we are avoiding sending such a bomb to the bottom of the sea," explains Mr Jiménez.

'Recyship' recommends that end-of-life ships above 500 gross tonnes be given a LOW code to avoid the current situation where boats that are not dismantled dangerously outside the EU are left unattended until they sink, or are scrapped by car dismantling facilities without the green skills to do the job safely and properly. Thanks to the efforts of Ms Mota, Navalria has become the first dry dock to have legal permission to dismantle end-of-life ships as well as cars, an important first step in putting the legislative framework in place to build a new, green ship recycling industry.

The project is also mentioned in the Directive Impact Assessment for the draft Directive on ship recycling and its concept of the best available technologies to be used in ship recycling operations has been proposed as an amendment to the draft.

Project number: LIFE07 ENV/E/000787

Title: Recyship – pilot project for dismantling and decontamination of out-of-use ships

Beneficiary: Reciclauto Navarra

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Period: 01-Jan-2009 to 30-Sept-2013
Total budget: €3 393 000
LIFE contribution: €1 687 000

WASTE

Creating green jobs via **a new market for pig waste**

The Spanish project 'ES-WAMAR' has shown that an effective management system for pig slurry not only encourages environmentally friendly management of this waste, but also creates sustainable jobs implementing the system.

Photo: LIFE06 ENV/E/000044

The ES-WAMAR project developed a system for using pig slurry as fertiliser

Villages in the countryside of south-east Aragon have a long history of pig farming, an activity that remains one of the main sources of jobs and income in the area.

Greater professionalism and increased production have brought economic benefits to pig farmers, but also environmental costs and benefits. "I started to realise that we had a problem with pig slurry in our municipality," remembers Francisco Esteve, Mayor of Peñarroya de Tastavins. "We had about 40 000 pigs, but only about 1 500 ha of useful arable land where we could spread the slurry. Thus there was a need to provide sustainable solutions to improve manure management and reduce its environmental impact in areas with high pig production."

Improper handling of manure, mainly the repeated application of high doses into fields, has led to a number of environmental problems: nitrate pollution of surface and ground water, eutrophication, accumulation of phosphorus (P) and heavy metals in soil, as well as ammonia and greenhouse gas emissions. In addition, the foul odours generated when the waste was spread were socially unacceptable.

Anti-pollution legislation existed, however it was very difficult to enforce as people were often just trying to get rid of the slurry any way they could.

A new market and new jobs

The solution provided by the LIFE project 'ESWAMAR' (**LIFE06 ENV/E/000044**) was to put in place a system to exploit the potential value of the pig slurry as fertiliser, rather than seeing it solely as a waste product. Delivery of this system not only provided benefits to pig and arable farmers, but created jobs for local people.

Mr. Esteve explains: "Through the LIFE project we have introduced a management model for the slurry that demonstrates that it is possible to both avoid pollution and provide valuable fertiliser to agricultural farmers. Through some fairly simple organisation you can take the slurry to different areas where it is needed, reducing the nutrient burden on small areas of land."

The system was based on the establishment of local swine waste management enterprises (SWMEs). These SWMEs work to create a bridge between pig and arable farmers, much of which involves simply matching up the supply and demand for pig slurry. However, there are also several technical aspects to this work, including the application of the Best Available Techniques, slurry analysis and dosing calculations for application as fertiliser.

By providing a cheap disposal option for pig farmers and cheap non-chemical fertiliser for arable farmers, the system created the financial incentives to make it feasible in principle and sustainable in practice. This meant the creation of sustainable jobs to operate the system.

Tractor drivers were trained to use the new computerised spraying system

Photo: Gabriella Camarsa

Pig slurry management jobs and skills

Arturo Daudén Ibáñez, who managed the LIFE project on behalf of the Environmental Development Society of Aragon (SARGA; formerly SODEMASA), notes that, "The project created 16 jobs for local people (running the three SWMEs): three local coordinators; one salesman; one foreman; two plant operators; one clerk; five tractor drivers; and three lorry drivers."

One of the people employed by the project was Fernando Ederra, who, since November 2009, has been the manager of the Tauste Swine Waste Management Enterprise. This coordinating role involves overseeing the whole system for the area, ensuring that agreements are reached between pig farmers and arable farmers and that the slurry is treated and distributed appropriately and efficiently.

Mr Ederra has a degree in Agricultural Engineering at the Public University of Navarra but his new role required specific training to develop new green skills. "All the jobs I have had have been related to agriculture. In my previous job I was working for an animal food factory, responsible for computerised management of the pig farms. However, this new role [was quite different] and I had to learn about new technology, creative thinking, innovation tools, SWOT analysis, and so on. I had a month of training in 'Specialisation in Innovation Management'."

Other jobs throughout the SWME also required new green skills, most often provided by experts from SARGA. Key to the whole operation is a software tool for the centralised management of the system, called GEMA. This includes a database with information from all participating pig farmers and arable farmers, so that the coordinators, with their scientific and technical background, not only know current production levels of pig waste, they can also match it to arable land available for fertilisation.

Knowledge of how to optimise the application of pig slurry as a fertiliser has been key to the success of the project. With the help of the GEMA tool, coordinators such as Mr Ederra have learned, according to the composition of the slurry analysed, how to determine the correct amount to be spread according to the land and type of crop. This information must then be communicated to the tractor drivers out in the fields, who enter the data into a computerised spraying system fitted to their vehicles, a

new green skill for the drivers – taught through the project - which ensures the optimum use of this waste as an organic fertiliser.

Spreading the knowledge

As well as the green jobs directly created by the project, it further aimed to transfer new knowledge to other stakeholders in both pig and arable farming sectors, including technicians, vets and especially farmers. "We held 34 seminars and 17 open sessions reaching more than 1 500 participants," says Mr Daudén. These focused in particular on increasing farmers' knowledge and awareness of environmental problems generated by manure and of ways of minimising those problems. The training sessions highlighted aspects such as the Best Available Techniques for slurry management in order to reduce pollution at source, new standards for the sustainable application of pig slurry to the land and how to use the management-system software developed by the LIFE project.

A number of local farmers also took part in field trials arranged by 'ES-WAMAR' testing the applicability of pig slurry as a fertiliser on a variety of crops. Results were very promising, indicates Mr Dauden: "Yields were the same or slightly higher [than with mineral fertilisers] and cost savings ranged between 45% and 78%, depending on local circumstances and crops."

The future

Mr Daudén highlights the continued job creation potential of this new market: "As a consequence of the results obtained in this project, four new SWMEs are being created in four different areas of Aragón with a similar problematic." One of them, Ejea de los Caballeros, has now started work, taking as its example the management system and experiences of Tauste municipality.

The project partners are continuing to promote the establishment of these systems and the jobs that are necessary to operate them. Mr Daudén adds that since the LIFE project ended, "More seminars have taken place, both in the municipalities covered by 'ES-WAMAR' and in other new regions interested in the centralised management [approach]. They are aimed at all the stakeholders of the [potential] management process."

Photo: Gabriella Camarsa

Fernando Ederra, manager of the Tauste SWME analysing the composition of the slurry before its application on farmland

Other potentials are also being explored: "Since the project we have also worked to set up a biogas plant so that we can sell electricity to subsidise the treatment of the pig slurry and keep the costs down for farmers," says Mr Esteve. The idea is to combine pig and olive waste to generate biogas, and both solid and liquid fertilisers as before. "This should create further economic advantages and yet more jobs in improved management of pig slurry."

Project number: LIFE06 ENV/E/000044

Title: ES-WAMAR - Environmentally-friendly management of swine waste based on innovative technology: a demonstration project set in Aragón (Spain)

Beneficiary: SARGA - Sociedad Aragonesa de Gestión Medioambiental, S.L.U.

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Period: 01-Oct-2006 to 31-Mar-2011
Total budget: €6 900 000
LIFE contribution: €2 564 000

WASTE

New jobs in **petro-chemical catalyst recycling**

The LIFE BASHYCAT project developed a recycling solution for used catalysts from the petro-chemical industry. This has already created 29 sustainable jobs and holds the promise of many more in the future.

The petro-chemical industry has sought to meet the requirements of an EU Directive on atmospheric pollutants (2001/81/EC) through the use of hydro treatment to extract potentially harmful elements. This involves combining the oil with hydrogen, heating it to more than 300°C and feeding it into a reactor loaded with a catalyst. Chemical reactions deposit metals on the catalyst and combine, for example, sulphur and nitrogen compounds with the hydrogen.

This technique avoids creating atmospheric pollutants such as sulphur dioxide and nitrogen oxide. However, the process is not entirely environmentally clean. After a time, the catalysts have reacted as much as they can and have become 'used up'. These used catalysts are themselves a hazardous waste, containing the elements they were originally composed of as well as the harmful elements captured.

The BASHYCAT project demonstrated a resource efficient catalyst recycling process that recovers several raw materials

'BASHYCAT' (**LIFE06 ENV/F/000125**) is a French LIFE project that developed a treatment process for two types of used catalyst: nickel-molybdenum (NiMo) and nickel-tungsten (NiW). The solution involves processes of roasting, plunging the catalysts into water (hydrometallurgy) and heating (pyrometallurgy). It is able to extract several usable materials, including regenerated catalyst, metals and minerals.

Job creation

By implementing a process that extracted valuable end-products from the used catalyst, the 'BASHYCAT' project created 19 sustainable jobs within three partner companies during its lifetime. An additional 10 jobs have been created since the end of the project as the companies have worked to expand implementation of the process.

Sophie Comte was hired as a development project manager by the project beneficiary, VALDI, a private SME with a specialism in regenerating metals from industrial waste. Now a full-time laboratory manager, Ms Comte highlights the job creation aspect of the project: "At VALDI, we took on 12 new people: one development technician; one development project manager; one development operator; six process operators; and three logistic operators."

Other jobs were created in the partner companies. L'ELECTROLYSE, a private company that specialises in treating chemical waste recruited three people: one laboratory technician and two hydrometallurgy process operators. The Eurecat Group, providing off-site catalyst services to the petro-chemical industry, created four marketing posts.

Training

The educational background of the new recruits was important. "The lab technicians all have higher education qualifications, mainly in chemistry or environmental science," says Ms Comte. "L'ELECTROLYSE has a relationship with Bordeaux 1 University that runs a specific course in industrial chemistry and recycling of materials, which was a good source for the technician level."

"The operators are usually educated to secondary level," she continues. "We looked specifically for people with a professional BAC in chemical processes, but it was not always so easy to find people with the right profile." Furthermore, the education received was not sufficient to work in the new sector of activity developed by the 'BASHYCAT' project.
"In order to treat a large volume of NiW catalysts, we had to adapt our existing equipment and train people in the use of this equipment and in the different processes. In all cases, we had to give people a minimum of three months on-the-job training [to fulfil their new roles]."

A particularly positive aspect of the project, however, was that the recruitment and training led to sustainable jobs. "After the project, for each partner, all the jobs created were conserved," highlights Ms Comte. Furthermore, as the sector developed "there were other jobs created; [specifically] five additional operators at VALDI, and four additional operator jobs and one marketing role at L'ELECTROLYSE."

The future market

The project expected to create an additional 80 jobs as the market developed beyond the end of the project. However, "the economic crisis led to a reduction in demand for raw materials and so a reduction in the price of metals contained in used catalysts. This has slowed the development of the sectors begun during the BASHYCAT project," says Ms Comte.

A personal story

Job creation is good for the economy, but also important in individual lives. David Raynaud, 27, was recruited at the beginning of the project as a development technician. "It was my very first job. Before I started at VALDI I was in tertiary education at a college in Poitiers. I was studying a two-year course in organic chemistry and a qualification in environmental protection."

The project provided a technical job for Mr Raynaud at a time when it was already becoming harder for young people to find work. "At first it was difficult to find a job in the region, so I was very happy to get an opportunity with VALDI," he remembers. "It allowed me to stay in the region where all my family and friends live, and to work in a field that really interests me and relates directly to my education."

David Raynaud, process manager at VALDI

Mr Raynaud has now been at VALDI seven years and has risen to the role of process manager of a furnace that is used for the nickel-tungsten catalyst recycling. "[The project] has given me good career progression opportunities. I started as a lab technician, then I worked in a process unit, but now I am responsible for managing two parts of the process and for the work of 15 operators."

He is also positive about his future career, thanks to the development of the catalyst-recycling sector. "I think and I hope that this sector will provide good prospects in the future."

Nevertheless, as Gaël Pochart, Process Production Manager at VALDI, highlights, "We are hopeful that this situation will change within the next two to three years. Supply of the raw materials we deal in is finite and falling. So we are confident the demand for recycled metals such as molybdenum, tungsten, nickel and cobalt will rise."

However, market forces alone may not be enough. Sophie Comte concludes by highlighting the importance of European legislation to the development of the sector: "Our business is based on the implementation of European environmental regulation. The more European laws oblige industrial firms to recycle their waste, the more our business will increase and the more jobs we will create."

Project number: LIFE06 ENV/F/000125

Title: BASHYCAT - BASHYCAT: Basic hydrometallurgy on catalysts

Beneficiary: VALDI

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Period: 01-Jan-2006 to 31-Dec-2008
Total budget: €11 315 000
LIFE contribution: €2 733 000

CAPACITY BUILDING

Transferring skills for forest fire management

Wildfires are a significant problem in Greece. Through training and support, a LIFE project has helped transfer academic expertise in nature hazard management to the local authorities responsible for designing the country's forest fire action plans.

Every year, Greece suffers an average of over 1 500 wildfires, burning more than 35 000 ha of forests. A national law of 2002 transferred significant responsibility for dealing with this problem from the national level to local authorities. It required each municipality to have a civil protection office and draft annual action plans for forest fire management.

Dr. Ioannis Papanikolaou of the University of Athens highlights the importance of local action plans. "The plan should be compiled by the Civil Protection office of each municipality, updated annually before the onset of the forest fire surveying period. It requires the cooperation of the forest service, the fire brigade, the police, the volunteers and sometimes the army. Up to now, 25% of [Greek] municipalities do

A forest fire in the area of Attica

not have action plans and the vast majority of the municipalities have inadequate plans with no spatial data (e.g. maps). Without good plans, it is easy to make mistakes, especially in the high-pressure situation of an actual fire." Such mistakes not only have made inefficient use of the available resources, but have failed to prevent damage to forests and loss of life.

In August 2007, 63 people were killed in forest fires in the Peloponnese, most of them in the Ilia Prefecture and the municipality of Zacharo. After an investigation, the public prosecutor launched the first legal proceedings for negligence against local and regional civil protection officers for a failure to deliver the legally required local action plans and for poor prevention practices. However, whilst such legal enforcement may be necessary, it was also apparent that lack of political will was not the only obstacle to successful delivery of local action plans.

In many cases, civil protection officers lacked the know-how to take advantage of modern technologies to inform the development of such plans. Some simply did not know where to start, particularly when faced with competing pressures on their time and resources. The result was the LIFE 'Forest Cities' project (**LIFE08 ENV/GR/000553**), which sought to develop expertise on forest fire prevention planning and train local civil protection officers how to implement it.

Developing the knowledge base

The University of Athens already had a long history of work on prevention and management of natural hazards. "Masters students had been learning how to use GIS mapping as a tool in earthquake management since 2005," explains Dr Papanikolaou. "We knew that GIS mapping could also be a useful tool for planning the prevention of forest fires."

The 2007 forest fires had provided the incentive to start work on precisely this approach. "We developed a pilot initiative to use GIS mapping to inform better forest fire prevention planning. This was not very sophisticated, but it helped show the potential," says Dr Papanikolaou.

Within the LIFE project, the University of Athens and the Technical University of Crete Department of Electronics and Computer Engineering cooperated with a network of stakeholders to develop a risk-assessment model. They adapted forest-fire prevention work from California to the situation in Greece, using their knowledge of the most important parameters. The model overlays maps of key natural and human risk elements – including vegetation type, slope gradient and presence of electricity pylons - to identify the areas of forest most at risk of fire.

'Forest Cities' had two municipalities as project partners: Serres and Ilioupoli. The academics worked with these two local authorities to develop complete local action plans that could provide an example to others. The work helped confirm the fire risk assessment model that the team had developed and provided concrete examples of its benefits.

The system highlighted clear inefficiencies in current planning. Dr Papanikolaou remembers that, "We mapped the areas of forest visible from observation towers in Ilioupoli. We found that not only did many towers overlook urban areas as much as forest, but the location of the towers left large 'blind spots' within the forest. Furthermore, by overlaying with the fire-risk maps, we saw that these blind spots were often areas of forest at greatest risk from fire."

The GIS maps also highlighted areas with limited access by road, no water points or where electricity pylons within forests created increased fire risk. The benefits to local planners were obvious. They could reallocate their resources - including towers, water points and volunteers - more efficiently, improve access for firefighters to vulnerable ar-

The project leaders demonstrated improved forest fire management skills

eas, increase safety by planning evacuation roads and reduce risks - for example, by clearing forest around electricity pylons.

Preparing the training

The result of the project team's efforts was a template that could be used to develop a local forest fire action plan in any area of Greece. This template was to form the basis of the training provided by 'Forest Cities' to civil protection officers and other relevant staff at local level. It also helped finalise detailed guidelines for the development of action plans for forest fire prevention that take the reader through the process step by step.

To confirm its relevance and the interest of local authorities, the project undertook a few preparatory actions. Firstly, it held a seminar in Crete for six representatives of five local authorities. Talks explained the current legal situation, presented the cases of the local action plans developed by Serres and Ilioupoli and set out what data are needed to elaborate similar plans. The seminar confirmed the interest of local planners in the project's work.

A second seminar presented the two completed local action plans to 45 representatives of local authorities, regional authorities, forestry agencies, voluntary organisations, the fire service and the military on the Greek mainland. Participants were shown how the plans were developed and the tools necessary to draft a similar plan. "The positive engagement of the volunteer organisations was a happy surprise," highlights Dr Papanikolaou. "They can help convince more local authorities of the value of developing action plans."

The project also conducted a survey of local authorities to which 125 of the 325 Greek municipalities responded. It confirmed their urgent need for the 'academic' knowledge and expertise developed in the project. Nearly 25% of the municipalities had no local action plan and of those that did, 85% did not use risk maps or spatial data to inform them. The lack of training was identified as a key obstacle for successful local planning by 65% of municipalities.

Finally, the project identified municipalities that were well placed to benefit from training and with the capacity and potential to adopt a local action plan. Kostas Georgiou, one of the project managers, explains that "The project beneficiary, PEDA, was the key to engaging local authorities with the training. It has a good reputation and communicated directly with mayors." From the interested municipalities, six municipalities and one association of municipalities

GIS mapping was used to create fire risk maps, an important tool for forest fire prevention

were selected to undertake the training to develop a local action plan.

Training the local planners

Dr. Papanikolaou explains that the logic of the training "was not to teach anything 'by heart' but for participants to learn and understand the methodology. If you know what you need, how to use the necessary tools and the process you need to follow, afterwards you can put it into practice by yourself."

The training took the participants through a process of several stages. They firstly participated in an event similar to the Crete seminar where the legal context was explained and they were presented with the example local action plans and told what data would be needed. Then they went away and started gathering the information for their municipality.

At the following session, they were shown how to input the data they collected into the GIS system. An e-Forum was used for ongoing support in between the training sessions. At two subsequent sessions, the trainers helped deal with any issues the participants were having developing their plans and municipalities learned from each other's issues and progress.

By early 2013, the project had reached the point where sessions needed to be individualised to deal with the specifics of each plan; three of the six municipalities were nearing completion of their plans.

The value of the training has not been lost on the trainees. Michael Pantelakis, technical service manager for the Association for the Development of Western Athens – a grouping of nine municipalities – explains: "We have data on forest fires going back to the 1980s in our region and had some experience of GIS in other contexts. However, we did not know how to use the data we had to create fire risk maps. We had local action plans based on our experience, but now we have a tool to assess the situation more systematically." The Association hopes to develop a GIS network across its nine member municipalities.

Local authorities took part in seminars and training sessions on GIS and the development of forest management plans

Maria Papantoniou works in the Urban Planning Department of the Municipality of Agia Paraskeui. "I was not working on the issue of forest fires before, but my mayor asked me to attend the training as I already had some knowledge of GIS. The Civil Protection Office has no IT expertise, so I am in charge of gathering the necessary data to prepare the plan. Once the database is completed, I will share it with the other relevant departments." The training provided by the project is extremely practical. It aims to lead directly to the final product of an actual local action plan.

The future

The LIFE project team aims to build momentum towards high-quality local forest fire action plans across Greece. "We hope that other municipalities will see what has been achieved and work to develop the same skills," says Mr Georgiou. He adds that there has been much interest already: "Mastic producers on the island of Chios want help to develop their own action plan to protect the special trees on the island. We have even been contacted by groups in Croatia who want to use our model."

Project number: LIFE08 ENV/GR/000553

Title: Forest Cities - Local Authorities Alliance for Forest Fire Prevention

Beneficiary: Local Union of Municipalities and Town-councils of Attica (TEDKNA).

Contact: Kostas Georgiou
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Website: www.forestcities.gr
Period: 01-Jan-2010 to 31-Dec-2012
Total budget: €698 000
LIFE contribution: €2 564 000

CAPACITY BUILDING

Helping to fill green skills gaps in Italy

A three-pronged approach to green skills support in Italy is targeting higher education establishments, public administrations and private sector experts in a strategic bid to broaden environmental knowledge.

One of the challenges involved in achieving environmentally sustainable growth in Europe relates to improving the integration of environmental thinking into mainstream professional training schemes. Italy's 'SUN EAGLE' project (**LIFE09 ENV/IT/000115**) set out to tackle this task by working with a wide variety of stakeholders from Mountainous communities in four Regions of southern Italy (Campania, Puglia, Basilicata and Molise), as well as South Epiro in Greece.

The project planning processes identified a demand for improving environmental considerations in the way that public and private sector professionals operated. A coordinated programme of green skills training was therefore designed, organised, and launched in response.

LIFE support deliberately set out to target private and public professionals on three levels. Firstly, strengthening environmental know-how amongst trainers and educators was seen as vital for ensuring a long-term improvement of sustainable development skills among graduates and trainees from private and public training bodies (this included enforcing the role of the university in forming these profiles and in creating a link between the university and both public and private sector employers). Secondly, boosting such skills of public sector officials was also seen to hold good possibilities for achieving multiplier effects between and within municipal departments. Thirdly, project organisers acknowledged the role that expert consultants can play in helping businesses and public services to become greener in the way they operate.

With these three target groups in mind, the 'SUN EAGLE' project has been focused on providing green skills that augment the professional capacity of educators, foresters, engineers, auditors and other key personnel involved in the governance of environmental resources. Improvements in the management and energy use and CO_2 emissions remain core themes for the project's training actions.

Public sector foresters were trained in forest management technique for storing carbon

Sustainable forests

SUN EAGLE manager Alessandro Coppola explains the rationale behind the project's targeting of its skills support to foresters. "Forests are our main environmental resource here in the Mountainous municipalities and so it is important that we look after the forests and use them in sustainable ways. However, our forestry education system was focused more on productivity skills and we needed to find a way of improving knowledge among our forest engineers working in the public authorities about the functions that the forests have in terms of carbon storage and climate change mitigation

and incorporating these aims into planning solutions in forests management plans."

The first stage involved mapping the forests in the project area to determine their CO_2 absorption capacity. This task was carried out by the beneficiary, the Second University of Naples, with the expert help of Professor Corrado Ievoli from the University of Molise. A carbon storage database was created for each of the Mountainous communities. Using this information, the university experts modelled different scenarios for use of the forest biomass (from no use and no management interventions to total use), each of which correlated to a socio-economic benefit analysis. Through an analysis of existing Forest Management Plans, they were able to identify not only that the plans lacked carbon sinks data, but also that, even if they had such data, the public authorities lacked the scientific tools to translate it into the norms and actions foreseen by the Kyoto Protocol. Thus the university experts provided training to forest engineers in each of the Mountain communities to enable the engineers to translate their chosen scenario into concrete actions and norms for a certain political programming period.

"A particular priority was to facilitate a wider appreciation of forest management techniques for storing carbon and exploiting forests' full potential as social and economic assets. To do this we needed to train public sector foresters as well as private sector consultants who can advise the full range of forest owners," explains Professor Sergio Vellante, head of the project's Technical and Scientific Committee.

There are long-term implications for all forest engineers. They will need to learn how to make decisions about which trees to fell based on a scientific approach that ensures that carbon storage remains high at the same time as the economic use of the forest continues. They will also need to communicate this information and new way of felling trees to the forest workers.

Federico Antonio Di Marzio, from the Molise Mountainous community, believes the additional green skills were badly needed by local foresters: "The LIFE project helped us to hire and train a forest engineer in sustainable management techniques and she has used this knowledge to improve the way we implement our Forest Management Plan."

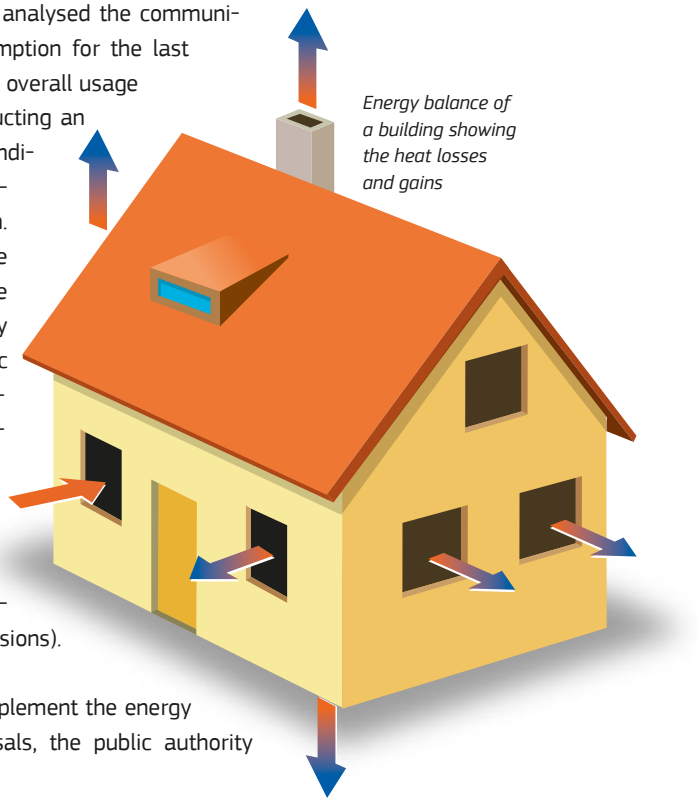
Such outcomes are welcomed by Professor Ievoli, who was aware that, "These types of environmental management modules covering climate action topics do not form part of the forest engineering courses offered by the University." 'The LIFE 'SUN EAGLE' project has filled that green skills gap and provided knowledge that can be picked up by the forest educators and passed onto to new generations of forestry graduates in the region. "Now we know how to manage the territory's forests in harmony with the Kyoto Protocol," surmises Professor Ievoli.

Energy skills

Public authorities often generate large carbon footprints but such impacts may be reduced when public bodies have sufficient understanding about how to adopt greener practices in areas such as energy use. 'SUN EAGLE' has shown how this can be done in practice through providing training in a range of sustainability techniques, including energy audits and energy efficiency.

Vincenzo Raucci is an external energy adviser who took part in a project working group led by Professor Biagio Morrone from the Second University of Naples. The aim of the group was to increase the energy efficiency of the 18 Mountainous communities and to strengthen their skills and knowledge on the subject "We showed them how to carry out energy audits and we provided them with plans that they could apply to reduce both energy use and carbon dioxide emissions," says Mr Raucci.

The working group analysed the communities' energy consumption for the last five years to get an overall usage trend, before conducting an analysis of each individual source of energy consumption. This allowed the consultants to write an energy efficiency plan for each public authority, proposing a range of actions to reduce consumption as well as the costs involved and impacts (e.g. the reduction in CO_2 emissions).



Energy balance of a building showing the heat losses and gains

To interpret and implement the energy consultant's proposals, the public authority

GPP Ambassadors

Funds from the SUN EAGLE project helped to broaden knowledge of green public procurement (GPP) techniques. A total of 20 'GPP Ambassadors' are expected to complete the project's GPP course; their role will include proactively promoting these procurement principles amongst local bodies.

Angela Terzo and Antonietta Verrazzo are two of the trainees who have benefitted from the GPP course led by Laboratorio Craet, which added value to their existing engineering skills sets.

Ms Verrazzo explains that thanks to the LIFE project, "We gained the technical and legal knowledge that we needed covering the national GPP action plan, the European GPP toolkit, green labelling and green purchasing procedures."

Ms Terzo is pleased with her new green skills and says, "We have learnt how to properly assess the quantity and quality of green products purchased by public authorities. These new techniques will be very useful and they complement my engineering knowledge well. Although GPP is still very embryonic in our region we now have a much better understanding of how to move forward with helping authorities to integrate a GPP culture into their operations."

Antonella Verrazzo (left) and Angela Terzo

"will have to invest in training one person or a group of people to become its 'energy experts'," explains Professor Morrone. One of the actions of the 'SUN EAGLE' working group was thus "to provide training for one person from each authority to be responsible for supervising the implementation of an energy action plan." The training was designed to enable the trainees to independently assess energy efficiency and propose continuous improvements. Thus, energy auditing creates jobs both for the external consultant/trainer – initial training and subsequent support - and for an energy manager with a scientific background within the public authority, who is able to implement the plan, ensure compliance and propose modifications when needed.

Buying power

In addition to its focus on energy and forest issues, the 'SUN EAGLE' project was designed to increase uptake of green public procurement (GPP) skills. This is a relatively new concept in the project area and a lot of progress has been made during the LIFE funding period by using the multi-purpose approach of targeting trainers and trainees in public and private sectors.

Professor Andrea Unich of the Second University of Naples, who led this working group, explains how it worked: "We conducted an analysis of the public authorities' purchases and purchasing procedures aimed at identifying areas of potential improvement, measurement and detection of deviations and potential corrective actions." This analysis fed into a set of guidelines for the relevant staff within the authorities, each of whom received training that will allow them to make green procurement decisions largely independently.

"We trained staff from inside the public authorities and also consultants who can provide advice to other authorities," explains Antonio Gargiulo, a consultant with Anci Campania and one of the team who provided the GPP training. "Topics included teaching them how to write a green tender, how to recognise the technical specificities of products and environmental labels and certifications, and where to insert them in the public procurement tenders."

A total of 13 staff within the public authorities have received this specialist skills update through 'SUN EAGLE', whilst the 18 trained consultants will now provide GPP practice to all 160 municipalities that make up the Mountainous communities.

Experiences to date from the project's green skills model have therefore been very productive. 'SUN EAGLE's popularity is expected to help convince even more people in the Mountainous communities to upgrade their knowledge about how they can apply environmental skills in their professional (and personal) lives.

Project number: LIFE09 ENV/IT/000115

Title: 'SUN EAGLE – Endorsement actions for Governance of local environment'

Beneficiary: The Second University of Naples

Contact: Alessandro Coppola
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Period: 01-Sept-2010 to 31-Dec-2013
Total budget: €3 006 000
LIFE contribution: €1 456 000

CAPACITY BUILDING

Creating rural opportunities in forest biomass management

A LIFE project in Spain is demonstrating how sustainable forest management and fire prevention can create valuable new employment in Europe's countryside.

European forests generate over €300 billion for the EU economy and provide employment for more than two million people in the Member States. A multitude of green jobs and green skills are associated with forest work and sustainable forestry techniques continue to become more widespread within the sector.

LIFE provides support for many different types of forest activity that helps to generate jobs and strengthen skills throughout rural Europe. For instance, the 'BIOENERGY & FIRE PREV' initiative (**LIFE09 ENV/ES/000450**) is an ongoing LIFE action in Spain that is focusing on reducing forest fire risks by selective clearing and processing of biomass into wood pellets for renewable energy.

A mix of high-tech and hands-on approaches is being applied through a controlled roll-out of forest biomass reduction and management in Enguera and Moixent, two municipalities within Valencia. Jobs are a main factor driving the project, as explained by the Mayor of Enguera, Santiago Arévalo Llácer: "Our rural areas suffer from abandonment problems, which are bad for the economy and the environment. We wanted to find a win-win solution that could tackle this sustainable development challenge and we identified biomass as a good option."

The total project area covers some 20 000 ha. "We knew that better management of the forest biomass was needed to reduce fire threats," says Mr Arévalo. "We have used LIFE to help us achieve our goals in ways that also support peoples' livelihoods. The employment aspects of our LIFE project are very important to us, especially in the current poor economic climate, and we believe that the jobs created during the project will still be needed after the LIFE funding is finished and will even rise after – without the need for further public funding."

Photo: Gabriella Camarsa

Santiago Arévalo Llácer - Mayor Of Enguera (left) and Fernando J. Pradells Monzó, a forest engineer for Enguera Municipality

Forest jobs

Four direct jobs were created for the project's staff: three forestry engineers and one administrator. Additional employment for some 20 forestry workers is scheduled in the project budget, and up to 10 other jobs are forecast for a biomass plant (which represents an indirect outcome of LIFE's inputs).

The forest engineers carried out a detailed inventory of the forest's biomass. This information has been fed into computer software designed to calculate optimum forest thinning and management practices for different times and locations in order to guarantee the correct biomass production of the forest, whilst also allowing commercial use to continue.

"Our inventory maps the forest's condition and shows the availability of biomass for energy use," explains Fernando J. Pradells Monzó, a forest engineer from the LIFE project. "The information also helps reduce forest fires because it highlights areas where unmanaged biomass is a potential risk."

Photo: Gabriella Camarsa

Forest workers are learning how to apply ecosystem-based techniques

Mr Pradells adds that the project team has used GIS data "to map and understand the calorific value of each [10 x 10 ha plot). This gave us a detailed and site-specific knowledge of the territory's biomass resource. That means we can now determine how much of the forest needs thinning so as to protect it from fire and produce sufficient biomass in a sustainable way." The amount of work involved in the task led to the employment of an additional three specialised forest engineers. Experts in their own field, they also learned new green skills working alongside nature conservation experts who taught the value of the forest in biodiversity terms. "We had to learn about new techniques concerning how to select the trees to cut for biomass; which were healthy to maintain the forest and biomass potential; and which to eliminate to prevent the risk of fire," he explains.

Nature skills

A number of the forest sites within the project area are designated parts of the Natura 2000 network, so special care has been paid to nature conservation during the forest engineers' work. This is an aspect of good practice in LIFE-funded forest employment that can be replicated around other parts of rural Europe.

"Before the project, the forest practices used might not normally involve thinking about the biomass as a biodiversity resource," the forest engineer adds. Through his efforts and those of his colleagues, contractors are learning how to work in the forest using ecosystem-based techniques that make positive contributions to a wide variety of plant, bird, insect and animal species.

"Workers in the forests have to be trained in sustainable skills", says Mr Pradells, "We are teaching them about which areas of the scrub to clean and cut and which to keep." In the case of scrub clearance, this also involves being able to identify plant species that are protected or important for biodiversity, so that they are not removed needlessly.

"We have to teach the forest workers how to prune timber instead of felling entire trees. They will learn about the long-term benefits from cutting older trees to encourage diversity and growth, and thinning tree populations in some areas to promote healthier growth. Our goal is to harvest timber and plant new trees in a manner that improves the forest's overall health," says Mr Pradells.

These green skills in forest management are necessary for the future because not only do they create jobs for the engineers teaching the new approach, just as importantly, they ensure that the forest is not diminished as a resource through over-exploitation. In addition, "it supports more forest work and brings new economic benefits for our area thanks to the biomass production," believes Mr Pradells.

This is reiterated by the Mayor of Enguera, who observes that, "As well as the forest management work and new jobs planned for the biomass plant, we see opportunities in all the new wood fuel systems that will be installed in public buildings. What's more, an assessment of the LIFE project's impact indicates that every euro spent on this type of sustainable forestry work generates six times more for the local economy. This can be very useful for us as a tool for tackling our country's current employment crisis."

Project number: LIFE09 ENV/ES/000450

Title: BIOENERGY & FIRE PREV. - Contribution of forest biomass generated in the prevention of forest fires in the EU energy strategy'

Beneficiary: Ayuntamiento de Enguera

Contact: Fernando Pradells Monzó
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Website: www.bioenergy-project.eu
Period: 01-Oct-2010 to 30-Sept-2013
Total budget: €1 024 000
LIFE contribution: €512 000

BUSINESS AND INDUSTRY

Breakthrough GAP technology secures patents... and jobs

French SME, Dufieux Industrie, continues to build on the success of the LIFE 'GAP' project technology – for a new greener process for aircraft panel production – securing several international patents, new orders and jobs.

It's all systems go at the Dufieux Industrie machinery tool company, near Grenoble, France, as orders come in for units from clients worldwide, notably in the aerospace sector – a market, which despite the recession, appears to be remarkably buoyant.

Founded in 1963, the company today employs 70 staff – over 15% of whom have been recruited as a result of increased production activity arising from the LIFE 'GAP – Green Advanced Panels' – project (**LIFE05 ENV/F/000062**). Dufieux Industrie has customers in the fields of energy, railways and aerospace. But, it is interest from the latter sector, for equipment developed using the project's greener process for panel manufacturing, which is mainly fuelling current demand.

Aircraft panels produced through the green mechanical milling process

About the project

The LIFE GAP project, in partnership with Airbus, developed a new greener technology for the manufacture of 3D fuselage aluminium skins (panels used in aircraft assembly). Such critical plane parts have, in the past, been produced by chemical milling, since no other technology was available.

Under the project, the 'demonstrator F5X1' was built by Dufieux for Airbus, using its eco-friendly mechanical milling process. It was very successful, showing impressive potential annual environmental savings and cost efficiencies by switching to the new process. Furthermore, the technology avoids any need for dangerous materials, such as flammable hydrogen used during chemical milling, and so improves health and safety conditions for employees at the manufacturing plants.

LIFE skills

Managing director, Stéphane Chauveau, says the technology developed under the (2005-07) project has performed "beyond expectations". Since the design of the first machine for Airbus, in 2005, Dufieux has secured international patents to protect its ground-breaking Milling Mirror System (MMS).

The GAP project created green jobs for engineers and technicians through in-house training

Thanks to the development of that new machine – and a burgeoning aerospace market, requiring increased production capacities – the company has recruited 11 skilled staff (engineers and technicians) and plans to recruit 10 more over the next two years.

Mr Chauveau is confident that it will "not be difficult" to find these skills, adding that the company also relies on in-house training. This includes for process application and use of the new equipment. In addition, intensive practical training is provided on a demonstration MMS machine installed at the plant.

Summing up the LIFE GAP' legacy, he says this was a "very daring project" with highly challenging technical issues to overcome. He believes the new MMS process is a green solution that will be supported by new industrial standards (i.e. a Best Available Technology). Furthermore, he says it has the potential to "transform" aerospace production plants worldwide, replacing a long-cycle production process that requires large chemical baths, routing and drilling machines and specific part tooling, with a short-cycle process based on a single installation.

Finally, pondering a greener future for jobs and skills, Mr Chauveau says Dufieux is convinced that "greener technical solutions are vectors of technological progress towards global industrial change with the creation of new jobs and new skills."

Project number: LIFE05 ENV/F/000062

Title: GAP - Clean alternative technology to chemical milling

Beneficiary: Dufieux Industrie

Contact: Stephane Chauveau
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Website: www.dufieux-industrie.com
Period: 01-Oct-1999 to 31-Dec-2002
Total budget: €8 150 000
LIFE contribution: €1 904 000

BUSINESS AND INDUSTRY

The dividends of **a green approach to banking**

A project at a bank in Greece has not only given an impetus to the beneficiary, it also provides a model for future sustainable economic development in the financial services sector.

Piraeus Bank was a large - but by no means the largest - bank in Greece. Thanks to its own commitment and the support provided by a three-year LIFE project, it is now the market leader in "Green Banking" products in Greece and the creator of many sustainable jobs in the country.

The 'GREEN BANKING 4 LIFE' project (**LIFE06 ENV/GR/000375**) ran from 2006 to 2009. Four new posts were created within the bank to implement the project; both to improve its internal environmental performance and to develop new green banking products. Not only have these posts been maintained beyond the project, but the new 'environment unit' and 'green banking division' have now expanded to comprise a total of 18 new posts since 2006.

As Mr Dimitrios Dimopoulos, head of the environment unit, explains, "These jobs exist within the bank as a result of the impetus created by the LIFE project and the commitment of the top-level management to these ideas." The project's focus on green banking was a fundamental part of the bank's strategy.

Jobs through green banking

Piraeus's journey can be traced back to the decision, in 2004, to appoint Vrassidas Zavras as an environmental consultant to the Board of Directors. Mr Zavras, who came from an NGO background, saw that there was significant scope for the bank to reduce its environmental impact and associated economic costs and to tap into markets for renewable energy and other 'green' investments, which could also enjoy state subsidies.

Mr Zavras was also aware, however, that taking advantage of these opportunities would mean taking the bank into totally new territory. Piraeus did not have the internal expertise to become a leader in either environmental performance or green products. Nor did everyone within the organisation fully comprehend the economic arguments around 'green banking'.

A successful application for LIFE co-finance enabled the 'GREEN BANKING 4 LIFE' project to address these issues, as well as creating jobs from the start. Elena Primikiri, who studied to PhD level as an architect, was lecturing on renewable energy and environmental sustainability at the University of Patras when she was hired to help deliver the project.

"I grew up in Crete and I was always fascinated about how we could make better use of all this energy we get, but waste, from the sun," she explains. "I never imagined I would work in a bank." Yet, she was headhunted by the project to help Piraeus deliver new green-banking products.

GREENBanking4Life also improved recycling in branches

Photo: Ed Thorpe

Photo: Ed Thorpe

Mr Dimitrios Dimopoulos came from an NGO background to head the Environmen Unit

A similar experience happened to Mr Dimopoulos, a biologist with a doctorate in environmental education, who spent many years working in sea turtle conservation for the NGO, Archelon. When he was approached by Piraeus, he recognised an opportunity to work in a business context, to drive forward environmental thinking from the inside.

Piraeus Bank's environment unit worked to reform the organisation's environmental performance. This included increasing the recycling of paper and batteries and the installation of water- and energy-saving measures. The benefits to the bank were so clear that the unit has now expanded to comprise seven full-time staff members as a direct consequence of the LIFE project.

Green banking structure

The approach driven by the LIFE project was for the green banking division to help existing divisions within the bank to fund green investments.

Ms Primikiri remembers that back in 2007, "it was very new for the bank to be thinking about giving a loan to companies installing, for example, photo-voltaic panels. We worked to understand the details of the technology, the economic costs and benefits, so we could explain these to the credit divisions to make a decision on whether and under what conditions to grant a loan."

The green banking division also worked with potential clients to help them understand the true costs and benefits of an investment from their side and any business issues. The focus was on making sure that both sides of the eventual loan agreement fully understood the contract they were entering into and that it was of benefit to both.

Prokopis Gavril's new role included supporting branches to achieve EMAS certification

The results have been extremely positive, both during and beyond the lifetime of the project. "We do not judge loans on how much interest they earn for the bank, explains Ms Primikiri. "Rather, we judge them on how many missed days of repayments there are and our green banking loans have the lowest rates."

This helps explain why Ms Primikiri has, since the project, been promoted to director level, overseeing a team of 10 others working in the green banking division. Some of these people were recruited internally and some externally, but they are all new jobs in a new field of specialist work for the bank.

Prokopis Gavriil, 41, was also recruited from an environmental NGO background in early 2008, in his case to run a dedicated green banking branch of Piraeus Bank. "The branch was not a typical bank branch with tills and money. It was more like a demonstration area," explains Mr Gavriil. "We were a contact point for anyone interested in green banking products." The branch also served as a reference point for people within the bank who were still trying to understand the new green banking concepts.

This particular initiative of the project was short-term and the branch has since closed, replaced by green banking services at a host of branches throughout the country. However, Mr Gavriil's job has not ended, but evolved. He now works in Piraeus's environment unit, where he still functions as a central contact point on environmental performance for all branch staff. In fact, he has supported all 350-plus branches of the bank to achieve EMAS and ISO 14001 certification.

"I had no idea about green banking when I started," admits Mr Gavriil. "I was not really sure what I was going to do in a bank. But it has worked out even better than I thought. I was used to trying to convince people and government about environmental matters when I worked in NGOs. But in the bank you also have money and so people really listen!"

An exchange of skills

The 'environmentalists' that came into the bank had to learn about banking to fulfil their new roles. In return, they helped change the culture of the bank to

understand and take on board the great potential of the green economy. Although there were some formal presentations, much of the learning had to happen organically by working together in the bank.

Mr Dimopoulos recalls, "We had to understand each other; for example, the risk department and the environment unit. We had a lot of meetings and a lot of talks internally to develop that understanding." Likewise, the green banking division had to meet with the different financing divisions of the bank every time there was a potential green investment to assess.

As part of its work, the new environment unit developed training for staff in Piraeus Bank branches across Greece. "During the initial LIFE project, we developed an eLearning tool," remembers Mr Dimopoulos. "Between 600 and 700 staff completed modules during the project. However, we have now developed this to the point that over 70% of all the staff across the country - more than 4 000 people - have learnt about green investment through our programme."

Following on from the project the unit trained 20 people in the bank as trainers who helped roll out a three-day course across all branches that has been attended by more than 2 000 members of staff across Greece. A specific result of the training is that every branch now has a person who is responsible for internal environmental performance, liaising with Prokopis Gavriil in the environment unit for all aspects related to the environmental management system certified under EMAS and ISO 14001.

Jobs outside the bank

From a green jobs perspective, the success of the 'GREEN BANKING 4 LIFE'' project is not just in the sustainable jobs and skills created and developed within the bank. Vrassidas Zavras, who is now general manager of Piraeus Bank, says, "We were surprised by how many jobs we created indirectly, for example by creating a market in Greece for photo-voltaics."

Indeed, by combining technical and financial expertise inside the bank, Piraeus has been able to provide the funding to allow a real market to develop in the renewable energy sector in Greece, creating more economic possibilities and jobs than the bank has been able to measure. All of those involved in the green banking initiatives are also convinced of the potential of this sector to develop even further, despite the withdrawal of some government subsidies.

The project also improved recycling in branches

Mr Gavriil is clear in his belief that, "the potential of green business is the only road for Greece and for Europe. All the previous models of growth have failed. Sustainable development in sectors such as tourism and renewable energy is the only way to get out of the crisis." The bank is already exploring further specific opportunities around waste recycling, the use of biomass as a renewable energy source and sustainable agriculture.

"It is very sad that in these difficult times, we see the environment being pushed off the top part of the agenda in Europe," says Mr Zavras. "Green banking is, in fact, central to the development of a new sustainable economy and the jobs that go with that. Green banking creates new markets by providing the money necessary for their development. This in turn forces companies to respond and develop new, more sustainable, products and new jobs."

Project number: LIFE06 ENV/GR/000375

Title: GREEN BANKING 4 LIFE - Developing green products in the financial sector and reducing environmental impact of bank services

Beneficiary: Piraeus Bank.

Contact: Vrassidas Zavras
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Website: http://www.greenbanking.gr/
Period: 03-Oct-2006 to 02-Oct-2009
Total budget: €2 021 000
LIFE contribution: €932 000

BUSINESS AND INDUSTRY

Sustainability skills suggest a **greener future for construction**

'RENEW BUILDING' (LIFE08 ENV/A/000216) is a LIFE Environment project in Austria that has been training construction professionals in urgently needed skills for using green materials and sustainable building practices.

Photo: Monique Braem

A demonstration building created for an earlier LIFE project, the 'S-HOUSE' continues to be used as a training centre for architects and builders

Construction has long been one of the most polluting sectors, both during the building phase and at the end-of-life of buildings. The driving force behind the promotion of green skills in the construction sector in Austria has been GrAT – the Centre of Appropriate Technology in Austria. GrAT is a scientific association that brings together interested people from a range of disciplines – including industrial design, biology and project management – to consider more sustainable technologies for the future..

In 2001, GrAT started the successful LIFE project 'S-House' (**LIFE00 ENV/A/000243**). This was an exceptional demonstration sustainable building that won many national and international awards in fields such as eco-technology and energy efficiency. Located in Böheimkirchen, near Vienna, the

Photo: Ed Thorpe

Apprentice builder Peter Csala (left) is learning to work with more environmentally-friendly building materials

S-House is made predominantly from straw bales with clay plastering, delivering excellent results in terms of insulation, fire resistance, sound absorption and humidity control, whilst also complying with the design standards and requirements of a modern office building.

The S-House is a so-called "factor 10 building", i.e. it reduces energy consumption by a factor of 10. It achieves this through numerous energy-efficient design features. As well as the use of straw as the core material, these features include a large south-facing glass wall, stone floors, a raised floor, a wooden facade, innovative bio-plastic screws for attachment without creating a thermal bridge and efficient ventilation linked to a biomass stove.

Building on 'S-House'

Stefan Prokupek, project manager at GrAT and a lecturer at the Technical University of Vienna, remembers that "We had one nice building, which attracted visitors from all over Europe, even many years later. We had many private constructors coming and asking questions. But we started to ask ourselves how we could move the work forward to have impact on the wider construction industry. We wanted to take our knowledge out to architects and craftsmen."

The idea was not to promote copies of the S-House and demand the construction of fully-sustainable buildings. "It was not our goal to have a single sustainable housing concept," continues Mr Prokupek. Rather, the concept was to give key construction sector stakeholders the tools and knowledge necessary to include sustainable materials and design features within their everyday commercial projects.

GrAT used its network of contacts to identify experts in as many areas of sustainable construction as possible; and not only from Austria, but also from Germany, Czech Republic and the Netherlands. Expertise covered such issues as window restoration, use of straw bales and clay plaster.

The project worked to develop nine sustainable concepts that could be taught and explained to architects and craftsmen. These were partly determined by the training site available. "We are very lucky that we have an estate with several old buildings here in Böheimkirchen for practical use by students studying Architecture and Civil Engineering. It was bequeathed to the University by a former Professor," says Mr Prokupek. Training was thus designed to coincide with actual restoration work on the available buildings.

The preparatory work included testing and developing some of the techniques with the relevant experts, as Mr Prokupek explains: "We had a lot of knowledge from our experiences with the S-House, however there were still gaps in our knowledge and understanding of how best to work with local materials in different sustainable construction concepts." For example, the project experimented with the use of shredded reeds as infill insulation material. This led to the abandoning of a mechanical filling process in favour of a manual process for ensuring the correct density.

Putting theory into practice

The project took two years to fully develop the training. "Without the LIFE funding it would not have been possible," believes Mr Prokupek. "At the peak time of the project, we had seven people working on developing the training." There were

eLearning modules

1. Ecological restoration concepts and economic analysis;
2. Building physics and assessment of the building's original status;
3. Resources, materials and products;
4. Construction and detail; and
5. Insulation standards and calculations.

Each module contains different learning chapters, each of which includes hand-outs and an training video explaining the important concepts in a logical and easy-to-follow manner.

several important elements that needed to be prepared beyond identification of the experts, notably pulling together all the relevant theory and structuring it into an eLearning platform.

The platform contains five modules covering different aspects of sustainable construction (see box).

Learners can check they have understood the content by taking the test that is provided at the end of each section. Although the modules can be studied on a standalone basis, they have proven to be particularly useful for preparing participants for subsequent hands-on training. "In several cases," highlights Mr Prokupek, "the boss of the company studies the theory and then sends his craftsmen to learn the practical techniques."

More than a dozen people – mainly architects and planners – have completed all the online modules. In many other cases, people have completed the parts that interest them. "It is possible to control access to the different parts of the online platform," notes Mr Prokupek. "At the moment we have provided access free of charge, but we want to retain control of the content." The system provides the opportunity to turn the eLearning platform into a fee-paying service in the future.

The straw bales provide excellent insulation, thus reducing energy consumption

Photo: Justin Toland

Practical training

In the beginning, the project beneficiary used its network of contacts to find companies and individuals interested in undertaking training. "Some people were already coming to us with questions. However, in many cases we had to reach out and find people who might be interested in learning sustainable building concepts," remembers Dr Robert Wimmer, LIFE project manager and since 1996, the chairman of GrAT.

Much of the cost of the training has been covered by the 'RENEW BUILDING' project, which encouraged companies to send people. However, attitudes and levels of engagement have evolved as participants have seen the value of the training. The idea is that companies will fund ongoing training themselves in the future because of the business incentive. "We wouldn't expect the training to be profit making, but hopefully it will cover its own costs and allow us to reach out even further into the sector," says Dr Wimmer.

Nearly 80 representatives of construction companies have already received training in at least one of the sustainable-building concepts, through some 20 different training events. One construction company, Vogler, has sent workers to four training sessions because it has seen the potential economic benefits of offering sustainable building solutions to clients as part of standard commercial contracts. This market is particularly strong, not just in new construction but in restoration of the many old buildings in Austria.

Peter Csala is a 19-year-old apprentice bricklayer with Vogler. He has already participated in three

training sessions, learning to understand lime plaster and how to prepare it for use in construction projects. "What I learned in the first course I have already used on three construction sites," highlights Mr Csala. "Only the people who have been on the course know about these techniques."

The materials are better for the environment, both during use and at end-of-life, as well as being better for workers' health. "I like the clay plaster and would use it in my own building," says the apprentice. "Before I didn't really think about health or environmental issues, but this has made me think about [them] differently." He has also noticed an even more direct consequence of using the more sustainable materials: "The tools are easier to clean!"

Teaching the next generation

The aim of teaching apprentice builders about sustainable building is to make such concepts a normal part of the profession. The LIFE project has taken this even further by developing a course on 'Sustainable Planning of New Buildings and Retrofit' for students at the Technical University of Vienna. This is the first time sustainability concepts have been taught specifically as part of architecture or civil engineering courses.

Photo: Ed Thorpe

Mr Stefan Prokupek of GrAT visits one of the demonstration sites used by the RENEW Building project

In the first three years, the numbers of students increased from 15 to 35 and then 50. In the final year of the project, 91 students had registered for the course and 83 had completed it – including Erasmus students - representing a very high completion rate. This not only shows the interest amongst students in green techniques, but highlights the growing reputation of this course within the student architecture and civil engineering fraternity.

Indeed, feedback from the students has been very good, says GrAT, with particular appreciation for the strong practical element. Students have the opportunity to leave the lecture hall to undertake practical activities in the old houses on the demonstration estate. This has helped them better understand the sustainable building concepts being taught.

"Some older builders and house owners are still prejudiced against sustainable materials, such as straw because they think it has lower quality or attracts rats and mice," concludes Mr Prokupek. "By educating the next generation that these prejudices are false and such materials come with numerous advantages, we hope to make them a normal and commonly used material." The hope is that sustainable building will move from being a novelty concept in a demonstration site to an unremarkable part of a successful construction industry.

Project number: LIFE08 ENV/A/000216

Title: RENEW BUILDING - Demonstration and Dissemination of Climate and Environmental Friendly Renovation and Building with Renewable Resources and Ecological Materials

Beneficiary: GrAT

Contact: Robert Wimmer
Email: rw@grat.at
Website: www.renew-building.eu
Period: 01-Jan-2010 to 30-Jun-2013
Total budget: €684 000
LIFE contribution: €323 000

BUSINESS AND INDUSTRY

Green schooling thumbs-up from French cleaning chiefs

The heads of 300 French cleaning companies have opted to return to school to learn new greening skills. As well as making their operations more sustainable, the training has proved popular with clients and staff alike – and has provided a welcome boon to business.

The timing of the launch of the French LIFE Environment project, 'CISDP - Cleaning Industry Sustainable Development Programme' (**LIFE08 ENV/F/000481**) couldn't have been worse, concedes Laurence Acerbo, president of sustainable development at the Fédération des Entreprises de Propreté (FEP), the project beneficiary. The LIFE-supported green skills' training courses for FEP members started in 2010, around the same time as the start of the recession in France..

"We were really afraid that some of the participants would be unavailable," she says, explaining that, in fact, the economic difficulties in France seemed to have the "opposite effect" encouraging participation from a higher-than-expected 300 companies, whose managers have passed on their newly-acquired green skills to their employees (around 250 000 in total). In particular, she notes, the companies have benefited from the exchange of experiences and knowledge provided by the collective part of the training programme. Moreover, she says, the participants find themselves better armed to combat the economic downturn, (e.g., promoting the greener aspects of their activities to win new customers).

Training mix

The management training, or workshops, were organised regionally, throughout France, for

More than 250 000 employees in cleaning companies have acquired green skills thanks to LIFE funding

First prize in business & environment award

In December 2012, FEP, the beneficiary of the LIFE 'CISDP' project, was awarded first prize in the category of 'Management and Initiatives for Sustainable Development' at the Prix Enterprises & Environnement.

FEP won the award for its sustainable development project for cleaning companies. The award, organised annually by the French Ministry of Ecology, Sustainable Development and Energy (MEDDE) and the Environment Agency (ADEME), rewards companies with a record of "outstanding achievements" in the fields of environment and sustainable development. After evaluating 54 companies or groups, the judges singled out FEP for its overall commitment to sustainable development: Says a delighted Laurence Acerbo: "We are very proud to have this official recognition of our achievements.... This will help us to continue - and even better - our work in this field."

groups of up to 10-14 individuals, joining the programme for a period of six-to-eight months. Each participating company attended a mix of (six) group days and (two) individual day courses, led by an industry consultant. Says Ms Acerbo: "I think it was reassuring for the companies to be able to get together and discuss (non-sensitive) issues with other companies – even rivals – and to discover that they shared similar problems."

Project manager, Stéphanie Hirtz, responsible for the organisation of the training courses, agrees, noting that whilst a large part of the training was developed along classic lines, the more informal group discussions generated popular exchanges of experiences and knowledge. She cites, for instance, a discussion concerning the use of EU ecolabel products for cleaning: "One company might comment that they'd been using, for example, product X, but perhaps found it inferior to the product they previously used. Another candidate might suggest an alternative [ecolabel] product that worked well and was cost-effective... In the beginning we were a little worried that, as some of the companies attending the courses were competitors, there might be a problem," she says, adding that this proved not to be the case.

Another advantage, she says, was the availability of an industry consultant. Just under a half of the participants are small enterprises, i.e., employing fewer than 50 employees, with the rest medium-sized enterprises – their size making them unlikely to be able to normally afford such expertise. "We found ourselves working with companies of different sizes and also in different sectors, for example, some were operating in the public sector, the private sector, some were specialists in office cleaning and some industrial etc.," she says.

All the participants learnt the value of drawing up and implementing a plan of action for their greening policies. For many of the smaller companies, she says this formalisation of a work plan was "something new" that could also be applied generally to their business, providing them with a competitive advantage compared with other companies.

LIFE+ CISDP

The LIFE+ CISDP project involved the promotion of the French cleaning industry's already developed, sustainable development programme, through the promotion of self-diagnosis software for cleaning companies and the training of cleaning company bosses in sustainable development issues. The greening programme covers 51 practical actions aimed at saving natural resources and preserving the environment through reduced water consumption and pollution, less waste and improved recycling of waste.

Project number: LIFE08 ENV/F/000481

Title: CISDP - Cleaning Industry Sustainable Development Programmes

Beneficiary: La Fédération des Entreprises de Propreté et Services Associés (FEP)

Contact: Stéphanie Hirtz
Email: shirtz@federation-proprete.com
Website: http://www.proprete-services-associes.com/le-developpement-durable
Period: 01-Jan-2010 to 31-Dec-2012
Total budget: €1 176 000
LIFE contribution: €563 000

What the cleaning companies say

At the end of their particpation in the CISDP training, particpants were asked for their opinions. Their experiences, recorded in the project's DVD "Sustainable development - involving cleaning companies" include:

Neova (450 employees, Ile de France).
Created in 2005, the company has several major retail clients and is responsible for the daily cleaning of large shop floor surface areas. This involves the use, traditionally asociated with high consumption of water, energy and chemical detergents. Thanks to the training, the company has tested and introduced new, greener cleaning products and equipment, including a new industrial floor cleaner, which cleans and disinfects using only water (i.e., no chemicals) and also requires less water than conventional machines. Neova employee, cleaner Rodrigo Augusto De Sousa, reports: "At the beginnning I said: 'OK I'll give it a go. If it works all very well. If not, I'll go back to the usual machines..." Today, he says he's "very happy" to be cleaning without chemicals.

Director, Philippe Jouanny, comments: "This kind of innovation is also very useful in our relationship with our clients, who are themselves looking to be more sustainable – in this way it's more of a partnership, which is satisfying."

NET PLUS (1 000 employees, region, West France) Bruno Coeurdray, director, joined the CISDP programme because his company wanted to develop a more social aspect to its recuitment policy, but was unsure as to how to go about this. He says a valuable part of the training was the support provided by the consultant – which allowed NET PLUS to "formalise arrangements, to highlight areas of improvement and to build a sustainable development programme over the long term."

Cleaning – the downside
Each EU citizen consumes an average of 11 kg/yr of cleaning products. The manufacture of these products requires substantial amounts of water and energy, as well as producing water, air and noise pollution.

Source: French Federation of Cleaning Industries (FEP)

Isabelle Perru-Poupon (sustainable development director) and Stéphanie Hirtz (right) (LIFE project manager)

Greening route

Ms Hirtz was also responsible for the coordination of the project with its partner European cleaning and support services associations. She explains that a key aspect was to work with these organisations to share the knowledge already acquired by FEP: "Since we had gone down the 'greening route' relatively early, it was important to follow this through, to ensure that other European countries didn't need to start from zero, but could benefit from the transfer of this expertise," she says.

Interestingly, she notes that whereas in France, despite the recession, there is nevertheless a strong commitment and support from cleaning companies to address environmental issues, the experience was not shared by all the partners. For example, she says the UK partner reported problems in organising support for the project among its members.

Finally, when the current economic climate improves, the EU cleaning sector is aware that, as for all industry sectors, there will be a need to recruit a younger workforce to replace an ageing working population. Compared with, say a career in new technology, or in communications, the cleaning profession "hasn't exactly been attractive to young people," admits FEP's Laurence Acerbo. However, she believes the federation's commitment to sustainable development is "helping to improve this image among young people – demonstrating other choices of career and jobs."

BUSINESS AND INDUSTRY

Lead-free soldering: green and efficient

A German LIFE project has played an important role in enabling people working in the electronics industry to learn about and implement lead-free soldering techniques.

Lead is considered a hazardous waste, particularly in its use in such electronic goods as printed-circuit board assemblies (PCBAs), and it was thus banned as a solder in July 2006 under the Waste Electrical and Electronic Equipment Directive (2002/96/EC). In response, the LIFE 'LEADFREE' project (**LIFE05 ENV/D/000197**) was launched to set up a non-profit training centre for lead-free soldering, at the premises of the Fraunhofer Institute of Silicon Technology in Itzehoe, Germany.

During the course of the project, some 700 companies (300 more than proposed) received training at the centre's specially constructed fabrication line in the form of workshops and trials. Not only does using the demonstrated technique allow companies to comply with environmental legislation, it also leads to considerable resource and energy savings in the long term. Advantages of the method include: a reduction in the lead, cadmium and mercury content in the solder to below 0.1% by weight; a 99% reduction in the use of bromide and other halides, through the use of halogen-free flame-retardant laminates; and a 50-90% reduction in greenhouse gas emissions through the use of VOC-free flux and by controlling energy consumption.

Another benefit is improved manufacturing control as a result of better educated personnel. Indeed, companies have reported that employing workers who are more aware of the issues and better trained leads to great reductions in the number of production defects that occur. Limiting defects obviously reduces the need for rework and repair, thus saving material, time and energy costs.

Greater job satisfaction is also a reason for such improvements in overall quality. "I learned from one company, from which we have examined around 120 people to date, that their yield has improved and that they have 80% fewer processing errors. That is one approach that we take; certainly this is also environment friendly, when there is less waste produced," says Dr Thomas Ahrens, the 'LEADFREE' project leader who launched training and analysis company Trainalytics to continue the work begun through LIFE.

Getting started

Trainalytics is itself a good example of how the LIFE programme has led to the creation of jobs. Dr Ahrens founded the company in September 2008 at the end of the LIFE project in order to carry on the training pioneered during the project. Today, it has

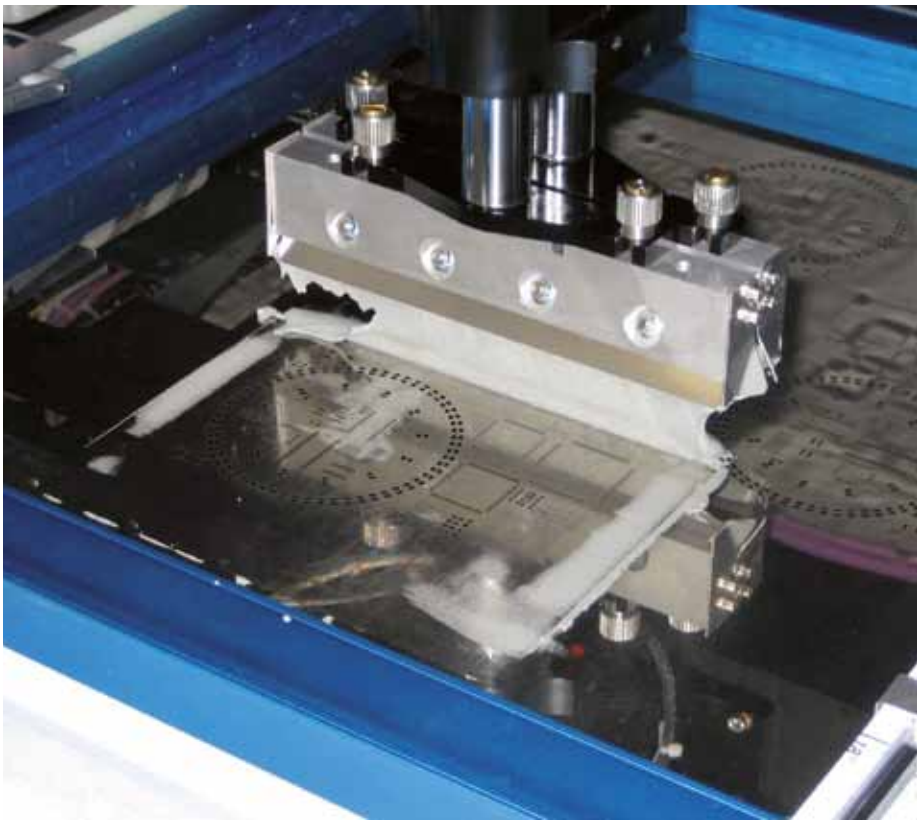


Photo: Thomas Mayer

A 90% reduction in soldering greenhouse gas emissions can be achieved by switching to mechanical soldering

Photo: Thomas Mayer

Approximately 120 workers attended the LEADFREE training programmes in 2012

eight permanent employees with two short-term openings for students. Three staff members, including Dr Ahrens, are qualified to give the training.

Whilst the Fraunhofer Institute still runs some training courses, Dr Ahrens says that "an institute is rather a heavy type of administration" and therefore makes it difficult to further the development of the training. "With this company (Trainalytics) I was able to operate more flexibly, to develop guidelines within the training framework of the DVS (German Welding Society) and adjust to the associated quality management system. This adjustment enabled us to carry on with the training programme that we developed during the LIFE project," he says.

In fact, Dr Ahrens has been able to implement the business plan drawn up during the project, but on a greater than foreseen scale. "In the beginning I had a plan to start a small training company next to the Fraunhofer Institute and make use of the training equipment, but then I found out that a former project partner was in the process of being liquidated after 10 years of existence. This company had originally been set up to perform process development for electronics production for four major shareholders, but was also active in the market of consulting on damage analyses. I discovered that several small companies in this area were also interested in solder training and consulting services as well as the big shareholders of this company – and this was the job that I had done at the Institute all this time."

As a result, Dr Ahrens says that his company today also offers analytical services: damage analysis, quality analysis, quality assessments, qualification of materials etc. It is based in Lippstadt in North Rhine-Westphalia for strategic reasons. "It took us three years until we succeeded in the market," he adds, but last year [2012] he trained around 120 people in lead-free soldering and demand is still growing (see box – the value of training).

Two other organisations have also given classes in the technique. According to Dr Ahrens, one of the companies, a soldering equipment manufacturer, has, following the lead of the LIFE project, established an educational institution based on the DVS guidelines. This company trained 32 people in lead-free soldering in 2012.

Official recognition

Indeed, the incorporation of the 'LEADFREE' training programme into the DVS guidelines is an important legacy of the LIFE project, leveraging the widespread recognition that the society's training programmes have achieved. DVS has some 300 training institutions in Germany alone teaching mostly welding, adhesive joining, and now soldering in electronics.

"In electronics production, many people are employed without being properly trained," says Dr Ahrens. "In Germany we have apprenticeships for three years with a company, but there is not really an electronics manufacturing profession, so it was considered that there was no real need for this type of education. Management bought expensive machines and thought that they only then needed cheap labour, but it doesn't work that way."

He points out that because soldering temperatures are higher and tighter control is needed using the 'LEADFREE' process, operators must have higher skill levels and a greater understanding of the behavior of the material being soldered. "Hand soldering, viewed often as a non-controllable process, can

achieve a high yield with properly trained workers taking responsibility for their own work."

Whilst the staff that received the training are often "on the production floor and not the management level", the training does influence management decision-making. These workers were taught to "press this button and then that button and then this one, but now they learn [through the LEADFREE programme] why they press this button and they are able to influence more than just the pressing of these buttons. They question the material selection and communicate better when they know more of the technical background," according to Dr Ahrens.

He says that his trainees want to know more in order to be able to ask the right questions. Thus, he says, the training provides valuable "assistance to the idea of green products". Moreover, it offers his company a profitable future as the number of workers requiring this green production line assistance is "huge".

Another advantage of cooperating with DVS has been the added benefit of being able to offer certification. This examination at the end of the training is optional and costs extra, so not all companies decide to go for it, but "some companies want the certification so they can show to their customers that they have skilled personnel," affirms Dr Ahrens.

In fact, employees report that they have become more valuable in the job market as a result of the training. One company even told Dr Ahrens that it wasn't sure whether it wanted to send its personnel on the course again because the first employees to do the training were subsequently poached by a competitor!

The value of training

Trainalytics runs a series of five-day courses, helping operators to learn lead-free soldering skills that are of practical use for companies. "The more the operators know about the process, the less waste is produced, the better the yield and the better the use of raw materials," says one participant on a course held at the beginning of 2013. "The products that we produce are made for energy conservation, and lead-free soldering fits into the whole idea of a green product," the participant says. "The training leads from operation to supervision, from pressing buttons to controlling the process."

Photo: Jon Eldridge

Building on the LIFE project, Dr Thomas Arhens founded a company to train workers in lead-free soldering techniques

Case study: KEB

Founded in 1972 by Karl-Ernst Brinkmann, KEB is a medium-sized company employing around 1 200 people, including over 120 apprentices. Its three core areas are drive and control electronics, motors and gears, and magnetic technology.

KEB made the transition to conform to the Restriction of Hazardous Substances (RoHS) Directive a year before the 2006 deadline. Carrying out RoHS-compliant production at the same time as non-lead-free production is "expensive and difficult" because of the time needed to clean equipment, says Patrick Hilligehekken of KEB. So the company decided to make the switch to completely lead-free in Surface Mounted Technology (SMT) production.

The company's assembly lines use a true colour visual inspection system, which marks soldered components with an 'NG' ('no good') if the positioning, direction, colour or character differs from requirements. The operator of the system then has to decide whether the component is a true failure or a false call – but how to judge the quality of the soldering? "In the beginning we didn't have a clear idea," says Mr Hilligehekken, "so the plant manager chose to employ the services of Trainalytics."

Along with colleague Alexander Schulz, Mr Hilligehekken took all four week-long training modules offered over a year-long period before achieving certification in December 2012. "We are now able to look with different eyes at our production. We don't only see what's wrong, but we can also describe where the failure is and how to overcome this," says Mr Hilligehekken.

The company has even drawn up its own instructions for this type of soldering, and the two operators are themselves training other staff members. "Every new colleague has to be trained by us before he can touch a soldering iron," he emphasises.

Mr Hilligehekken believes that the skills he has acquired will be very useful for promotion at KEB. "I've learned that the lead-free process is more difficult than the non-lead-free process, but when you keep an eye on some essential details, it isn't a problem at all and you can handle it."

The nature of his work has also changed significantly. "Before we were solder specialists and we had only to programme our AOI-systems. Now it is still the basic part of our job, but we also examine initial PCB samples, check temperature profiles and develop footprints as well as giving solder training." He has also noticed his new-found knowledge has increased his influence with colleagues "because they know what [I'm] talking about."

"I grew up at a time when people started to think seriously about environmental issues. In my view, it's great that companies such as Trainalytics are helping industry change its production to lead-free."

Project number: LIFE05 ENV/D/000197

Title: LEADFREE - Demonstration and Training Lead-Free Soldering for European Industry in Order to Promote Environment-Friendly Electronic Productiont

Beneficiary: Fraunhofer Institute of Silicon Technology

Contact: Thomas Ahrens
Email: info@trainalytics.de
Website: www.trainalytics.de/
Period: 15-Apr-2005 to 14-Oct-2008
Total budget: €4 249 000
LIFE contribution: €1 662 000

BUSINESS AND INDUSTRY

Building 'apps' for better water treatment

LIFE co-funding has helped a Scottish enterprise develop an innovative and resource efficient water treatment solution. Now, Dryden Aqua is leveraging sectoral support networks to create more skilled green jobs across Europe.

Activated Filter Media (AFM) is a chemically-altered filtration medium manufactured from recovered green container glass by the Scottish SME Dryden Aqua Technologies. It was developed with the assistance of the LIFE 'AFM' project (**LIFE02 ENV/UK/000146**), which ran from 2002 to 2005. LIFE co-finance helped establish that AFM could remove at least 30% more unwanted solids and dissolved pollutants from drinking water than high quality silica sand and that it could improve the performance of most drinking water treatment systems and reduce the incidence of disease, whilst delivering substantial operational costs and carbon savings.

At the AFM headquarters in the small town of Bonnyrigg, near Edinburgh, Dr Howard Dryden, the founder and chief executive of the company explains that, "LIFE was crucial for establishing the conditions of [our] growth. It gave us the incentive to progress and we built a new factory [here], specifically for doing the activation of AFM. LIFE funds were used to purchase the equipment that went into the factory. We had to build a pilot plant to produce a reasonable amount of material. By reasonable I mean several thousand tonnes. That allowed us to kick things off and it was brilliant."

An important part of the company's subsequent growth came when, as a spin-off from its LIFE research, it began developing a market for AFM in the private swimming pool market, with particular success in central Europe. "We started doing work with a Swiss company based out of Basel - Aqua Solar - and we now have somewhere in the region of 40 000 systems running with AFM in Switzerland, Austria and Germany," notes Dr Dryden proudly.

With LIFE's support, AFM has created a viable business converting green container glass into a filtration medium for water treatment plants and swimming pools

Developing jobs and skills

Today five of Dryden Aqua's 12 staff work full-time on AFM, including "high-paid, technical jobs" for quality control specialists, engineers and industrial chemists. This is backed up by a pan-European warehousing and distribution network, supported by "highly-trained technical distributors," explains Dr Dryden. "We've got the warehousing in the Netherlands, Germany (Munich) and Switzerland, a facility in northern France and one in Alicante in Spain...In total, some 100 jobs created directly and indirectly."

These include some very highly-skilled positions at the Bonnyrigg HQ. For instance, Christy Ashley-Sing, a graduate in pharmaceutical chemistry from Manchester Metropolitan University is currently characterising all the chemical properties of AFM, using scanning Kelvin probes and other specialised lab equipment; one part of this research is looking at the material's suitability as means of removing arsenic from water in India (part of an FP7-funded project called 'Eco-India'). "We're working with quite a few different universities, including Strathclyde, to char-

Dryden Aqua CEO, Dr Howard Dryden: "[LIFE] allowed us to kick things off and it was brilliant"

acterise the activation process, to physio-chemically study it," Mr Ashley-Sing explains.

Much of AFM's work is so cutting edge that there is no formal training programme for employees; rather the learning is passed on under the direct supervision of Dr Dryden, who points out that he started this work as a PhD at university.

"Training's pretty much been on-the-job really," concurs another graduate employee of the company, mechanical engineer Calum Reid. "There's a lot of learning, a lot of different things," he says, explaining that his latest assignment has taken him to Bangladesh, where AFM filters are being used by pharmaceutical producers to clean process water.

Both graduates were brought on board by AFM through a scheme known as Talent Scotland, which matches high-skilled university-leavers with potential suitable employers. "[Talent Scotland] did all the leg work in finding candidates that matched our skills requirements. We have been delighted with the service and with our graduates," says Dr Dryden.

Once rather doubting of the value of such business support networks, Dr Dryden is now an enthusiastic convert to the cause, particularly after a meeting with the Scottish Government's Environmental Clean Technologies (ECT) Strategic Partnership, which focuses on the growth of a number of sectors.

For Diane Duncan, who leads the Partnership's work in the water sector, more can be done to reduce the innovation cycle and speed green growth and jobs. To this end the ECT Strategic Partnership, HydroNation Initiative and Scottish Government are now drawing up a 'route map' in order to deliver sustainable economic growth within the water sector. This also involves working with Skills Development Scotland to identify where the green skills will be needed. Ms Duncan says that what is increasingly evident within the water industry is that, "The types of job are changing. [The large engineering firms] are now recognising that they almost need to behave like Apple or Microsoft and they need the 'apps' and the SMEs are now providing those 'apps'. They're not pouring as much concrete and civil engineering companies are now looking for low carbon solutions. So it's a different kind of design; designing out waste and reusing materials to deliver a circular or regenerative economy – Dryden Aqua's AFM is set to play its part in doing exactly that."

Dryden Aqua is now investing some £4 million in a new AFM factory next to its existing facility which, when it opens later this year, will be "probably the world's most technologically-advanced glass processing facility" and will create a further five "high-paid, technical jobs" notes Dr Dryden. Through a partnership with Zero Waste Scotland, a regional support programme promoting resource efficiency, Dryden Aqua aims to source all 30,000 tonnes/yr of waste green and amber glass needed by the new factory from Scottish glass collection companies, rather than from Germany or Finland as at present. The net result would be a resource efficient restructuring of the waste glass collection industry in Scotland so that all useful fractions are used locally.

Dryden Aqua's long-term goal is to build a second plant to use all the remaining waste glass in Scotland and then replicate this model across Europe, in partnership with local companies, allowing Bonnyrigg to become a training and research centre for refining and modifying the process.

Project number: LIFE02 ENV/UK/000146

Title: AFM - Development and applications of advanced filtration medium

Beneficiary: Dryden Aqua Limited

Contact: Howard Dryden
Email: aqua@drydenaqua.com
Website: www.drydenaqua.com
Period: 01-Jul-2002 to 01-Jul-2005
Total budget: €1 166 000
LIFE contribution: €176 000

'*Use and re-use*' flourishes into multi-million euro business

A remarkably successful Italian LIFE project, "Use and... re-use" started off with modest funding and nine people. Nowadays, the beneficiary is part of a nationwide fruit and vegetable distribution chain, with some 200 employees and a €50 million per year turnover.

"Great oaks from little acorns grow" is a 14th century proverb[1] that remains relevant today, as exemplified by the LIFE project, *Usa e riusa* ("Use and... re-use" – **LIFE99 ENV/IT/000034**) whose goal was to promote greener fruit and vegetable distribution in Italy, through the CPR System – a novel approach based on the use and reuse of recyclable and foldable crates for packaging (see box).

The 'little acorn' of an idea was the brainchild of Gianni Bonora, who until 2012 was director of the CPR cooperative of Italian fruit and vegetable producers and distribution agencies. Ms Monica Artosi, today CPR System's general manager, says the idea of switching from disposable cardboard packaging to reusable and recyclable, foldable plastic crates, was not easily accepted in the early days, either by all the members of the cooperative, or its Board of Directors. However, LIFE co-funding not only helped overcome these barriers and demonstrate the viability of the concept, it has stimulated the creation of an environmentally-friendly business with a capital value of some €25 million.

During the period of the LIFE project (1999 to 2002), the growth of the number of partners in the supply and distribution chain, as well as the quantity of units handled by the first CPR System processing centre "was extraordinary", she says (see box). And the CPR success story continues: it has expanded nationwide and now has over 1 000 partners and 17 processing centres that jointly handle some 117 million packaging crates.

More than 335 companies in the supply and distribution chain use the plastic recyclable crates

1 source: Oxford Dictionary of Quotations]

Gianni Bonora's project idea has led to the employment of 170 manual workers at the 17 processing centres

"At the start there was only Gianni Bonora [managing director] and myself working on the LIFE project," recalls Ms Artosi. "During the project, a first processing centre was built in Gallo (Ferrara) employing 10 people – mainly manual workers carrying out various tasks associated with the reusable crates (maintenance, inspection of units, fork life truck operators etc). For example, before they're cleaned, the crates need to be checked, to ensure they are suitable for reuse. If they have faults it may be possible to repair them, otherwise they are sent for recycling."

Since the end of the project, says Ms Artosi, CPR has continued to grow "exponentially" and with this, has been the need to increase the workforce. It now has two divisions - CPR System, employing 22 managerial and office staff; and CPR Services, which has seven people responsible for overseeing the work of the 17 processing centres. In addition, it employs some 170 manual workers at the various centres.

Green skills are essential

According to Ms Artosi, "To be able to work within CPR System, you would have to acquire some types of 'green skills'. All our managers have had to acquire legislative and regulatory knowledge that is related to the correct waste management; this also goes for our office staff. Other knowledge and skills concerns the management of sustainable production processes."

Monica Artosi - CPR System's general manager

This includes a company-wide requirement to learn and follow specific environmental procedures that make the whole process more environmentally friendly. As an indication of CPR System's commitment in this regard, since 2008, the company has employed a dedicated person (engineer, Roberto Piano) to oversee environmental affairs, security and quality control. One of Mr Piano's responsibilities is to ensure environmental considerations are included in the manuals and procedures for the firm's production processes (e.g., how to reduce water consumption or energy consumption). He then has the task of ensuring all employees are familiar with the environmentally-friendly procedures and are respecting and implementing them. The employees are also audited to ensure they are complying with the procedures, which are regularly updated in a process of continuous improvement.

Another part of his job is to keep up-to-date, through regular training, with any regulatory or other technical environmental changes affecting processes. For example, after a recent course on water efficiencies, he has instigated a new system for cleaning the facilities of the processing centres that reduces water consumption. And following a training course on national recycling legislation, the company is now recycling damaged crates to obtain a plastic granule that can be reused to form new ones. Further training is planned on energy efficiency and, says Mr Piano, the results will be fed back into making improvements to the whole process.

Ms Artosi says such training courses are "essential" to improve production processes and performance environmentally (e.g., exploring water and energy savings as well as further plastic recycling). "Work in the environmental field will grow in the future and there will be a need, above all, for skills related to environmental protection and sustainability."

Use and ...re-use

The 'Usa e riusa' project developed an innovative system to avoid the substantial amounts of waste generated in the packaging of fruit and vegetables. The project designed recyclable, foldable plastic crates to replace single-use packaging that was thrown away. The new crates can be folded and re-used up to 30 times.

The scheme included a processing centre to handle cleaning, reuse and recycling of the products, and computer software to track their journeys. At the start of the project, there were nearly 50 companies involved along the supply and distribution chain. By 2003, this number had soared to 335, with over 30 million movements of crates. And this figure continues to grow...

Project number: LIFE99 ENV/IT/000034

Title: Usa e Riusa - Use and ... reuse. The "processing centre" in the logistics of packaging of fresh fruit and vegetable products

Beneficiary: CPR System

Contact: Monica Artosi
Email: cprsystem@csoservizi.com
Website: http://www.cprsystem.it
Period: 25-Nov-1999 to 25-May-2002
Total budget: €1 486 000
LIFE contribution: €610 000

PACKAGING

Creating a **greener distribution chain** in Sweden

More than 100 jobs have resulted from a pioneering LIFE project whose eco-innovation has mainstreamed green technology throughout the distribution chain of Swedish grocery goods.

Photo: Tim Hudson

LIFE's support helped the company to significantly expand its scale of operations and workforce.

The LIFE 'Eurocrate' project (**LIFE00 ENV/S/000867**) was launched 12 years ago by a group of Sweden's largest grocery retail associations, in order to find resource-efficient methods for transporting, storing, and displaying goods. Timber crates and cardboard cartons created vast volumes of waste that were no longer tolerable following the adoption of EU and national environmental legislation..

Such fiscal incentives proved effective in encouraging the grocers to seek alternative solutions and they identified an opportunity to introduce washable plastic crates and pallets as a greener option. LIFE funds were used to help validate the commercial viability of the new plastic products, as well as their washing facilities and distribution logistics.

Returnable crates

A new company, called 'Svenska Retursystem', was established by the grocery associations to operate a washing plant and distribution service for the plastic pallets and crates. A total of 16 new green jobs were created initially as a result of the first pilot washing plant that was based in Helsinborg. Five managerial positions were involved and 11 staff operated the washing facility.

"LIFE was instrumental in helping us demonstrate the cost-effectiveness of replacing single use packaging with the new washable crates and pallets," explains Conny Swahn from Svenska Retursystem. "Interest from grocers and distributors in our company's eco-friendly service grew rapidly thanks to

LIFE's inputs." As a result, by the end of the two-year project, the company's workforce had expanded from 16 to 23 people as demand for the reusable packaging increased.

This green business has continued to grow: "We now have 120 employees," says Mr Swahn. "Most of these jobs are involved in operating our four washing facilities that are located across Sweden. The company's management team is deliberately lean, containing the chief executive, and five supporting managers responsible respectively for production, finance, logistics and IT, environmental sustainability, and sales and marketing."

Mr Swahn says the outcomes of the LIFE project have been instrumental in the creation of most of these 120 posts. "These are new types of jobs that did not exist in Sweden before. Some drinks companies had washing plants to reuse glass bottles but no technology, or know-how, existed for cleaning reusable crates. We had to be pioneers and we think we have done a good job at 'breaking the ground' that needed to be broken in order to introduce our eco-innovation."

Green job satisfaction

In addition to the 120 people employed directly by Svenska Retursystem, as many as 500 jobs are estimated to be reliant on the green technology that LIFE helped to establish. "At the start we were using about 2.5 million crates each year. We now use that same number each week. Hence, as a much bigger operation we help support a higher proportion of jobs in the companies that manufacture our reusable products", says Mr Swahn.

He explains that close cooperation with a "strategic alliance" of partners has built the professional skills base and green workforce potential of all parties. "As well as our collaboration with the crate manufacturers, our relations with the providers of our automated equipment, labels, conveyors, and distribution controls etc. have led us to introduce even more cost efficient operations."

As one example of this, the logistics company that works with Svenska Retursystem has been able to increase its own workforce from five to some 80 people skilled in coordinating green products. "LIFE's support for us certainly made a difference for job creation at their firm as well," notes Mr Swahn.

In addition, close cooperation with the company that supplies the equipment for washing the crates has led to much more efficient water and energy use. "Staff who work in the washing facilities feel that understanding their machinery is like understanding a craft and they are always looking for ways to fine-tune their work. They seem genuinely committed to trying to find ways to get the crates as clean as possible using the minimum inputs necessary," says Mr Swahn. He points to the low turnover of staff at Svenska Retursystem as an indicator both of job satisfaction and the quality of the green jobs that LIFE helped to catalyse.

"All our staff are dedicated to their work and we think that our environmental values are part of the reason why. We proactively train all our staff in the company's environmental principles and so people here know that they are doing something useful. This helps to provide job satisfaction," explains Mr Swahn. "We also know that our staff like the fact that our operations are so successful that they see the pallets and crates they work with everyday all over Sweden in shops and supermarkets. Our employees know we are a key part of the backbone of the country's distribution chain and we appreciate LIFE's role in helping make that happen," he adds.

His colleague Jessica Lindholm highlights how it is not just employees who are satisfied with the company's green working methods but clients as well.

LIFE's Eurocrate project created direct jobs in managerial, technical, and warehouse positions.

Photo: Tim Hudson

"We can see that our customers are using the green credentials in their own marketing materials and this is another positive green multiplier effect from LIFE", she says.

Skills training

Training in the company's environmental standards forms a core component of the induction process for all staff. "The training we provide for our staff is delivered in-house. We continue to update our skills programme which builds on the knowledge we gained during the LIFE project," states Mr Swahn.

Realising that the green credentials of its products were recognised as a unique selling point has led Svenska Retursystem to employ a dedicated sustainability manager, to investigate and identify, "how every part of our business could be improved from an environmental perspective. Her job thus helps us to do our green jobs better, and we know that every little thing that we do greener can make the entire Swedish grocery industry greener," explains Mr Swahn.

Green skills learnt during the LIFE project continue to be refined and transferred to new washing plants and new employees as the company grows. Knock-on benefits have also been gained for other employers from the LIFE funded eco-innovation.

Sören Frediksson, head of the Coop's distribution centre for grocery goods in Västerås underlines this point and notes that his company is very satisfied with the reusable system because, "It is easier to operate than alternative packaging systems. This means it is easier for us to train people in the skills needed to use the plastic systems, and so it is easier for us to provide employment opportunities."

Wider impacts

Many of the green skills demonstrated by this LIFE project example are not the conventional type of environmental skill. Mr Swahn believes that the skills needed for greening the distribution industry relate more to conventional business skills, such as innovation and problem solving, communication and client relations.

Photo: Patrick Linden

Jobs from the Eurocrate LIFE project have helped to green much of Sweden's grocery distribution chain

"We are constantly forced to challenge our logistical competences because we need to understand both the distribution and collection of our products. These job skills are very much green ones since they represent the key difference between jobs that work with reusable products compared to single use items."

However, he points out that is not easy to facilitate such big changes in a large industry with many different stakeholders. "The more we can standardise our systems, the cheaper and more attractive we can make our service, and so the more waste that can be reduced. A vital green skill for us is the ability for our staff to implement standardised quality in a consistent and reliable way."

Svenska Retursystem's green skill set can be replicated in other sectors where reusable systems could be implemented. Clothing businesses and public sector food procurement for schools and hospitals are noted as offering interesting opportunities for expansion and job creation. Different types of green skills will be needed for this throughout the company's managerial, tactical and operational workforce.

"We are confident that our green business will continue to build on its firm foundation that LIFE provided, and as our company grows we will continue to be able to create an even greater diversity of green jobs in the future," concludes Mr Swahn.

Project number: LIFE00 ENV/S/000867

Title: Eurocrate - Integrated reusable plastic crates and pallets, eliminating package waste, for sustainable distribution of everyday commodities in Europe

Beneficiary: Svenska Retursystem AB

Contact: Conny Swahn
Email: Conny.swahn@retursystem.se
Website: http://www.retursystem.se
Period: 01-Jan-2001 to 31-Dec-2002
Total budget: €7 821 000
LIFE contribution: €1 843 000

PACKAGING

PaperFoam's journey to **greener growth**

LIFE funding helped the Dutch firm PaperFoam develop an innovative, resource efficient form of packaging for a range of product types. The company's development is a good example of 'green restructuring' of an existing industrial sector (packaging) and offers some useful lessons for the development of a low-carbon economy and workforce.

PaperFoam is a recyclable, biodegradable and compostable packaging material made from industrial starch (from potatoes or tapioca), natural fibres, water and "our secret premix", explains Mark Geerts, CEO of the company which is based in the Netherlands. The technology was initially developed by researchers at AVEBE, who found a novel use for the Dutch starch company's main product by applying injection-moulding technology from the plastics sector to make starch-based packaging especially suited to the production of low-quantity, high-quality applications.

After AVEBE spun off its new material to daughter company Vertis, LIFE Environment funding was secured at an early stage of the product development pathway (1999-2001), enabling the beneficiary to scale-up its pilot processes, explore new

PaperFoam has created some 50 jobs at its facility in Barneveld

Photo: Justin Toland

materials and new directions and prove the ecological credentials and market-readiness of PaperFoam packaging.

The LIFE 'Paperfoam' project (**LIFE99 ENV/NL/000232**) not only showed that packaging made with the new material offered considerable energy and emissions savings in manufacturing when compared with plastic or paper alternatives (see box), it also generated significant interest – including orders from international companies such as Bosch and Siemens, leading to the spin-off of the business and its intellectual property into a separate entity (Paperfoam BV) and a rapid increase in workforce (from two people initially, to some 30 direct employees by 2003).

Photo: Justin Toland

Examples of packaging products made by PaperFoam

Despite some bumps along the route, PaperFoam has today grown to encompass three production locations (two outside Europe – in the US and Malaysia, the latter facility belonging to licensee BCL – and one in the small Dutch town of Barneveld, which also serves as the company's headquarters, housing design, R&D, sales and management, as well as manufacturing).

"We have around 50 people working at this site," explains Mr Geerts. "It hasn't been a steep curve from two to 50, it has been like this (he makes a zig-zag motion). We made some mistakes and we made some good steps."

Knowledge deficit

One of the biggest barriers to the growth of the company has been the resistance of large buyers of packaging to the 'unknown': "Although we have existed since 1998 we are still a new product for many customers," says Mr. Geerts. "If you are looking at huge customers like Microsoft, Philips, you will see a lot of handbooks all describing how to handle plastic or how to handle paper, or how to handle aluminium or carton, and then we come in with PaperFoam and someone who is asked to sign for the product will look in the handbook and if they can't find PaperFoam they won't even consider it."

There have been some successes too however: "For some customers, like Philips, we are in now - in some divisions - they know us and they have a little handbook written about PaperFoam – that helps, but it's still nothing compared to plastic, which has been in the market since World War II," he adds.

This creates some difficulties when it comes to finding skilled industrial designers with significant experience of working with the starch-based material: "To get someone with 10 years' experience of PaperFoam is impossible unless they have already worked here...all the publications about PaperFoam are written by ourselves, so there is a small literature base and the only real research institute – our four R&D people - is here," says Mr Geerts.

Links with tertiary education

To circumvent this green skills gap, the company has got involved in a number of educational projects with universities in the Netherlands. For instance, the current academic year is the third in which design students at Windesheim University of Applied Sciences in Zwolle have carried out half-year long product development projects using PaperFoam: "60 students each year – we teach them about the material and then they ask questions and they do market research and make a business plan," continues Mr Geerts.

These links have led to skilled jobs at the company for some of the students: "We have three workers now who originally came from that technical school," points out Mr Geerts. "We are also working with the University of Twente in Enschede, resourcing chemical engineers and bio-chemical engineers."

Much of the work of PaperFoam's research team is dedicated to developing the material "to have more personal properties," explains Mr Geerts. "We have been working on the humidity resistance;

Properties and uses of PaperFoam

The main ingredient of PaperFoam is industrial starch made from potatoes or tapioca. The use of renewable ingredients, a low water consumption in the production process and the light weight of the packaging (a full truck load only weighs some 6 tonnes – saving energy and transportation costs) means that PaperFoam trays have a very low carbon footprint (lifecycle analysis studies estimate it is around 2 g CO_2 equivalent per gram of PaperFoam). A survey by the Copernicus Institute found that a PaperFoam tray used for packaging medical products had 40% less weight and 65% fewer CO_2 emissions than a plastic equivalent (PETE blister). Significantly less water is used in manufacturing than for paper-based equivalents.

we are working on strength; we are working on the ability to resist radiation, that's necessary in the food branch and the medical branch as well; we are working on lidding, so we can offer closed packaging, and so on."

As well as creating highly-skilled green jobs for science graduates, PaperFoam is also helping to green the packaging sector at the intermediate level, as Mr Geerts reveals: "Our sales people need a lot of technical skills – it's not just selling vacuum cleaners. They first work in the factory to know what the material is about, then they look around at the design department to know about designing; and then they start with the first sales cycle." This knowledge gives them a better understanding of customers' packaging requirements and how PaperFoam might meet those needs.

CEO Mark Geerts highlights the green properties of the lightweight starch-based material

Photo: Justin Toland

"For packers in our facility, it's different from designers. We have several training courses, all on the job, so they start working, there's a simple model, they do some tests; then they go to the next stage," says Mr Geerts. The Barneveld factory employs five people per shift (on a three-shift system) - a packer for each line as well as a quality control supervisor/shift leader. One of those supervisors, Anja Versteeg, explains that she joined PaperFoam two years ago after a career break to raise her children, illustrating how broadening the labour supply can help mitigate skills shortages in green occupations.

Lessons for Brussels

Despite the uneven course of PaperFoam's progress, Mr Geerts is optimistic that it can continue to deliver green jobs and growth, with plans afoot for expansion into southern and eastern Europe. However, he suggests there are ways in which the EU can smooth the path to a resource efficient green economy, particular for small and medium-sized enterprises: "For many start-ups and even for more, 'graduates', like we are now, the most difficult item is to get market share: to convince a market or companies that a new material is as sound as old-fashioned ones. What really would help is an introduction programme, financing, to facilitate the use of a new material. We have found that for us, on our scale, it's too difficult to do that on our own. So it would really help, besides the research financing grants, to have some markets introduction grants," he suggests.

Project number: LIFE99 ENV/NL/000232

Title: Paperfoam: demonstration of the applicability of an innovative technology to produce packagings, made of natural fibres and starch, which are both environmental friendly and of a high quality

Beneficiary: Vertis BV / Paperfoam BV

Contact: Mark Geerts
Email: geertsm@paperfoam.com
Website: www.paperfoam.com
Period: 01-Feb-1999 to 01-Aug-2001
Total budget: €1 608 000
LIFE contribution: €358 000

ENERGY PRODUCTION

Fuelling green employment from grasslands

Developing a technological approach for the production of bioenergy from mature grasslands is not only a way of protecting biodiversity, but it is also – as has been successfully demonstrated in the LIFE project 'PROGRASS' – a means of generating employment.

A recently-opened bioenergy plant in the German spa town of Baden-Baden has created five full-time permanent positions, based on its novel approach to energy production. The new approach was demonstrated by 'PROGRASS' (**LIFE07 ENV/D/000222**), a LIFE project that invested in distributed bioenergy production to secure the conservation of protected (Natura 2000) grassland habitats.

By demonstrating a use for grass that must be mowed as part of the habitat management requirements of the Natura 2000 network sites, the project has created local green jobs, with the potential for further employment down the line. The PROGRASS network is currently preparing similar investments to the one in Baden-Baden in 11 other regions across Europe that are suitable for such an energy plant, with the possibility of at least another five permanent green jobs per site).

Getting up to scale

The University of Kassel in Germany launched the LIFE project in order to scale-up to a working plant its promising bio-energy approach, which has been designed to be especially suitable for the "difficult substrates" of extensive grasslands. The project team created a moveable demonstration plant that became a template for today's full-scale facility in Baden-Baden. The newly operational plant is run by the town's environmental management department, which has contact with local schools and other energy consumers and is delivering the biofuel pellets to them.

"They are pioneering in the large scale investment what we did on a mobile level," says Dr Tim Scholze, who is in charge of project management at BUPNET, a consulting and education business that was a LIFE project partner. "The idea is that the plant will trigger investments in the other sites. Baden-Baden is approximately two years ahead," he adds.

Farmers have gained financial incentives to maintain the Natura 2000 protected grassland habitat through mowing

The PROGRASS technology for producing bioenergy from grasslands is generating green jobs in 11 regions across Europe

As a result of LIFE's inputs, the faculty of Organic Agricultural Sciences at the University of Kassel also has created three permanent positions for researchers/trainers to give people the necessary skills to work with the technology. The project is even expected to give rise to the awarding of a PhD.As well as conducting feasibility studies, "they are travelling through Europe with the mobile plant over the next three-and-a-half years," explains Dr Scholze. "It's not only about the technology, it's about capacity building and creating a Europe-wide network...The aim is to support the development in the targeted regions."

Mieke Piepenschneider is one of the people that the university has hired to do this work of sowing the seeds of a new green energy industry. "I will work with my colleagues on the whole process from the demonstration of our technology to the scientific evaluation," she explains.

Specialised learning programmes on the PROGRASS approach, as well as on capacity-building processes, will take place at the new partner locations in order to prepare regional stakeholders for their activities. Personnel employed at the new sites, however, will receive specific training in the technology from their organisation/company.

A further two jobs have been created at BUPNET to disseminate and implement the technology that was demonstrated under the LIFE programme. Both the BUPNET and the university positions require, "In depth theoretical and especially practical knowledge of the PROGRASS approach. In the first phase of the initiative, we created jobs in the core business, which is the exploitation and the valorisation of PROGRASS," says Dr Scholze.

"We took on board one new colleague who is responsible for communication and trained him in a 'learning-by-doing' process," he adds.

According to Dr Scholze, these colleagues have become highly attractive to development agencies in this area, since they have applied their competences in an innovative context that takes in nature protection, energy production, regional development and capacity building. "It is the unique approach of our projects that the development of these competences have been assessed and documented with a specific validation system (LEVEL5) that gives evidence of the learning and the personal and professional development of the staff members."

In the follow-up projects that the University of Kassel is carrying out – DANUBENERGY (funded under the Central Europe Programme) and COMBINE (an INTERREG IV project) – links have also been created with a Belgian organisation, Pro Natura, which wants to create green jobs for disadvantaged people. "In these projects we are also going to be using roadside verges, and at these locations there is definitely a big potential for new jobs also for [less] qualified people" he says.

Furthermore, this technology also offers farmers, who own land containing the grassland habitat protected by Natura 2000, a financial incentive to mow and maintain/manage their land in a way that optimises biodiversity. Without the possibility of the cut grass being collected and turned into usable bioenergy products, often it would be left on the ground or dispersed into hedges, which has a negative environmental impact. As the experiences of the 'PROGRASS' project demonstrate, these farmers now stand to benefit financially from the collection of mowed grass from their land.

Project number: LIFE07 ENV/D/000222

Title: PROGRASS - Securing the Conservation of Natura Grassland Habitats with a Distributed Bioenergy Production

Beneficiary: University of Kassel

Contact: Michael Wachendorf
Email: mwac@uni-kassel.de/pfb/
Website: http://www.prograss.eu
Period: 01-Jan-2009 to 30-Jun-2012
Total budget: €3 231 000
LIFE contribution: €1 614 000

ENERGY PRODUCTION

Heating pellets initiative fires up local employment landscape

A Swedish biofuel project has demonstrated the environmental and economic advantages of reusing agricultural waste as fuel pellets.

Prior to the launch of the LIFE 'BIOAGRO' project (**LIFE06 ENV/S/000517**), an effective and well-functioning technique for using grain and grain waste as fuel hadn't yet been demonstrated. Grain is more difficult to incinerate directly than wood chips or wood pellets, due to its high ash content, but the BIOAGRO method overcame this problem. During the project, pellets were effectively burned to generate energy for the beneficiary's own production facilities and the local neighbourhood.

The beneficiary, Skånefö, says that its position in the market as a grain, grass and seed trader has been strengthened - and its some 30-strong workforce safeguarded - as a result of the project. "Agricultural waste (and how it is handled) is an increasingly important factor in the agricultural market. The LIFE project greatly supported [our] visibility in the market, giving Skånefrö a reputation for being able to handle the possible harmful side impacts in a reasonable way," explains Sven-Olof Bernhoff, the company's managing director and the project leader.

Skånefrö – a Swedish agricultural company that specialises in seed production – and its partner HOTAB built and developed a complete facility at Tommarp in south-east Sweden for sustainable bioenergy heat production that uses agricultural waste such as seeds, husks and straw residues. The company's turnover increased and it became necessary to increase staff to manage the higher production levels. "The management function had to be strengthened to run the increasing business volumes as well as the operational parts," says Mr Bernhoff.

The company has estimated that around 10 new jobs were created during the project: the pellet production and heating plant was responsible for around half of these, whilst the others relate to transportation and logistics. In addition, the company takes on one or two people every year as extra hands during peak seasons at the heating plant. Some on-the-job training was required, according to Mr Bernhoff. "The new people working with technical installations and pressure vessels had to go through some mandatory short-term training in-house to acquire the other technical skills to work the machinery."

The project also indirectly benefited local employment. For example, the project helped safeguard jobs at Eco-Era, a subcontractor that developed the biochar product (charcoal made of pellets by dry distillation) that is used for soil improvement. The beneficiary has been able to offer small-scale consultancy services (e.g. feasibility and technical advice on green energy) to external organisations that are using the technology developed.

Moreover, the BIOAGRO technology is continuing to be applied after the end of the project. The heating plant has now received another burner and the district heating net has been extended. "These [developments] improve the overall employment and business opportunities in the project's vicinity," concludes Mr Bernhoff.

Photo: Justin Toland

Fuel pellets from agricultural waste have produced sustainable bioenergy and durable jobs

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
Period: 01-Jan-2006 to 30-Nov-2009
Total budget: €5 227 000
LIFE contribution: €1 212 000

AGRICULTURE

Developing **green skills for organic wine production** in La Rioja

Through the 'SINERGIA' project, the Regional Authority in Rioja worked to establish best environmental practice in wine-making and teach these green skills to stakeholders in the regional wine supply chain.

Photo: Anders Ljungberg

La Rioja is one of the regions of Europe most synonymous with wine. As the worldwide reputation of the wine has grown, so has the importance of viticulture both economically and socially: It now accounts for nearly half of all agricultural production in the region.

Many wine-makers use traditional techniques passed down through the generations. However, some good practices have been lost and the use of chemical fertilisers and pesticides as well as sulphates to prevent the spoiling of wines has increased the environmental damage associated with wine-making. Water consumption is another important factor, as is the energy consumption of machinery and transport vehicles.

A 1999 LIFE project 'Business, environment and wine: from the winegrape to the bottle' (**LIFE99 ENV/E/000349**) started to examine the environmental impact of the entire wine supply chain. This helped identify practices that led, in some cases, to the use of 20 litres of water to produce 1 litre of wine when it was known that it was possible to produce the same wine with just 1 litre of water.

Jesús Ruiz Tutor, Head of Environmental Integration Services in The Directorate-General of Environmental Quality (DGCA) of the Regional Authority of La Rioja had a vision to spread improved environmental performance throughout the region. This would be good for the local environment and also for the image of the sector. "When people think of Rioja wine, we want them to think of a quality product that also respects the environment."

The result was "SINERGIA' (**LIFE03 ENV/E/000085**), a LIFE project led by the Regional Authority of La Rioja, with partners in the fields of environmental controls, agro-food quality and control and local economic development. It also actively engaged stakeholders throughout the wine supply chain, including six important wine producers, as well as research, technological and academic bodies.

Developing best practice

To encourage wine producers to make their methods more environmentally friendly, a first important stage was to research and confirm the best ways of

reducing negative environmental impacts whilst retaining or improving wine quality. The project brought together a technical working group with participants from all stages of the wine supply chain, including farmers' associations and wineries.

The group members made suggestions of possible environmental best practices and exchanged ideas over two years. The final output was two best practice guides on grape growing and wine production. The two guides set out not only what to do, but also how and when to do it. They highlight which practices and methods should be considered almost obligatory for good environmental performance in the sector. They also make further recommendations, as well as setting out those practices that should now be seen as unacceptable.

"This was the first time that this knowledge had been collated," explains Juan Francisco Alarcia of the DGCA. "Some of the practices are very simple, but setting them down on paper makes sure that practitioners do not forget the basics of good practice and provides a check that their current practices are up to date and effective."

Most of the advice was focused on agricultural practices and means of improving environmental performance in this particularly important area. As Juan Bautista Chavarri, Technical Director of La Grajera Winery of the Regional Government, highlights, "The winemaking process per se is not so different although the techniques differ. However, in the cultivation, the farmer has to change his way totally and acquire knowledge on soil fertility, organic fertilisers, pest control and how to work the soil."

Connecting to the wine supply chain

Publishing guides was not enough on its own. "As a second step with 'SINERGIA' we aimed to interact with the farmers and winemakers to teach them these new skills and green ways to cultivate and produce," explains Mr Ruiz. Training was provided to seven wineries by Mr. Bautista. Six such events were organised, each looking at a particular stage of the viticulture and wine-making process. Relevant practitioners attended, examining the good practices identified already by the project and exchanging further new ideas.

Pedro Salguero, Winemaker of Bodegas Viña Ijalba was one beneficiary of the training provided. "We have relatively new vineyards that cover 800 ha and we aimed to convert it all to organic production. We had already started with some sustainable agriculture but we had many knowledge gaps to fill and missing skills that the LIFE project was able to give us."

During the training events, Mr. Bautista presented the different best practices set out in the guidelines. The aim was not to determine exactly what each winery should do, but to give them ideas and suggestions to make the most appropriate adaptations. "We did not implement all the practices that are mentioned in the manual. Each winery involved implemented some of the best practices on its land," says Mr Salguero.

"We applied many of the techniques," he continues. "For example, we sowed plant cover between the rows of the vineyard and introduced water-efficient irrigation techniques. We do not use any herbicides or pesticides, but follow the other practices such as releasing pheromone traps. We have four people working on the vineyard and they all underwent the training to learn the techniques."

The winemaker highlights the "great environmental benefits of this type of farming. We had a poor soil and over the years its fertility has greatly improved. The vines are more robust and not so easily attacked by parasites. The quality of the grape and of the wine is also higher, with higher levels of tannins and polyphenols that are good antioxidants."

The project also created an on-line course, which complemented the more practical technical training

Farmers acquired knowledge on cultivation techniques for soil fertility, irrigation and pest control

Photo: Gabriella Camarsa

Pedro Selguero (second left) continues to apply the SINERGIA guidelines in his vineyard and winery

sessions and allowed the project to reach out to a larger audience. The eLearning platform provides information and teaching on the basic principles and practices of sustainable farming in vineyards and winemaking. It was supported by on-line tutorials and the possibility to pose questions to the experts. During the project, 240 people finished this course, receiving a formal certificate as a result.

Similarly, a seminar attended by 250 farmers and winemakers was organised during the project to present the basic concepts and skills of sustainable production. Sessions covered unsustainability in grape growing, vegetative cover as a technique for maintaining soil quality and thinning grape clusters to augment productivity. This aimed to generate further interest towards organic viticulture.

Building momentum

The project had notable successes in reaching out to farmers and winemakers. "Demand for the guides was strong," highlights Mr. Alarcia. "Already during the project we distributed all 1 000 copies that we printed of each guide. Farmers were asking for two copies: one for them to read at home; and one for them to have out in the fields." The project also produced a field notebook - which several vine-growers, including Mr. Salguero, continue to use beyond the project - for keeping track of the practices they are using in the vineyards.

The notebook can help provide ongoing support. Mr. Bautista is keen to stress that the "training that started out with the 'SINERGIA' project is expanding today through the ongoing work of the regional government." When possible it sends experts to the wineries and vineyards to answer questions and provide further guidance for improving environmental performance. Reference to the field notebook can be important in this context.

The regional government also continues to hold events in its own vineyards to showcase the good practices, and since the LIFE project it has established a permanent organic winemaking training centre.

Whilst wineries continue to require support and advice from experts as they develop their organic farming, an important extension of the project is the training they provide to their own workers, especially new employees. "Maybe before they were working in a conventional winery," explains Mr. Salguero, "so we have to train them to follow our practices and procedures, to learn these skills and understand why they are doing it." The participating wineries are also now sometimes called to give presentations and lessons on the practices they have learnt.

Mr Ruiz concludes with further thoughts on his ongoing vision. "We used the LIFE programme funding and 'flag' to give us credibility to spread the word on these techniques. Implementation is expanding. However, it is not sufficient to show people what they can do. It is essential to promote a real market in these green products. It is this that will ultimately drive the necessary changes in the sector.

"The new EU organic labelling regulation is important for enabling producers to place their products on the market with a label that certifies the process. As the Rioja Government we are also organising weekly markets of organic products to spread this culture, which is still not diffuse in Spain. Environmental awareness among citizens that creates market demand will go hand-in-hand with farmers and winemakers moving towards this type of production and acquiring those skills."

Project number: LIFE03 ENV/E/000085

Title: SINERGIA - SYNERGY, Quality and respect for environment

Beneficiary: Dirección General de Calidad Ambiental. Gobierno de La Rioja (DGCA)

Contact: Jesus Ruiz Tutor
Email: integracion.ambiental@larioja.org
Website: www.lifesinergia.org
Period: 01-Sept-2003 to 30-Jun-2006
Total budget: €875 000
LIFE contribution: €424 000

AGRICULTURE/CLIMATE CHANGE

Cutting GHG emissions through greener farming

Training in greener farming techniques – adopting best practices and a software tool developed by the LIFE AgriClimateChange project – is helping EU farmers to reduce their energy consumption and to combat climate change.

The Intergovernmental Panel on Climate Change (IPPC 2007) estimates that agriculture is directly responsible for some 13.5% of total global greenhouse gas (GHG) emissions. Key sources are fertiliser application and livestock. In Europe, where the figure is closer to 9% of total GHGs, political instruments that promote good practices in climate mitigation or adaptation in farming are already in place in some countries. However, there is often a lack of appropriate technology, monitoring systems, or organisations to run such programmes. The 'AgriClimateChange' project (**LIFE09 ENV/ES/000441**) aims to address these issues, with an ambitious training programme and pilot actions for farms in Spain, France, Italy and Germany..

Led by the beneficiary, the Spanish arm of the non-governmental organisation, Global Nature Foundation, the ongoing project has developed a software tool (see box) to assess the energy consumption and GHGs of 120 pilot farms to identify the most suitable systems and best practices for combating climate change. It is now using specially-trained technicians to assist the farmers in putting these innovative practices to work on various farm systems (crops, fruit, dairy, cattle).

"We wanted the farmers to gain the knowledge and skills that would make them collaborate efficiently in the fight against climate change," says project manager, Jordi Domingo.

A rice farm in Albufera (Valencia, Spain) has adopted best practices to reduce GHG emissions and improve soil carbon storage

Photo: Jordi Domingo

Photo: Gabriella Camarsa

Alfons Domínguez has implemented practices to reduce energy consumption and GHG emissions on his organic citrus farm

Keep it simple

At the same time, Mr Domingo explains, it was important to show the farmers that the measures to help fight against climate change are not necessarily complex or expensive. On the contrary, he says, some of them are "quite simple" to implement and do not have to cost much (e.g. the use of vegetation cover and organic fertilisers). Encouragingly, the project's first results show that farms can reduce their energy consumed and GHGs by between 10 and 20%.

LIFE+ AgriClimateChange

The project – through partners in Spain, France, Italy and Germany – has developed and tested a software tool to assess the energy consumption, GHG emissions and soil carbon storage potential of farm plots using up to 60 parameters. This in turn has enabled farmers to implement targeted actions to improve the environmental performance of 120 farms, with impressive results. The project also hopes to pave the way for an EU agreement to fund programmes to encourage farmers to apply action plans for energy efficiencies and reduced GHGs.

Project number: LIFE09 ENV/ES/000441

Title: 'Combating climate change through farming: application of a common evaluation system in the 4 largest agricultural economies of the EU'

Beneficiary: Fundacion Global Nature

Contact: Jordi Domingo
Email: jdomingo@fundacionglobalnature.org
Website: www.agriclimatechange.eu/
Period: 01-Sept-2010 to 31-Dec-2013
Total budget: €1 589 000
LIFE contribution: €794 000

A tool to reduce emissions

Developed by project partner, Solagro, the ACCT software tool helps each of the pilot farms to measure their energy consumption and reduce their GHG emissions. It enables them to identify the main sources of their energy consumption (usually from hidden inputs such as fertilisers, machinery, etc) and to reduce GHG emissions by changes in farming practices, to aid carbon sequestration and storage in agricultural soil.

From the start of the project, it was also recognised that training of farm technicians would be essential in order to show the farmers how to optimise their knowledge on innovative agricultural practices (e.g., which crops to cultivate and when, and how to use data on soil properties to apply pesticides, herbicides and fertilisers only when they are really needed) and also to ensure the plans for the farms make sound economic sense.

Mr Domingo considers the training an important aspect of the project – enabling the farm advisors, usually with a background in agronomy, to learn more about energy consumption applied to different farm systems; and to identify the main sources of GHGs, when carrying out their initial farm assessments. When the project was launched, this type of training was a new concept in Spain, he says, adding, however, that similar training for private consultants and farming stakeholders, had already been run successfully in France, by project partner, Solagro, and more recently the region of Baden-Württemberg in the South of Germany has been using energy advisors to assist farmers.

New agronomy jobs

For the moment, he says, the training simply provides the technicians with an additional skill, but depending on national and European regulations (and energy/ GHG farming programmes developed) it could become a "new type of job profile", in particular for the private sector, for instance for wineries, fruit producers, retailers or cooperatives.

Solagro's Nicolas Métayer, responsible for organising the training sessions in the four EU countries, agrees, noting that a good advisor needs to be able to find a compromise between the theoretical skills acquired and the practice. Importantly, they must be able to propose appropriate and realistic measures i.e.,

they are taught how to use the software tool and to adapt it to individual farms – proposing cost-efficient measures that can be implemented easily.

Finally, in the context of the Common Agricultural Policy (CAP) reforms, currently under political debate, he believes there will be more scope for this type of farm advisor in the future. Farmers will increasingly be asked to implement sustainable agricultural practices and to justify them, he says: "There is already a market in the agricultural sector for these new farm advisor profiles, combining knowledge of agronomy and energy. This will take on increasing importance in the years to come."

Farmer's voice

Alfons Domínguez, an organic citrus fruit farmer in Alzira (Valencia), Spain:
"I have always been interested in green farming, so when I was approached about participating in the LIFE project, I was very happy to learn more about the techniques that I could use on my farm. I produce high-quality organic oranges and other citrus fruits for clients in France, Germany and the UK.

Not every farmer needs to become an organic farmer, but it is essential nowadays to learn these new techniques. Farmers need to learn again how to farm and cultivate their land with respect for the environment. You can call it a type of 'sustainable farming'.

The techniques are so simple and easy to implement, and – from what I've learnt – essential in fighting against climate change, which could have a negative impact on our farms and production yields. If we produce in a different way, we can actually help in actively fighting against climate change and in reducing the amount of emissions that our activities produce, for example, by increasing the carbon storage in our soils.

I'm also involved in teaching – giving a weekly class at the IVIA (Valencia Institute for Agricultural Research) and discussing with other farmers how intensive agriculture is destroying our soil and ground water sources through the use of chemical products. Furthermore, the yields are not as good, and some farmers are not earning enough.

I teach new methods of agriculture and now I also pass on to other farmers what I have learnt from the project about reducing energy consumption and GHG emissions. One such practice is to use vegetation for land cover, which not only reduces erosion, but also facilitates carbon storage. Most farmers think of this vegetation as weeds and eliminate them with chemicals. In fact, they also increase soil fertility.

There is also a positive economic effect that is due to the fact that through the action plans provided by the farm advisors we have energy savings. I believe this type of farming should be extended to all of the farms that apply the techniques to reduce GHG emissions and lower their carbon footprint.

I have also learnt that in other countries a labelling scheme is being developed for such farmers and that this can bring other economic advantages – enabling farmers to sell their products for higher returns."

Blanca Hurtado - project communications (left), Jordi Domingo - project manager (centre) and farmer Alfons Domínguez

Photo: Gabriella Camarsa

AGRICULTURE

Giving Spanish farmers **the skills to go organic**

Consumer demand for organic products continues to expand on a global scale. Growth across the organic food supply chain requires workers who are well qualified and LIFE is a useful catalyst for these green employment skills.

Organic farming can provide a profitable business model for farmers, both because many consumers are willing to pay higher prices for organic products, and because the organic processes provide lasting protection for the productivity of farmers' land..

These facts of farm life are recognised by a Spanish LIFE project that is involved in providing skills to help green agricultural systems in the country. Operational since 2010, the 'Crops for better soil' (**LIFE10 ENV/ES/000471**) project is bringing together farmers and organic production experts to learn from each other in ways that promote wider adoption of environmentally-sensitive soil management techniques.

"Farmers are losing out because yields are getting lower as soil fertility decreases. So we thought of demonstrating that organic farming can increase and restore soil fertility in ways that can also be economically beneficial and viable," explains project manager Mariano Saz Anchuelo, a director of the beneficiary, Transati, a Spanish logistics company specialising in the supply of organic cereals, seeds and legumes, most of which, prior to the LIFE project, it was required to source from other countries.

"We believe that organic farming is potentially so profitable and, in the long run, the farmers won't need any Common Agricultural Policy (CAP) subsidies. However to achieve this, we have to train [Spanish] farmers to learn about the benefits of using traditional crops and extensive farming techniques," says Mr Saz.

As well as improving the soil quality, he points out that the introduction of traditional crops also will,

The Medusa technology is used for mapping the composition and structure of participating farms' soil and sediment

"Enforce the development of new niches that respond to market demand for organic products." Although the market for organic produce is still in its infancy in Spain, however, the LIFE beneficiary believes that by teaching Spanish farmers the green skills required to produce high-quality products, they will be able to expand the organic sector. "Our overall aim is to offer farmers alternatives to conventional practices by demonstrating the profitability of ecological agriculture in order to help maintain and improve job prospects in rural areas."

Organic skills

Pilot farms have already taken up the challenge of testing organic and sustainable chemical-and-residue-free approaches to growing traditional crops. The farmers receive a mixture of training and mentoring in the application of green skill sets. Early outcomes indicate that LIFE's support is proving to be fruitful in overcoming initial cynicism about organic approaches by demonstrating the tangible difference that organic methods can make to farmland's commercial productivity.

Luis Ballesteros is one of the farmers who has gained from the green skills project and seen the potential that his new knowledge offers. "Before the project we used a lot of chemical products to cultivate crops on our farm. After the LIFE project training, and the continuous help of the project agronomists, I have learnt about crop rotation and I am now not only sowing wheat but also leguminous plants."

He says it was, "Amazing to find out about all of the varieties and the cultivation techniques they need. I was dubious at the start that they would not have big enough yields, but I was proven wrong and I have seen that the wheat quality of the organic plants is much higher when compared against the previous system. They also have a higher economic value on the market."

Mr Ballesteros adds that he is "more and more excited about the future. I want to experiment with other varieties of legumes, oilseeds and cereals and see how and what techniques I need to apply to cultivate them."

Expert help

The value of the work of project agronomists such as Professor Juan Pablo del Monte, Professor of Botany at the Polytechnic University of Madrid (UPM), is also appreciated by another of the project's pilot farmers, Jose Miguel Villanueva. "Working in close collaboration with experts such as Juan Pablo is precious and without this first help and scientific guidance we would be at a loss ...We need the continuous practical support of the agronomists to guide us and tell us things like whether we should try to apply a bit more organic fertiliser to our crop or which varieties to try out." He adds that the consultancy role of the agronomists is "essential for the further development of organic farming techniques."

Photo: Gabriella Camarsa

Jose Milguel Villanueva (left) and Luis Ballesteros examine the quality of their organic crops

The training provider

Based in Barcelona, Vida Sana is Spain's only association dedicated to promoting organic farming and production along the whole value chain, from farmers to packaged food producers to consumers. As a LIFE project partner it is responsible for all the theoretical training in organic farming skills and certification issues. The first round of training sessions took place in the regions of Guadalajara, Navarra, Zamora and Zaragoza in February 2012, teaching the basic principles of organic farming (things such as crop rotation, weed control and certification).

The second round of training (October 2012) was organised on a national level and led by an expert on weed control from the University of Barcelona (the topic was selected by the farmers). The next course will be on improving soil fertility.

Montse Escutia from Vida Sana says that gathering a group of farmers in one place gives the training a greater value than if it was done on an individual basis: "Putting the farmers together so that not only can they ask the expert questions about techniques (and so acquire more agri know-how), but so that they confront each other about what they are doing and applying, learn from each other and teach one another." She cites this 'cross-learning' as important to fostering the growth of organic farming skills and helping to develop a real "culture of organic" in Spain.

Mr Villanueva also highlights the important role of project partner Vida Sana's training courses (see box), where he learned the theory of organic farming as an initial step prior to practical application.

Mr Villanueva says that he is "still in the learning phase" when it comes to applying the lessons. As well as receiving training in the basics of organic farming and the certification scheme, "We also learnt about soil science, how organic matter is formed and regulated through stable sources of organic fertilisers. We found out about the importance of micro-organisms, worms, fungi and small mammals as they increase the soils' organic matter."

After being initially cautious about the impact of the LIFE project's ongoing green skills support, he has been impressed by the results. "I started out by planting one of the leguminous plant varieties that they had suggested and at the same time I planted a different variety of wheat than the one that I would normally use. We did not use any chemical or organic fertilisers and after only one year the yield and quality was greater."

Seeding the market

The LIFE project has already helped Transati more than double its volume of organic cereals, legumes and oilseeds – from 3 000 to 7 000 tonnes per year. Mr Saz expects that figure to double or triple in the coming years, potentially leading to "four or five" new jobs for people doing the processing, marketing and sales of this rapidly-growing category of agricultural crops.

Luis Ballesteros is using the newly acquired green skills to cultivate traditional leguminous plants

Photo: Gabriella Camarsa

Cost benefits

Egbert Sonneveld is an agricultural advisor with the project and he is also impressed by how well the farmers have adapted after the initial training. "Before the farmers were buying the most common and cheapest seed on the market, now they are buying different varieties that cost more but produce higher value products when used in organic systems."

He notes, that in addition to the farmers taking part in the project who are following 'certified organic' procedures (90%), the other 10% - conventional farmers - have introduced crop rotation and abandoned the use of chemical fertilisers and pesticides, following the lead of LIFE.

Mr Sonneveld also points out that, "Although [2012] was a very dry year, the organic land actually did better than land farmed using conventional techniques. I think we are showing that organic approaches can help reduce farmers' reliance on subsidies and in the long run these green skills will also help create more types of green employment in farming."

One way of ensuring that more farmers receive the training needed to develop the organic sector would be through the use of CAP funds. Significant sums are available for such training and farm advisory support from the CAP's European Agricultural Fund for Rural Development, and other sources.

Professor del Monte sees the same potential from broadening the benefits of the green skills programme using mainstream support: "I have seen the enthusiasm in farmers like Luis and Jose Miguel for learning and applying the techniques. They saw the results of the first harvests and they are full of excitement and want to learn more."

Project number: LIFE10 ENV/ES/000471

Title: Crops for better soil - Profitable organic farming techniques based on traditional crops: contrasting soil degradation in the Mediterranean

Beneficiary: Transati

Contact: Mariano Saz Anchuelo
Email: mariano@transati.com
Website: http://cultivos-tradicionales.com/
Period: 01-Oct-2011 to 14-Oct-2016
Total budget: €3 557 000
LIFE contribution: €1 729 000

AGRICULTURE

Strengthening green skills in the agri-food workforce

Pollution prevention skills of over 4 000 farmers and 1 500 agricultural advisors from 15 different European countries were improved by a successful green skills training programme supported with co-finance from LIFE.

Farmers are the guardians of much of Europe's natural resource base and agricultural actions have a significant influence over key environmental factors such as soil, air, and water quality. Human society remains heavily dependent on these 'public goods' and farmers' organisations are continually working to improve awareness among agri-stakeholders about how to operate in sustainable ways.

Greening the skills of farm workforces is a complex task. Working with over 10 million employees (representing around 5% of total EU jobs) takes time and benefits can be gained from commonly-agreed methodologies for achieving sustainable agricultural practices.

As know-how evolves in this important field, the EU's agricultural workforce has been able to adapt its operations by applying new green skill sets. Pollution prevention is one of the areas where a lot of progress has been made in recent years, and LIFE has played a part in helping to expand agri-sector knowledge bases through developing and demonstrating techniques that reduce pollution risks.

The TOPPS story

A good example of LIFE's support for the promotion of pollution controls by farmers is the 'TOPPS' project (**LIFE05 ENV/B/000510**). This transnational initiative was implemented by a large partnership and led by the European Crop Protection Association (ECPA). It used a geographical cluster approach during the design and delivery of a consistent set of Best Management Practices (BMPs) addressing pollution threats to surface water from plant protection products (PPPs).

PPP 'point sources' were an area of focus from the outset. Thus the TOPPS partnership aimed to raise awareness about techniques for reducing pollution risks from specific points throughout the process of using PPPs (e.g. handling and/or storing the products, as well as filling and/or cleaning PPP-spraying equipment).

Workers on the farms are now more aware about pollution prevention methods

"No farmer wants to be a polluter of water and the TOPPS project was used to help show how farming operations can be as responsible and professional as possible," notes ECPA's Stuart Rutherford. "We did not need to introduce an entirely new set of so called 'green skills' and our task was more about building on farmers' existing environmental knowledge. This involved furthering and updating a common understanding about the interaction of PPPs with biology, soil science, and management in ways that still allowed farmers to produce good food and earn a living for their family," he continues.

One of the key messages promoted by the LIFE project, "Was that everyone involved - meaning farmers, authorities, sprayer manufacturers and the crop

Spraying equipment was adapted during TOPPS to make cleaning more efficient

protection industry - should be aware that crop protection needs to be understood as a process, which starts with the PPP, the application through a sprayer and ends with the intended effect on the pest, disease, or weeds," emphasises Mr Rutherford. As a result, it is necessary to develop concepts to reduce negative side effects at all stages of the process. "For instance, to protect water it might be easier and more effective to improve sprayers than to restrict PPP use," he notes.

The Best Management Practices published by the TOPPS team are acting as a useful toolkit of green skills for encouraging more appreciation of this 'process thinking' about preventing PPP point source pollution. "Outcomes from our project have been welcomed and we have seen the BMPs being adopted in Member States' national action plans for the EU Sustainable Use Directive for Plant Protection Products," says Inge Mestdagh from TOPPS.

Sustainable success

LIFE's achievements in raising awareness about reducing negative environmental impacts of agriculture from this project example can hence be considered a green skills success story. Farmers across Europe are now better informed than they were before the TOPPS project about how to act in responsible ways that look after water quality.

Experiences from two farmers in Belgium's Flanders region confirm this claim and demonstrate the difference that TOPPS made to the way they now work.

Guido Lammerant is an arable farmer from Koksijde who wants, "To ensure that I look after my farm so my son can inherit it in good condition. For me this means making sure the farm looks after the environment that it depends on...Previously I would always plan my field spraying rotas around cost-efficiency. I would spray one field with one type of PPP; then drive to the closest next field, which might require another type of PPP." The result was that he would regularly need to clean the sprayer and change PPPs. "But by participating in the LIFE project I learned a lot about how to reduce pollution risks by reducing the number of times I emptied and cleaned the sprayer. So these days I calculate which routine requires the least number of PPP changes and that is the routine that I use."

Mr Lammerant has also installed a bio-filter for treating unused PPPs and regularly applies knowledge about safe handling of these products learned through the LIFE project. 'The thing I liked most about TOPPs was that it used practical ways to help us to properly understand that PPPs could be a hazard, and that relatively simple things could be done to reduce risks," he says. "I think this is a good way of encouraging farmers to be responsible and it is better than introducing new legislation to impose restrictions on what we can do."

Supporting this LIFE lesson that facilitating green skills among farmers can be more productive than enforcing them, Ignace Vercruysse, another Flanders farmer from the TOPPs project says, "I am now much more aware about the things I can do to prevent pollution and I use these techniques all the time."

Mr Vercruysse says his farm is now "well-known as an environmentally-friendly business. This has helped me to attract the attention of important new customers for my products. I also pass on the information I learnt from TOPPs to the many groups of agricultural students and farm advisors who come on study visits here."

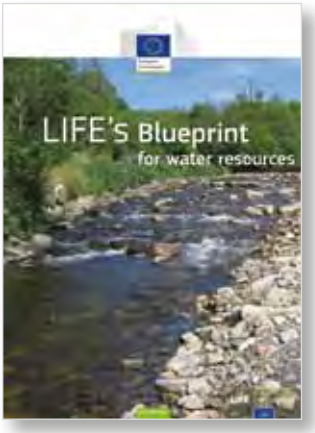
Project number: LIFE05 ENV/B/000510

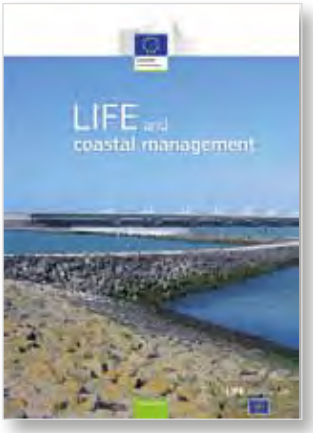
Title: TOPPS - Train the operators to prevent pollution from point sources

Beneficiary: European Crop Protection Association (ECPA)

Contact: Stuart Rutherford
Email: Stuart.rutherford@ecpa.eu
Website: http://www.topps-life.org
Period: 01-Nov-2005 to 31-Oct-2008
Total budget: €2 603 000
LIFE contribution: €1 259 000

Available LIFE Environment publications





LIFE Environment brochures

LIFE's Blueprint for water resources (2012, 80 pp. – ISBN 978-92-79-27206-6 – ISSN 1725-5619)

LIFE and coastal management (2012, 96 pp. – ISBN 978-92-79-25091-0– ISSN 1725-5619)

LIFE and Resource Efficiency: Decoupling Growth from Resource Use (2011, 72 pp. – ISBN 978-92-79-19764-2 – ISSN 1725-5619)

LIFE and local authorities: Helping regions and municipalities tackle environmental challenges (2010, 60 pp.– ISBN 978-92-79-18643-1 – ISSN 1725-5619)

Water for life - LIFE for water: Protecting Europe's water resources (2010, 68 pp. – ISBN 978-92-79-15238-2 – ISSN 1725-5619)

LIFE among the olives: Good practice in improving environmental performance in the olive oil sector (2010, 56 pp. – ISBN 978-92-79-14154-6 – ISSN 1725-5619)

Getting more from less: LIFE and sustainable production in the EU (2009, 40 pp. – ISBN 978-92-79-12231-6 – ISSN 1725-5619)

Breathing LIFE into greener businesses: Demonstrating innovative approaches to improving the environmental performance of European businesses (2008, 60 pp. – ISBN 978-92-79-10656-9 – ISSN 1725-5619)

LIFE on the farm: Supporting environmentally sustainable agriculture in Europe (2008, 60 pp. – 978-92-79-08976-3 – ISSN 1725-5619)

LIFE and waste recycling: Innovative waste management options in Europe (2007, 60 pp. – ISBN 978-92-79-07397-7 – ISSN 1725-5619)

LIFE and Energy: Innovative solutions for sustainable and efficient energy in Europe (2007, 64 pp. ISBN 978 92-79-04969-9 – ISSN 1725-5619)

Other publications

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KH-AJ-13-001-EN-N

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EU funding available approximately EUR 2 143 million

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> 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.

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Contact

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Luxembourg: Office for Official Publications of the European Union

2013 - 76p - 21 x 29.7 cm
ISBN 978-92-79-29814-1
ISSN 2314-9329
doi:10.2779/33031

Publications Office

ISBN 978-92-79-29814-1

doi:10.2779/33031