editorial

Peter Gammeltoft
Head of Unit
European Commission,
Environment Directorate-General

In the majority of countries in Western Europe, the last 30 years have seen a significant improvement in air quality for a number of pollutants. Indeed, the EC, the Members States and the local authorities together have been very active particularly in recent years in finding and supporting ways to improve the quality of the air we breathe. Furthermore, work in this area shows that economic development does not necessarily have to lead to environmental degradation.

However there is much more work to be done. The Sixth Environment Action Programme, "Environment 2010: Our future, our choice", includes Environment and Health as one of the four main target areas where we must strengthen our efforts if we are to significantly reduce today's unacceptable levels of air pollution, which are putting our health and our environment at risk. This is particularly the case for ozone and particulate matter, for which additional strong efforts are needed.

Moreover, strong partnerships, sharing of expertise and knowledge, networking with technical experts and representatives of populations at particular risk – such as children, expectant mothers and the elderly – are critical to achieving success.

This brochure presents 12 examples of successful projects that illustrate how the LIFE-Environment programme actively supports the targets set by the Sixth Environment Action Programme. The articles highlighted here not only contribute to the development of new technologies and solutions, they also prove the value of information sharing and exchange. Finally they show that we can all take active part in making our environment a healthier one.

summary

Key policy and legislation on air quality in Europe

Nearly 97% of European citizens living in urban areas are exposed to pollution levels that exceed EU limits. EC air quality policy and legislation are designed to help Member States meet the set limits and create a safer environment for their citizens.

Background

Since the late 1970s, the EU has been working to improve air quality by setting limit values for various pollutants in the air, controlling emissions of harmful substances into the atmosphere, improving fuel quality and integrating environmental protection requirements into different sectors such as transport, energy or waste incineration.

Despite these efforts, however, today nearly 97% of European citizens living in urban areas are exposed to air pollution levels that exceed EU quality objectives for particulates, 44% for ground-level ozone and 14% for NO2[1].

Road traffic is the main source of these and other air pollutants. While substantial progress has been made in reducing emissions from individual motor vehicles – which has contributed to the decrease in urban concentrations of particulate matter, NOx and other ozone precursors – the growing levels of motor traffic in urban areas are to some extent diminishing this progress. The concentration of particulate matter has stopped decreasing since 1999 and the concentrations of ozone are now on the rise. If nothing is done to reverse the traffic growth trend, CO_2 emissions from transport can be expected to increase by around 40% by 2010 compared to 1990.

Yet, traffic is not the only source of air pollution in Europe. Several stationary sources contribute to the problem, including VOCs' emissions from several industrial sectors, and emissions from large and smaller combustion plants or from agriculture and other transport modes such as ships and aircraft.

[1] See Communication COM(2004)60 "Towards a Thematic Strategy on the Urban Environment"

Responding to the challenge: Policy and legislation at European level

Improving air quality in Europe requires a combination of policy measures, legislation and partnership.

In accordance with the obligations set out in the Aarhus Convention (1998) and the Directive on implementation of these obligations[2], the European Commission has involved stakeholders in the design of its environment legislation on air pollution. Indeed, the Commission has a long-standing tradition of liaising with stakeholders (particularly industry and NGOs) when designing policy and legislation related to air quality.

Policy instruments:

> The Sixth Environment Action Programme, "Environment 2010: Our future, our choice", includes Environment and Health as one of the four main target areas where a renewed effort is needed. Air pollution is one of the priority issues, the objective being "to achieve levels of air quality that do not give rise to unacceptable impacts on, and risks to, human health and the environment". The focus in the coming years will be to implement air quality standards and coherency in all air legislation and related policy initiatives.

> The 2001 White Paper on European Transport Policy highlights that European transport policy has reached a critical point where clean, well-functioning and less fossil-fuel based urban transport systems are considered an indispensable condition for achieving the Community's overall objective of sustainable mobility in Europe. The Transport White Paper identifies two types of Community activities in the field of clean urban transport: supporting a diversified energy supply for transport and promoting good practice.

> The Commission's Green Paper on the security of energy supply sets an ambitious target of 20% substitution of diesel and gasoline fuels by alternatives in the road transport sector by the year 2020. In the follow up Communication on alternative fuels for road transportation, an "optimistic development scenario" is presented that builds upon three fuel types that potentially can reach a significant market share and which also present considerable advantages for the urban environment: biofuels, natural gas and hydrogen. In addition, measures have been taken to support a broader market introduction of biofuels.

> The Commission supports the development of the trans-European transport networks (TENS), which have a considerable impact on the interfaces with urban areas. For example the TENS programme supports the use of intelligent traffic management systems, the development of nodal points such as airports and ports, most of which are in or near urban areas, and the development of infrastructures connecting major urban areas in Europe, in particular by rail and waterways.

> The Thematic Strategy for the Urban Environment, which supports the Sixth Environmental Action Programme, focuses on four themes: sustainable urban management, sustainable urban transport, sustainable construction and sustainable urban design. These themes were identified in consultation with the EU Expert Group on the Urban Environment and other stakeholders.

> The "Clean Air for Europe" (CAFE) programme, launched by the European Commission in March 2001, provides technical analysis and policy development which will lead to the adoption of a thematic strategy on air pollution under the Sixth Environmental Action Programme by mid 2005. The major elements of the CAFE programme are outlined in the Communication on CAFE (COM(2001)245). Its aim is to develop long-term, strategic and integrated policy advice to protect against significant negative effects of air pollution on human health and the environment. The integrated policy guidelines from the CAFE programme are expected to be ready by the beginning of 2005. The European Commission will present its Thematic Strategy on Air Pollution during the first half year of 2005, outlining the environmental objectives for air quality and measures to be taken to achieve these objectives.

[2] Directive 2003/35/EC of the European Parliament and of the Council of 26 May 2003, providing for public participation with respect to developing certain plans and programmes regarding the environment, and amending Council Directives 85/337/EEC and 96/61/EC (OJ L 156 of 25.06.2003, p. 17) with regard to public participation and access to justice. This Directive contains rules on public participation in the preparation of a number of environmental plans and programmes under Directives on waste, air pollution and protection of waters against nitrate pollution. Member States are obliged to adopt their laws and other provisions to comply with this Directive by 25 June 2005 at the latest.

Actions proposed for the thematic strategy on sustainable urban transport

Each capital city and every city and town of over 100 000 inhabitants should develop, adopt, implement and update a sustainable urban transport plan, with short, medium and long-term targets. All Member States will be encouraged to:

- set out a clear framework policy on sustainable urban transport;
- evaluate the impacts of new urban transport infrastructure projects on the sustainability of the town's transport system;
- closely follow the guidelines on the use of structural funds;
- purchase cleaner and more efficient vehicles;
- support activities such as the European car free day and mobility week.

EU legislation

Another essential tool to create change at European level is the EU legislation on air pollution, which compels Member States to comply with Community efforts to improve air quality.

Directive 2001/81/EC of the European Parliament and of the Council on National Emission Ceilings for certain pollutants (NECs), the framework piece of legislation in this area, sets upper limits for each Member State for the total emissions in 2010 of the four pollutants responsible for acidification, eutrophication and ground-level ozone pollution (SO_2, NOx, VOCs and ammonia).

Emission ceilings are designed to meet interim objectives for acidification that have been agreed by Council and Parliament, and new objectives for ozone, in the most cost-effective way for the Communities as a whole.

The pollutants concerned are transported in large quantities across national boundaries. In general, individual Member States would not be able to meet the objectives set within their territory based on actions at national level alone.

Based on the provisions of the Directive, Member States are obliged to report each year their national emission inventories and projections for 2010 to the European Commission and the European Environment Agency. They shall also draw up national programmes to demonstrate how they are going to meet the national emission ceilings by 2010.

The Directive calls for reviews in 2004 and 2008.

- Air quality assessment and management

The Decision 97/101/EC "Exchange of information and data on ambient air quality" aims to establish a Community-wide procedure for the exchange of information and data on ambient air quality in the European Community. It introduces a reciprocal exchange of information and data relating to the networks and stations set up in the Member States to measure air pollution and the air quality measurements taken by those stations. All data is sent by the Member States to the Commission. The Commission then makes this information available to the Members States and to the general public through an information system set up by the European Environment Agency[3].

However, the key piece of EU legislation for air quality assessment and management is the Framework Directive 96/62/EC. This Directive establishes the basic principles of a common strategy for setting limit values as well as for the assessment and management of air quality throughout the EU.

In practice this Directive is implemented through Daughter Directives. At present there are three Daughter Directives covering specific pollutants: sulphur dioxide, nitrogen oxides, particulates and lead (99/30/EC), carbon monoxide and benzene (2000/69/EC) ozone (2002/3/EC). In addition, the Commission has prepared a proposal for a fourth Directive that will cover the remaining pollutants listed in the Framework Directive i.e. arsenic, cadmium, nickel, mercury and PAH (polynuclear aromatic hydrocarbon).

- Emissions of air pollutants

Stationary sources, such as industry, combustion plants, incinerators and mobile sources, primarily road transport, are major emitters of air pollutants.

[3] Council Decision 97/101/EC of 27 January 1997, establishing a reciprocal exchange of information and data collected from networks and individual stations measuring ambient air pollution within the Member States (Official Journal L 296, 21.11.1996).

Key pieces of legislation for stationary sources

The Directive 2001/80/EC fixes limit values on emissions of certain pollutants into the air from large combustion plants.

This Directive, which amends the 11-year old Directive for large combustion plants (Directive 88/609/EEC), proposes emission limit values for SO_2 (sulphur dioxide), NOx (nitrogen oxides) and dust that are considerably stricter than those set in the previous Directive. It also encourages the combined generation of heat and power and sets specific emission limit values for the use of biomass as fuel. Furthermore, the scope now includes gas turbines to regulate NOx emissions as their use in electricity generation is growing.

The Directive 2000/76/EC on waste incineration covers the incineration of hazardous (formerly Directive 94/67/EC) and non-hazardous (89/369/EEC and 89/429/EEC waste. The new Directive will prevent or – where this is not feasible – reduce as far as possible the negative effects on the environment caused by the incineration and co-incineration of waste. This will be achieved by applying stringent operational conditions and technical requirements and by setting up emission limit values for waste incineration and co-incineration plants within the Community.

Although the volume of waste incineration is expected to increase across the EU in the near future[4], the Directive will continue to help reduce significantly emissions of key pollutants, such as nitrogen oxides (NOx), sulphur dioxide (SO_2) and hydrogen chloride (HCl) as well as for heavy metals dioxins and furans.

Two other directives aim at preventing or limiting emissions in the atmosphere of volatile organic compounds (VOCs). These are Directive 94/63/EC, on the storage of petrol at terminals and its subsequent distribution to service stations, and Directive 99/13/EC, on the use of organic solvents in certain activities and installations. Lastly, the recently approved Directive on solvent contents of deco paints will assist in the reduction of VOC emissions from this product (Directive 2004/42).

Directive 1999/32/EC on the reduction of sulphur content of certain liquid fuels aims to decrease the emissions of sulphur dioxide resulting from the combustion of certain types of liquid fuels and thereby reduce the harmful effects of such emissions on man and the environment. These reductions in emissions of sulphur dioxide will be achieved by imposing limits on the sulphur content resulting from the combustion of certain types of liquid fuels as a condition for their use within the territory of the Member States.

Under stationary source emissions, it is also necessary to include other important sources of pollution such as diffuse pollution from agriculture (a major emitter of methane, nitrous oxide and ammonia), and from smaller combustion sources for which additional efforts will be necessary in the coming years.

Industrial plants are covered by the IPPC Directive (96/61/EC), which prohibits new plants and factories to run unless they adhere to stringent production standards, thus encouraging industry to avoid or reduce polluting emissions as much as possible by adhering to the "Best Available Techniques" (BAT) as defined by each sector. All industrial plants covered by this Directive are required to obtain a permit to operate from the authorities in the EU countries. These permits must be based on the concept of BAT. Under this umbrella, access to information is in practice carried out via Decision 2000/479/EC, which calls for a European Pollutant Emission register for air and water from large and medium-sized industrial facilities in Europe[5].

[4] See LIFE Focus / "A cleaner, greener Europe: LIFE and the European waste policy", DG Environment, European Commission 2004.

[5] See "Industrial pollution, European solutions: Clean technologies" , DG Environment, European Commission, 2003.

Key pieces of legislation and initiatives for mobile sources

Motor vehicle emissions are regulated by Directive 70/220/EEC (light vehicles) and 88/77/EC (heavy vehicles) and amendments to these directives. A series of amendments have been issued to tighten the limit values. Emissions per vehicle are falling considerably because of this, but the transport sector remains one of the main contributors to air pollution because of the constant increase of traffic volumes. The implementation of the Auto-Oil Programme will result in a notable improvement of air quality in our cities. The programme focuses on the emissions of carbon monoxide (CO), Volatile Organic Compounds (VOC), nitrogen oxides (NOx) and particles. It also calls for stricter limit values to be set for light vehicles in 2005 (Directive 98/69/EC) and for heavy duty vehicles between 2005-2008 (Directive 99/96/EC).

In addition, legislation has been implemented on the use of on-board diagnostic systems (OBD) which will alert vehicle owners if the emissions of the vehicle are too high and a light on the instrument panel will indicate when there is a need to repair the vehicle.

For existing vehicles, there is also legislation on periodic inspections during which the vehicle owner's maintenance of the vehicle is checked (Directive 96/96/EC).

To reduce emissions during short trips, when the catalytic converter is less effective, and driving during winter, a separate requirement on "cold start emissions" was introduced. This part of the legislation is of particular importance for city driving where the average trip is normally very short.

By amending Directive 1999/24/EC, emission levels for motorcycles will be lowered as well. The current legislation will be tightened in 2004, and again as of 2006. This Directive also applies to emissions from mopeds.

Directive 98/70/EC, amended by Directive 2003/17/EC contains environmental fuel quality specifications for petrol and diesel fuels in the Community with a primary focus on sulphur, and for petrol on lead and aromatics. There are three distinct specifications. The first entered into effect on 1 January 2000; the second will enter into force on 1 January 2005 (it sets limits for the sulphur content of petrol and diesel (50 ppm) and the aromatics content of petrol (35% by volume)); the third (as amended by Directive 2003/17/EC), which will also enter into force on 1 January 2005, requires phasing in diesel and petrol with a sulfur content of 10 ppm. In addition, as of 1 January 2002, all petrol sold in the Member States is unleaded.

Transport is today fuelled to a large extent by oil. This situation has implications for energy policy, but is also of particular relevance from an environmental perspective, notably in view of climate change. Developments have been made in the domain of alternative fuels in general and on biofuels specifically. The long-term vision of hydrogen as an energy carrier is being pursued following the work of a high-level group on hydrogen and fuel cells.

Additional initiatives are expected in the coming years to reduce emissions from other forms of transport, such as ships and aircraft.

Road traffic is the main source of air pollution today.

LIFE-Environment's contribution to air quality management and pollution prevention

The LIFE programme supports the implementation of policy and legislation on air quality by co-financing innovative projects that explore ways to facilitate their implementation and enforcement in all countries throughout the Union.

Following "Waste" and "Water", "Air" has been a main topic of investment for LIFE-Environment. As Table 1 shows, interest in this theme as been on the rise (by around 19%) since 1995. From 1992-2003, 185 projects out of a total of 1 298 (14%) focused on air quality protection.

As Table 2 illustrates, Northern countries have been more actively involved as project leaders; in Austria, Germany, The Netherlands, Romania and Slovenia, more than 20% of LIFE projects focused on air policy. Although Slovenia's number is not representative, it is interesting to note that it has invested primarily in "air" projects, with literally 2 projects out of 3 developed on this topic.

Year	Air projects	Total LIFE projects	Percentage
1992	2	67	3%
1993	7	99	7%
1994	22	160	14%
1995	25	134	19%
1996	16	104	15%
1997	18	116	16%
1998	21	120	18%
1999	29	158	18%
2000	15	117	13%
2002	19	114	17%
2003	11	109	10%
	185	**1 298**	**14%**

Table 1. *Share of LIFE-Environment projects on air quality*

Table 2. *Geographical breakdown: Beneficiaries and partners*

Country	Air projects	Total LIFE projects	Percentage
AT	8	36	22%
BE	8	65	12%
DE	37	144	25%
DK	7	37	19%
EE	0	6	0%
ES	13	167	8%
FI	2	43	5%
FR	13	132	10%
GR	7	87	8%
HU	1	10	10%
IR	3	33	9%
IT	23	193	12%
LU	0	5	0%
LV	0	6	0%
NL	30	102	29%
PT	5	59	8%
RO	3	12	25%
SE	4	43	9%
SK	0	1	0%
SI	2	3	67%
UK	19	114	17%
TOTAL	**185**	**1 298**	**14%**

Apart from the beneficiaries who actually lead the projects, there are many partners all over Europe that collaborate on the implementation of these LIFE projects.

Budget by sector

The total **budget** planned for air protection (some projects are ongoing) is MEUR **297,** with a total EU contribution of MEUR **80.** Air management remains a concern that is more frequently addressed by public authorities. One reason for this is that while air pollution has less visual impact, it involves more technical issues and has long-term impacts on health and the environment.

Globally, the more costly projects fall under the themes of energy, industry and waste.

Project themes

Most projects fall into to 2 main sectors: industry and transport; 44% of the projects target emissions reduction, particularly in the two above sectors. Surprisingly, only one project deals with in-door air pollution.

Industry

Industrial projects are mainly technological. All kind of industries are involved (electronics, textile and clothing industry, printing industry, wood products…). Forty-four projects concern reduction or elimination of VOCs (and more specifically solvents). Fourteen deal with surface treatment products (coating, lacquer, varnish…).

Transport

Most of these projects (20) are methods oriented, focusing on transport planning linked to urban design or land-use planning; others focus on traffic monitoring and control. In transport, the second highest number of projects (12) are on awareness-raising, in the form of public awareness campaigns to encourage people to shift from the use of private cars to cycling or public transport. These projects often apply an integrated approach to the traffic problems they address.

General

Thirteen per cent of the projects focus on methods and tools for air quality management, such as pollution level measurement and impact assessment. From 1992-2003 several monitoring systems were developed within LIFE-Environment.

Energy

New technologies for energy savings or alternative fuels are the main focus in this sector. Methods include monitoring vehicles emissions and emissions trading. Awareness-raising projects apply mainly to the construction sector (energy saving and green building).

Theme	N° of projects	Total budget*	EU contribution*	Average budget*
Industry	84	161 400 935,27	34 066 764,64	1 921 439,71
Transport	38	54 692 553,64	17 950 351,29	1 439 277,73
General	24	25 721 739,64	10 517 733,64	1 071 739,15
Energy	13	25 499 715,65	6 865 437,24	1 961 516,59
Waste	8	14 176 062,48	4 177 471,78	1 772 007,81
Agriculture	10	9 440 108,28	3 330 554,38	944 010,83
Land-use and planning	8	5 990 442,77	2 725 733,38	748 805,35
	185	**296 921 557,73**	**79 634 046,35**	**1 604 981,40**

Table 3. *Budget by sector*

**In EUR*

Waste

These projects are technological and mainly concern the treatment of incinerator or landfill gases.

Agriculture

Few air projects relate to the agriculture sector. These are mainly technological projects.

Land-use and planning

These projects develop methodologies on diverse topics driven by climate protection related issues.

Three types of projects with different aims

In general, LIFE-Environment has funded three main types of projects: technological development, creation of methods and tools, and awareness-raising projects. These three types of projects are complementary and are all needed to achieve the main aim of the Sixth Environment Action Programme: “make the future our choice”.

1. **Technological development:** These projects aim to reduce emissions, eliminate pollutants or improve industrial processes in terms of their environmental impact; many projects focus on VOCs and especially on solvents. They bring innovation in specific industrial sectors and tend to be "win-win" types of projects: they reduce the impacts of a specific industry on the environment, whilst increasing the competitivity of the enterprises undertaking them.

2. **Development of methodologies and tools:** These projects are more oriented towards decision-makers. By providing better tools for assessing the likely impact of a policy on the environment, they contribute to better governance. Related to air quality, they aim primarily to measure and monitor air-quality/pollution or to improve land-use planning, mainly in urban areas.

3. **Awareness-raising projects:** these projects aim to promote changes in consumer patterns and citizens’ behaviour, mainly in the fields of transport and energy. They contribute to encouraging a more responsible civic attitude.

Technologies	65	35 %
Methods and tools	104	56 %
Awareness-raising	17	9 %

Table 4: *Break-down of air projects according to type of project*

LIFE in action: How the LIFE programme supports Community clean air policy

This brochure presents a selection of 12 projects, which illustrate the exciting work being done to reach the European Union targets for clean air.

The EuroBionet project in Germany created a standardised system to monitor air pollution using bioindicator plants.

One of the key roles of LIFE is to support innovative initiatives that aim to facilitate the effective implementation and enforcement of environmental legislation in all EU countries. This brochure presents a selection of 12 ground-breaking projects that offer economically viable, sustainable and transferable solutions.

In the field of technological developments:

> In Denmark, a world-wide company that produces wind turbine blades used a LIFE-Environment grant to develop a new moulding technique, which reduces the emission of styrene into the atmosphere by 95%.

> Air Eco Concept, an SME in France, developed an innovative solution to reduce ambient air pollution produced by high-speed rotary equipment, and to protect equipment operators from the inherent occupational health risks.

> A German SME in the plastics industry developed a cost-effective new technology that reduces industrial over-spray, solvent emissions and paint sludge.

> In Ireland, a major multinational chemicals' company has managed to reduce its overall impact on the environment while improving its competitivity by reducing its production costs.

In the field of methodologies and tools:

> An SME in Venice brought together a team of dedicated, eco-conscious environmental experts to develop an accurate and cost-effective roaming urban pollution monitoring device.

> A university in Germany created a standardised system to monitor air pollution using bioindicator plants. This system can be tailored to the specific conditions in all cities throughout the EU.

> Inspired by the former project, the East Hungarian Biomonitoring Network is helping national and local government decision-makers and citizens to take active part in improving air quality in the region.

> In Italy, an institute for care and scientific research designed a system to monitor benzene exposure levels in the urban population. This system was used in six European cities.

> In Greece, the Centre for Research and Technology/Hellenic Institute for Transport is designing and promoting innovative means of alternative transport.

In the field of awareness-raising:

> In Brussels, a non-profit organisation is transforming the city's transportation culture into a bicycle-friendly one.

> The French Ministry of the Environment and the Environment and Energy Management Agency succeeded in doing what no one thought could be done: they convinced thousands of city dwellers in Europe and beyond to give up their cars for one day each year.

> Following on the success of the "European Day in Town without my car", the French Energy Management Agency has developed an exhaustive catalogue of mobility recipes for success, so that all cities throughout Europe can join the mobility movement.

To learn more about the different LIFE projects dealing with air-related issues, please consult the LIFE website at:
http://europa.eu.int/comm/environment/life/project/index.htm

LIFE-Environment project in Denmark

Blowing in the wind: Producing wind turbine blades without VOC emissions

A world-wide company that produces wind turbine blades used a LIFE-Environment grant to develop a new moulding technique, which reduces the emission of styrene into the atmosphere by 95%.

LM Glasfiber produces the longest wind turbine blades in the busines: 61.5 meters.

Wind power, one of the renewable sources of energy, has seen a tremendous growth over the last few years. Indeed, it is expected that by 2010 it will contribute 50% to the increase needed to achieve the renewable energy electricity consumption target of on average 21% across the EU 25 Member States. Notably, the European wind industry has 90% of the world equipment market, with Denmark, Germany and Spain contributing 84% of the total EU15 wind power capacity.

LM Glasfiber, an international company which originated in Denmark, has become the market's leading supplier of blades for wind turbines and claims to be the preferred global business partner for wind turbine manufacturers and end-users. It has recently achieved a major breakthrough with the production of blades that are 61.5 meters long and weigh 17.7 tonnes.

However, during LM Glasfiber's rotor blade production system, the glass fibre is laid out by hand and the polyester is rolled manually in the laminates. Due to the size of the blades and to their odd shapes, the production is extremely difficult to automate. This means that during production, workers are exposed to styrene steam, which is released from the laminate. Breathing protection devices and a sound exhaust system are therefore an absolute necessity.

If the process was confined to a closed mould and was partly automated so that the present manual rolling work could be eliminated, the working environment would be significantly improved and the emission of the organic solvent styrene into the atmosphere would be reduced to a minimum. The new technique developed by the LIFE project aimed to reduce the styrene steam to about 5% of that released during the old process. Full implementation of the new technique was expected to lead to an annual reduction in styrene emissions of some 90 tonnes.

Lab technician tests new production methods.

The project also sought to test a newly developed production method based on a vacuum technique. This technique had not previously been used on items as large and with such complicated geometric shapes as wind blades. The expected result was that the project would show that in future, wind turbine blades could be produced using the vacuum technique.

This would result in a better quality blades and lower production costs, and in turn would lead to an increase in the production of wind energy. The new technique was also expected to have potential applications in other parts of the European fibreglass industry.

The principle of the new technique is that the glass fibre is placed in the mould, a plastic sheet is placed over it and then all the air is sucked out, leaving the glass fibre in a vacuum. The polyester is sucked into the glass fibre through tubes and is then hardened. The whole process goes on in a closed mould without any evaporation of styrene. When the plastic sheet is removed from the hardened polyester there is an insignificant evaporation from the hardened glass fibre.

This project showed that vacuum infusion technology is a step in the right direction when producing fibre reinforced polyester. After three years and a lot of experience, the project came to the conclusion that vacuum infusion technology is a complicated process which demands high accuracy, particularly during the process when the fibreglass and the "sandwich" materials are placed in the moulds. This requires skilled workers, perfect raw materials, good design and preparation.

The implementation of the vacuum infusion technology demands quite a large investment in durable equipment and its competitive advantage depends on the geometric shape of the products and the demand for weight and strength, for example. But all things considered, vacuum infusion technology is now a realistic option in the choice of production methods.

Reaching new heights in wind turbine blade production.

LM Glasfiber's factories in Denmark and The Netherlands are now equipped with the technology, and it is envisaged that the technique will be transferred to other company factories.

An innovative partially automated system reduces the release of pollutants into the air.

Reference: LIFE97 ENV/DK/000338
Total eligible cost: EUR 2 035 781.34
LIFE contribution: EUR 541 731.87
Beneficiary: LM Glasfiber A/S

Contact: Kurt Due Rasmussen
Tel.: +45 7558 5122
E-mail: kdr@lm.dk
Website: *http://www.lm.dk*

LIFE-Environment project in France

A change of air: Cyclonic heat exchangers for industrial oil mist treatment

Air Eco Concept, an SME in France, developed an innovative solution to reduce ambient air pollution produced by high-speed rotary equipment, and to protect equipment operators from the inherent occupational health risks.

Rotary high-speed equipment, such as lathes, milling and grinding machines, require the use of lubricants in the form of oil or emulsion. While these machines are at work, the rotation and overheating of the machinery disperses the lubricants into the air in the form of microdroplets and vapour, creating an oily mist.

This oil mist is present in the ambient air of the workshops where these machines are used and can be inhaled, thus posing a health risk to the machinery operators and other on site staff.

Oil mists also damage the environment by causing pollution in the form of hydrocarbons when they are emitted directly into the atmosphere, or during the washing of floors and machines after the dispersed oil has settled.

As part of the campaign against air pollution from hydrocarbons, and under the framework of ISO 14000, the goal of this project was to develop a new process for the treatment of oil mist from industrial emissions.

The strategy of Air Eco Concept was to develop an industrial prototype thermal cyclonic exchanger to transform the oil mist into a recyclable substance.

The prototype would be tested on selected industrial sites. The expected results were to achieve:

> a high performance oil mist treatment process

> a reduction of waste produced in the treatment process, by collecting the mist and transforming it into an oil concentrate that could be recycled

> a reduction in secondary impacts on the environment, i.e. dispersing the hydrocarbons into the air when washing the floors, equipment and other surfaces

The innovative nature of the process developed by Air Eco lay in the development of a high performance treatment for oil mists and the reduction of waste to an oil concentrate. This process would not require a lot of maintenance. The oil concentrate could in some cases be filtered and recycled, and in other cases be sent to waste treatment plants in a concentrated form.

In tests, the prototypes were used to treat five similar machine tools on one test site. Results revealed that the concentration of oil mists in the ambient air decreased to a value of between 0.05 and 0.09 mg/m^3, which corresponds to a minimum of 10 times less than the recommended limit value of 1 mg/m^3. The quantity of emulsion recovered by the process was on average 3 l/h per exchanger, for an air flow rate of 500 m^3/h. This represents around 130 m^3/year of recovered cutting fluid for all five treated machines.

The positive effects of the process in the workspace atmosphere and nearby environment were clearly visible: there was a reduction of oily film on the work surfaces and floor, and there was a noticeable reduction of emissions into the atmosphere. In addition, the process is clean and facilitates the recovery of condensates, thus the problem of clogged filters – which are normally treated by incineration – was avoided.

After one year in operation, the prototypes were opened. The inside walls and the cooling coils were free of layers of dust and oil. This proved that the evacuation of condensation and condensates had been effective.

Based on the success of these results, a commercial version of the process, called AIREC'OIL, is now available.

Reference: LIFE98 ENV/F/000298
Total eligible cost: EUR 456 049.68
LIFE contribution: EUR 128 347.36
Beneficiary: Air Eco Concept (AEC)

Contact: Jean-Charles Weber
Tel.: +33/3/83.46.92.64
E-mail: aec.aireco@wanadoo.fr
Website: *http://www.aireco.fr/Page/PagesGB/OILGB/CadreGBOIL.html*

LIFE-Environment project in Germany

High speed rotary carriers reduce paint consumption and solvent emissions in the small plastics industry

An SME in the plastics industry developed a cost-effective new technology that reduces industrial over-spray, solvent emissions and paint sludge.

FENNEL GmbH, an international company founded in 1981, is a mass producer of injection-moulded plastic components for the furniture industry. In this sector, most of the small plastic components produced need to be painted. FENNEL GmbH is also responsible for this last step, aptly called the finishing treatment, and paints some 20 million items per year.

State of the art painting processes involve the use of spraying. However, in this process, a far greater quantity of paint is used than is actually required to coat the parts. This over-spray factor fluctuates between 100%-150% and in some cases can even be as high as 200%. This results in a waste of resources; moreover, disposal sites are over-burdened with unnecessary quantities of left-over paint sludge. In applications where the use of paints containing solvents cannot be avoided, this also results in the emission of unnecessary amounts of solvents. Indeed, as a result of needless over-spray, approximately 259 000 to 280 000 tonnes of solvents were emitted in Europe in 1995.

There are various approaches and processes currently in use, which are considered state-of-the-art in terms of reducing the percentage of over-spray. However, these approaches cannot be applied to small, geometrically complex plastic components. Funding from LIFE provided FENNEL with the means to develop a new technology tailored to the intricacies of painting these small plastic components and set up a test plant to measure its effectiveness.

The innovative nature of the technology developed for this project lay in the idea of not only painting the plastic pieces while they passed the spray guns but to simultaneously rotate them at high speed in such a way that the pieces would catch the paint particles from the air.

On the basis of this idea, cylindrical carriers were developed to which the plastic pieces were attached. These carriers were then rotated inside a spray jet. The arm of the painting robot travelled in a vertical direction at the same time. The piece to be painted would rotate at high speeds through the paint mist. Thus, the plastic pieces and all the undercuts could also be reached and pick up a greater quantity of the paint sprayed. Due to the large number of parts to be

FENNEL GmbH's new painting technology works effectively on small complex components, such as cellular phones.

painted, FENNEL developed the new technology so that it would run continuously.

At rotation speeds of 100-200 rotations per minute, depending on the geometry of the parts, it was possible to reduce the over-spray by 55%. Following these very promising laboratory trials, the next step was to verify the results and demonstrate the technical and economic feasibility under industrial manufacturing conditions.

As with the laboratory tests, it was possible to save 55% of the over-spray using the new technology. Therefore, using this technology to paint 20 million individual pieces per year with 60 000 kg of paint, it was possible to save up to 19 800 kg of paint and 16 830 kg of solvents. This also led to a significant reduction in the amount of paint sludge to be disposed.

The new technology also proved cost-effective: at an average paint price of about EUR 16/kg, using it amounted to a savings of about EUR 315 000 per year. The lower disposal costs of the paint sludge also resulted in considerable savings: considering average disposal costs of EUR 0.13 /kg, this meant a further savings of EUR 1 900 per year, assuming a sludge reduction of 2 970 kg.

Apart from the savings in raw materials and disposal costs, the new plant also achieved a higher output of painted components as compared with conventional plants.

Finally, similar problems are found in almost all production processes in the furniture industry, for painting lamps, decorative articles, toys and cell-phones for example. Thus there is scope to apply this method on a wider scale. A "win-win" proposition for the environment and manufacturers alike.

FENNEL's technology is now the preferred finishing method for parts made from high-performance plastics, the fastest growing market in Europe.

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Contact: Andreas Riebe
Tel.: +49(0)5734/661-1429
E-mail: *ariebe@fennel.de*
Website: *http://www.fennel.de*

LIFE-Environment project in Ireland

Environmental sustainability through solvent and energy recovery technologies

In Ireland, a major multinational chemicals company has reduced its overall impact on the environment while improving its competitivity by decreasing production costs.

The multinational chemicals company, Cognis Ireland Ltd (formerly known as Henkel), has a site in Cork, Ireland which manufactures LIX® Reagent, a product used to extract copper from copper ore.

Cognis Ireland is known for its positive environmental record. The company's environmental philosophy is to eliminate potential problems at the source, and a significant part of the efforts in research and development is directed towards developing safer and cleaner processes. In their experience, such investment in environmentally sustainable technologies actually saves money in the long run, and prooves that environmentally sound processes can also be cost-effective.

The Cognis LIX® manufacturing process involves the use of large quantities of toluene (16 000 tonnes per annum) as the reaction solvent. During the process, methanol and methyl formate are generated as impurities, which remain in the toluene, rendering it unfit for reuse without pre-treatment. This pre-treatment is traditionally achieved by washing the toluene, with water at 45-50°C in a static mixer to reduce the impurity levels to an acceptable level for recycling; the wash water is then processed in the biological treatment plant.

As a consequence of the treatment process for this stream up to 1 500 tonnes of solids are sent to the landfill, and 700 tonnes of COD (Chemical Oxygen Demand) are generated for treatment in the waste treatment plant. Combined with the fact that the wash water (up to 17 000M^3) is heated to 45-50°C (equivalent to 386.2 x 10^6 kJ of energy), the treatment process generates a significant impact on the environment.

This project sought to replace the existing flashed toluene wash system with a solvent purification distillation step. While solvent distillation is not in itself unique, the use of the resulting distillate as part of fuel requirements on-site is. A skid mounted distillation plant was required to strip such reaction by-products from the toluene stream.

The system has been in full operation since October 2001. It has delivered on all design parameters and significant reductions in COD and hydraulic load to the waste treatment plant have been observed. The overall results achieved by the project in terms of reduced pollution were as follows:

Environmental benefit *(Annual reduction)*	Target reduction	Results achieved
to landfill	700 000 Kg	665 000 Kg
to effluent	350 000 Kg	605 000 Kg
in water usage	1 320 m^3	16 128 m^3
in energy usage	193x10^6 kJ	1685 x 10^6 kJ
in solvent emissions	50 000 Kg	40 158 Kg

The benefit to the environment as a direct result of this project is significant, and in many cases greater than originally anticipated. The toluene recovered can be used as an alternative fuel for the energy requirement of the plant. The cost savings have been estimated at EUR 613.000/an.

This is a valuable illustration of integrated pollution control in the chemical industry and its results are being widely disseminated. As such it is hoped that the project will have a significant impact on policy within the industry by encouraging other companies/industries in Ireland and across the EU to adopt cleaner technologies in their manufacturing operations.

The project has also demonstrated the cost/benefit advantages of cleaner technologies, which should demonstrate to the wider EU chemicals industry that it is possible to adopt environmental improvements while enhancing industrial competitiveness.

The results speak for themselves: in September 2003, Cognis received a national award for the Management of Waste from the Irish Business Employers Confederation (IBEC) for their work on this project. The project has since been short-listed as a finalist for the European Awards for the Environment 2004 in the category Process Award for Sustainable Development.

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Contact: Frank Mc Donnell
Tel.: +353(0)214517100
E-mail: *frank.mcdonnell@cognis.com*
Website: *http://www.cognis.com/cognis/mining/mid/about/pdfs/wastewater.pdf*

LIFE-Environment project in Italy

Eco-Explorer: Environmental Control Observatory Exploration of Pollution Levels on the Road for Ecological Real Time Survey

An SME in Venice brought together a team of dedicated, eco-conscious environmental experts to develop an accurate and cost-effective roaming urban pollution monitoring device.

Ecotema's roaming pollution sensor is small and light enough to attach to bicycles and mopeds.

European and national laws require local authorities to monitor urban (atmospheric, acoustic and electromagnetic) pollution. Fixed monitoring stations make it possible for the local authorities to comply with the obligation to monitor atmospheric emissions. However this system is not adequate for the surveillance of noise or electromagnetic pollution. Furthermore, fixed monitoring stations are costly, thus few of them are in use. Moreover, they are not sufficiently distributed throughout cities to be able to provide data on the pollution distribution and concentration with high spatial resolution. To compensate for the uneven information gleaned with fixed monitoring stations, national authorities must carry out periodic surveys to check more precisely the pollution situation in their cities.

Within this context, Ecotema, an SME in Venice specialising in finding solutions to today's environmental challenges, developed the Eco-Explorer in collaboration with the Municipality of Venice, the Regional Agency for Prevention and Protection of Environment for Veneto - ARPAV), the Venetian Environmental Multiservice Company (AMAV S.p.A, now VESTA S.p.A) as well as two private companies (ARCHIMEDES LOGICA s.r.l, UNITEC s.r.l.). The goal of project was to design an accurate tool to support pollution survey campaigns, on both a periodic and sustained basis.

Eco-Explorer, or Environmental Control Observatory Exploration of Pollution Levels on the Road for Ecological Real Time Survey, sought to:

> show the existence of elevated concentrations of pollution in urban areas which are not picked up by the common fixed monitoring stations and which, consequently require direct dynamic monitoring;

> prove that it is possible to record dynamic measurements with newly developed small-size, fast-response sensors;

> demonstrate that it is possible to integrate the cumulative effects of pollution and establish a global impact index with correlations between the various measured concentrations.

To do this, the project constructed and tested a mobile station for monitoring the level of air pollution in Venice to collect and integrate data – simultaneously and in real time – on atmospheric emissions, noise and electromagnetic pollution and transmit these to a Control Centre.

The data collected was used to produce thematic maps for atmospheric, acoustic and electromagnetic pollution covering the entire road urban network and to develop an information system about the state of the environment.

Indeed, Eco-Explorer was successful in measuring atmospheric, acoustic and electromagnetic pollution continuously and in real time, over the entire road network in the Municipality of Venice. The system is comprised of small measurement modules, one for each environmental variable of interest, all integrated together, lodged within a small container for easy installation on any mobile station already in use in the current public services. Furthermore, the mobile station can be installed easily on public buses, taxis, specific cars and even on bikes.

The Eco-Explorer is now being tested in other European cities and China.

The Control Centre collated the data and produced thematic pollution maps. The Centre was also responsible for alerting the public authorities in a timely manner when pollution levels were in danger of exceeding the set limits in a given area. Finally, the system is cost-effective, as the mobile stations do not generally require an operator.

A global impact pollution index was defined, however it would require substantially more data in order to be completely validated.

With the solid-state sensors originally employed, the comparison between the innovative sensors' performance with the conventional fixed stations achieved a correlation coefficient between 60% and 80%; this performance was deemed sufficient to demonstrate the global behaviour and operation of the system.

The project has also been further refined: after the project ended, the Italian national institutions pointed out that the system would be accepted only if it complied with the current legal standards for air quality monitoring instruments. Therefore, the air quality sensor unit, originally developed by UNITEC, needed to be completely rebuilt using a set of new technologies adapted to each pollutant to be monitored.

This new design, developed entirely by ARCHIMEDES LOGICA, achieved correlation coefficients above 99% and is now certified by the Italian national authorities for use in air quality monitoring networks.

This system with the new sensor technology is currently running in Municipality of Venice; the product is easily transferable to other urban settings and links were set up with local authorities in other cities in other countries, not only in Europe but also in China.

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Beneficiary: ECO.TE.MA srl - Ingegneria per l'Ambiente

Contact: Tullio Ing. Cambruzzi or Luigi Tombolini
Tel.: +39 041 71 75 29
E-mail: *ltech@archimedes.it*
Website: *http://www.ecoexplorer.it*

LIFE-Environment project in Germany

EuroBionet: Monitoring and assessing air quality throughout Europe

A University in Germany created a standardised system to monitor air pollution using bioindicator plants. This system can be tailored to the specific conditions in all cities throughout the EU.

Air pollution is a major environmental problem in cities. The most important sources of air pollution are industrial plants, power plants, domestic heating and road traffic.

Road traffic emissions are increasingly responsible for the highest percentage of air pollution. Of the many different kinds of pollutants released in urban areas, the most noxious are sulphur dioxide, nitrogen oxides, ozone, suspended particulate matter, heavy metals and organic chemicals such as benzene or polycyclic aromatic hydrocarbons. Increased concentrations of air pollutants endanger human health, harm flora and fauna and damage buildings. Such negative effects are particularly rampant in cities, where large amounts of various pollutants are released in a relatively limited area. Given the high population density in cities, this means thousands of people are affected.

"Green boxes" set up in participating cities invite citizens to learn about caring for their environment.

Plants such as tobacco and kale are used to monitor negative environmental impacts.

Significant progress has been made in the last decades to reduce emissions in cities throughout Europe, nevertheless, air pollution continues to be a major environmental problem, with different Member States using disparate strategies in the attempt to comply with EU emissions' directives.

What usually happens is that air quality is assessed at local, regional, national and international level based on emission inventories, modelling and measurements of ambient air concentrations taken by physical and chemical methods. Measuring ambient air concentrations makes it possible to control whether the limit or indicative values recommended by the European Commission, are complied with.

However, the results of ambient air measurements do not allow for direct conclusions to be drawn on impact of the measured concentration of pollutants on living organisms. The effects depend on many factors, such as the dose of pollutant, climate, nutrition, predisposition, age, the simultaneous impact of other pollutants, etc. To take effective action to reduce emissions, it is therefore important and necessary to provide the general public, public authorities and enterprises with evidence of the effects of pollutants on human beings, animals, and plants. This is where the university of Hohenheim and bioindicator plants come in.

The Institute for Landscape and Plant Ecology, University of Hohenheim, Stuttgart, Germany, saw the potential of using bioindicator plants, such as tobacco, poplar, grass cultures and curly kale, to monitor urban air pollution. Bioindicators are organisms or communities of organisms that react to environmental effects by changing their vital functions and/or their chemical composition, thus making it possible to draw conclusions on the state of their environment. Moreover, using the same bioindicator plants in different cities throughout Europe would lead to the development of standardised monitoring methods, which could be applied at European level.

The University enlisted 12 partner cities in 8 Member States (Klagenfurt, A; Ditzingen and Düsseldorf, DE; Copenhagen, DK; Barcelona, and Valencia, ES; Lyon and Nancy, FR; Edinburgh and Sheffield, GB; Glyfada, GR; Verona, IT), and co-ordinated the monitoring system in these cities. They were also responsible for the overall scientific, technical and administrative management of the project.

The overriding goal of the project was to use a selection of plants to illustrate in concrete, visible terms the negative effects of pollution. If people can see what pollution does to a plant, then they are able conceive the implications on the environment in general on human beings and their surroundings. It was hoped that this exercise would encourage people to reflect on and reconsider their own behaviour in terms of how they contribute to a healthy or unhealthy environment.

Students in participating cities set up biomonitoring labs in their schools.

Interactive learning inside a "Green box"

The main objectives of the project were to:

- > establish the use of bioindicator plants on an European level;
- > provide data for measures to improve air quality;
- > create a network of cities that are concerned about their air quality beyond the duration of the project;
- > raise the awareness of the urban population with regard to air quality.

The EuroBionet projects succeeded in setting up 100 monitoring stations in the partner cities, and in building a network of cities that are concerned about air quality and committed to raising awareness of the issues at stake by holding regular information events and publicity campaigns. EuroBionet also worked in partnership with schools to begin making an impact on children and students and engage them in the process of making change for healthier lifestyle choices.

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LIFE contribution: EUR 1 201.339
Beneficiary: Universität Hohenheim – Institut 320, Schloss, 70593 Stuttgart, Germany

Contact: Andreas Klumpp
Tel.: +49 711 459 3043
Fax: +49 711 453 3044

E-mail: *aklumpp@uni-hoheneim.de*
Website: *http://www.eurobionet.com*

East Hungarian Biomonitoring Network

Reality check: Putting the pollution picture on the map

Bioindicator plants measure ozone levels in a neighbourhood in eastern Hungary.

In the wake of EuroBionet, the East Hungarian Biomonitoring Network is helping national and local government decision-makers and citizens to take steps to improve the air quality in the region. Project manager Béla Keleman tells us more.

"There's a lot talk about air pollution, a lot of talk about the need to do something about it, but what does that really mean to the average person or to the local government employee who has been told to develop a plan to reduce air pollution in his town? How do we improve something we can't really see or touch? People need to actually see a problem before they can be convinced to do something about it.

The LIFE EuroBionet project did very interesting work using bioindicator plants to show people the impact of air pollution in tangible terms. When it closed, the project team released a detailed manual so that other countries and regions could transfer the methods for their own use. That's how we created the East Hungarian Biomonitoring Network.

Our goal is to promote a new approach to air pollution assessment in Hungary. To accomplish this, we set up a biomonitoring network in the five biggest cities in the Hungarian eastern frontier zone based on the EuroBionet methodology. The Environmental Protection Inspectorate in the Transtiszanian Region is responsible for managing the network and for disseminating findings and other information to the national authorities and local government decision-makers.

Our project literally gives a picture of the pollution situation in the participating cities. The data gathered on the pollutants we are monitoring in the five cities – such as sulphur dioxide, nobelium, ozone and several others – are recorded using Geographic Information Systems (GIS). Then, using the GIS tool, we produce "air quality maps", which are sent to each local authority. The objective is that these pollution pictures help officials understand the problem, and give them a tool to use in arguing for creating change in industry and in the city infrastructure, for example.

The maps are also posted publicly so that each citizen can get a picture of the level of air quality in his or her town. This activity is paired with information and education campaigns on how people can help reduce the pollution in their town by modifying their behaviour (such as car-pooling to work, biking to school, etc.).

The project officially closed in January, but we hope to see the work we've done grow into lasting change"

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Contact: Béla Kelemen
Tel.: +36 52 527 600
Fax: +36 52 310 428

E-mail: *Tikofe@mail.datanet.hu*
Website: *http://tikofe.movinet.hu*

LIFE-Environment project in Italy

Monitoring atmospheric concentrations of benzene in European towns and homes

The Fondazione Salvatore Maugeri, an institute for care and scientific research in Italy, designed an innovative system to monitor benzene exposure levels in the urban population that was used in six European cities.

Benzene, also known as benzol, is a colourless, sweet-smelling liquid found in air, water and soil. One of the most prevalent sources of Benzene pollution, which can be extremely hazardous to human health, is road traffic. Indeed, research shows that benzene from road traffic can cause leukaemia; World Health Organisation estimates reveal the level of risk for this disease between 4.4 and 7.5 cases per million among people exposed continuously to benzene concentrations of 1 µg m^{-3} in the air.

The MACBETH project – Monitoring of Atmospheric Concentrations of Benzene in European Towns and Homes – was created to help enforce common policies and laws on environmental protection by establishing the correlation between urban benzene pollution levels and human exposure and providing this information to European legislators. The overall goal of the project was to protect people from the harmful effects of atmospheric pollution.

The environmental benzene pollution data commonly available are quite variable and often contradictory, due to striking differences between sampling and analysis procedures, weather conditions, the time of year at which data are collected and the economic development and lifestyle of the targeted areas. While useful for conveying a general idea of the problem, such data are of little use in establishing a relationship between environmental pollution and personal exposure.

The Macbeth project developed a new monitoring technique, based on an innovative sampling device, to take the various parameters described above into account. To begin with, six European towns and cities – Antwerp, Athens, Copenhagen, Murcia, Padova and Rouen – were selected to host approximately one hundred sampling sites each. The site locations were distributed over a multi-scale grid drawn over the city map. The site breakdown was comprised as follows:

> 85% background sites

> 10% hot spots

> 5% suburban sites

On six occasions over a one-year period, each site was monitored without interruption from Monday morning to Friday afternoon. At the same time, 50 volunteers underwent both personal monitoring and measurement in their homes. The volunteers were non-smokers, divided into equal groups of people exposed to traffic fumes as part of their job and those not exposed. Personal and domestic monitoring was carried out using the same technique and over the same period as the environmental monitoring.

The volunteers' movements within the city areas were recorded in individual diaries, which made it possible to link exposure levels with exposure locations. All monitoring was carried out using the "radiello" radial symmetry passive sampler. The sampler, devised by the project co-ordinator, works by the spontaneous transfer of gaseous molecules through a diffusive barrier. It comprises a microporous cylindrical diffusive body into which an adsorbing cartridge is placed. Once assembled (the whole unit weighs about 10 grams), the radiello is exposed and only the date and time of the beginning and end of exposure need to be known.

The benzene monitoring device is placed in selected sites around the city.

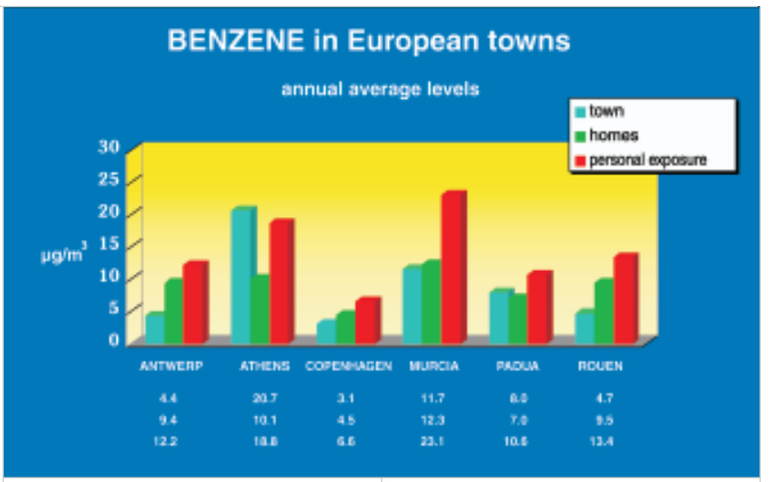
The database of findings contains 6 205 measurements, distributed equally over the six cities, comprising 3 147 environmental readings, 1 559 personal exposure readings and 1 499 home pollution readings. The innovative methodological approach made it possible to compile highly space-resolved iso-level maps of benzene concentrations for each city, providing the public administration in each city with a powerful tool for informed decision-making regarding traffic and the road network.

In addition, the procedure was extremely cost-effective: the optimum sampling grid is composed of 125 points per 100 km^2 of territory, roughly equivalent to a town of 300 000-400 000 inhabitants. An entire sampling campaign would cost about EUR 6 000, but if a city were to undergo twelve measurement campaigns in a year, the overall cost would amount to less than EUR 72 000 – in other words, equal to the cost of purchasing and running just one automated continuous instrument for one year.

The results revealed the following:

> Urban benzene pollution levels increase moving from northern to southern Europe, where the urban ventilation is slower. The data show annual average benzene concentrations ranging from 3.1 µg·m^{-3} in Copenhagen to 20.7 µg·m^{-3} in Athens.

> On average, European citizens are exposed to double the mean level of urban pollution. The data point to the following explanation for this phenomenon: people in urban areas tend to be on the street at the time of day when urban pollution is at its highest. Daily benzene concentrations oscillate between very low values at night and very high values in the middle of the day and in the evening. Since most people are exposed when the benzene concentration is 1.5 - 2.5 times higher than the daily average, actual outdoor exposure may be estimated to be about twice that calculated on the basis of the daily average urban concentration and the time spent outdoors.



> Pollution is considerably worse in homes than outdoors. The average pollution level in the home turned out to be 1.51 times the outdoor level. This finding is surprising since it was reasonable to suppose that home pollution came from outdoor pollution, and should not therefore have exceeded it. The fact that indoor pollution is generally higher than outdoor pollution might be attributed to an imbalance between the inflow of pollutants from outside and their removal from inside. In other words, the home itself might act as a flywheel created by the adsorbent surfaces of walls, floors, furniture and furnishings. The hypothesis is interesting, since it was demonstrated that the domestic-to-urban pollution ratio rises from southern to northern Europe, and this difference could result from the different indoor coverings used in the north and the south.

The monitoring technique implemented in the MACBETH project demonstrated that the protection of public health, which is the aim of European air quality legislation, requires the parallel measurement of both ambient air and personal exposure levels.

The diffusive sampling technique can therefore effectively supplement the information provided by the air quality monitoring networks based on continuous analysers, giving direct information on public exposure to pollutants. It also adds the value of high-resolution distribution mapping to time-resolved measurements provided by monitoring stations. The diffusive sampling technique can then help in the optimisation of fixed monitoring networks by choosing the best representative sites, as demonstrated by RESOLUTION project (LIFE 99 ENV/IT/081).

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LIFE contribution: EUR 783 734 56
Beneficiary: Fondazione Salvatore Maugeri - IRCCS

Contact: Paolo Sacco
Tel.: +39 049 806 45 11
Fax: +39 049 806 45 55

E-mail: *vcocheo@fsm.it*
Website: *http://www.pc4.fsm.it:81/padova/homepage.html*

LIFE-Environment project in Greece

Immaculate perfection: Improving the urban environment using an integrated approach

Thessaloniki, a thriving, national and international economic urban centre and Greece's second largest city, has an alarmingly high rate of air pollution. The Centre for Research and Technology Hellas/Hellenic Institute of Transport decided it was time to take action and created a plan to reduce air and noise pollution from road transport by designing and promoting the use of innovative means of alternative transport. Testimony from Evangelos Bekiaris, project manager.

"Today, 28% of the CO_2 emitted in the EU is due to transport, with 84% of it coming from road transport. Emissions of other harmful gases have also increased by 18% over the period 1990 to 1998. Aside from the harmful emissions, transport is also responsible for high noise levels in cities, levels that are expected to increase by 24% by 2010.

Greece is in fact the fourth most polluted country in the EU in terms of CO_2, and Thessaloniki, in the north, is a very good example of the kinds of problems that result from excess pollution.

Thessaloniki has approximately one million inhabitants and is a thriving national and international economic and transport centre. The city is surrounded by mountains and the sea, which leads to heavily populated and congested west-east corridors.

Hybrid passenger cars reduce air pollution.

From 1990 to 2001 the number of vehicles increased by 76% and there is a daily shortage of about 6 000-7 000 parking spaces in the city centre. Consequently, air pollution in the city, especially in the city centre, is very high. To deal with this problem, one of the three major policies that the city council has adopted is to promote the use of clean vehicles for both buses and private users.

We developed the "IMMACULATE" project to improve the quality of air and reduce the noise levels in Thessaloniki. To do this, we combined clean vehicle technologies – such as electric power-assisted bicycles, electric scooters, hybrid passenger cars and natural gas mini-buses – with other innovations in urban transportation schemes, including transport information, management and telematic systems, smart cards' technology, and mobility management schemes. We have also defined the technical features of the vehicles that will be used and the requirements to be met.

We also envisage developing a training programme for drivers and designing and implementing pilot studies throughout the city.

Finally, "IMMACULATE" includes an assessment and risk analysis of the proposed plans, a cost-benefit and cost-efficiency analysis, and dissemination activities to share the results of our work with other European cities. In this way, we hope to foster the creation of an "eco-consciousness" among citizens in urban settings.

Thessaloniki's citizens are taking to new means of transport: electric bicycles, electric scooters and natural gas mini-buses.

Of course, we are now only halfway through the project, but our expectations are high – and we mean to live up to them!"

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LIFE contribution: EUR 570 000,00
Beneficiary: Centre for Research and Technology Hellas/Hellenic Institute of Transport

Contact: Evangelos Bekiaris
Tel.: +30 (2310) 498265

E-mail: *abek@certh.gr*
Website: *http://imaculate.ece.ntua.gr*

LIFE-Environment project in Belgium

Dring-dring! The citizens of Brussels go Pro Velo

How a non-profit organisation in Brussels set out to transform the culture of the city from no bikes to pro bikes.

Brussels, the heart of Europe, comprises nearly one million inhabitants. A bustling international metropolis teaming with cars, trams and buses, the city suffers from intense traffic congestion, noise pollution and emissions, which are both harmful to the population and to the quality of the air and life in the city.

In the past, the transport culture of the city did not favour cycling as a way to get around town. Indeed, in 1997, less than 1% of the city's inhabitants used bicycles as a means of transport. Part of the problem was that the infrastructure of Brussels was not adapted to facilitate this method of transport. In fact, only the very brave or carefree would venture onto the streets by bike.

In 1992, a group of dedicated cyclists decided to create Pro Velo, a non-profit organisation, to inspire and promote a change in the mindset of the city's inhabitants. The mission of the foundation was to "promote mobility that respects human beings and their environment, particularly through the use of the bicycle".

The philosophy behind the Brussels-based foundation is to awaken city dwellers to the pleasures of seeing and interacting with their environment in a new way. The freedom of cycling allows one to discover or re-discover new or previously "hidden" spots, get into shape and contribute to reducing noxious emissions into the air.

Of course, a sound philosophy and enthusiasm alone are not enough. Setting up the necessary infrastructure and support from regional and local authorities are essential for creating and sustaining change. The approach of the Pro Velo team was to build a solid partnership with the Regional Authorities. Together, they produced the Brussels Regional Action Plan, which involved mapping out an ambitious network of cycling routes covering over 250 kilometres. The goal was to get 10% of the population travelling by bike.

Pro Velo today

Twelve years later, Pro Velo has become a city institution. Slowly but surely, the level of cycling activity has increased and the positive image of cycling as a means of transport has taken hold.

The growing popularity of the Pro Velo movement has led to numerous annual successful cycling events, such as "Dring Dring" (launched in 1993), which encourages thousands of the city's inhabitants to cycle around town, which is made traffic-free for the occasion. Dring Dring's slogan is "cycling equals good health" (le vélo c'est la santé). The event is launched in May each year on a Sunday, and is followed by community events throughout the week, such as "let's cycle to school" and "let's cycle to work". The healthy side of bike riding is reinforced by the participation of health organisations and associations such as the Foundation for Heart Surgery.

In addition, Pro Velo holds regular campaigns and events throughout the year to promote bicycles in our day-to-day lives. Activities include:

> education sessions for children and parents on safe cycling practices

> daily "Simply Brussels" guided bicycle tours to encourage Brussels' residents and visitors to discover Brussels in a different way (also available in Charleroi, Liege, Mons and Namur)

> "weekend art nouveau" tours invite participants on a two-day discovery of Brussels' architectural heritage, by bus, bicycle and on foot

> special bicycle festivals and parades such as the royal "Véloparade" held on 20 July 2003 to commemorate the 10 year reign of Albert II, or a nocturnal bike ride to celebrate the autumn

> strong support for European Mobility Week and similar initiatives

Pro Velo includes a strong road-safety component for children and adults.

The enthusiasm of the Pro Velo founders and the commitment of the government to building the necessary cycle infrastructure has indeed changed the transport culture of Brussels. The Pro Velo LIFE project ended in 2001, but Pro Velo and a growing number of enthusiastic city-dwellers are confidently cycling to work and school every day.

Reference: LIFE98 ENV/B/000269
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Beneficiary: Pro Velo asbl,
rue de Londres 15, 1050, Brussels,
Belgium

Contact: Jean-Luc de Wilde
Tel.: +32 2 502 73 55
Fax: +32 2 502 86 41

Website: *http://www.provelo.be*

European Day “In town without my car”

How did ADEME, France, get over 400 cities in all 15 Member States and candidate countries to support the first car-free day in Europe when so many said it couldn’t be done? A lot of effort, perseverance, and networking, networking, networking.

The context

Almost 40% of the transport sector's CO_2 emissions in the atmosphere today are produced through the use of private cars in cities. Although European citizens express a growing concern over air and noise pollution and traffic jams, the use of private cars as the main means of transport continues to rise.

Urban planners and environmentalists who witness this trend know that the best way to reduce these emissions is to favour “cleaner” forms of transport, such as car-pooling, cycling and public transportation. Used on a large scale, these alternative forms of travel can contribute significantly to a reduction in emissions, traffic congestion, air and noise pollution and traffic-related diseases.

But how can hundreds of thousands of people who have been used to the luxury of driving to work in their own cars, be persuaded to give up the comfort and freedom of their private universes in exchange for car-pooling and mass transport?

With cleaner transport as the answer to the numerous problems caused by the increasing transportation in private cars, in the 1990s, some countries (Iceland, Switzerland and Germany) organised car-free days in their city centres. However, these remained local and sporadic events, one-off deals rather than sustained activities.

A car-free day in France

In 1997, the French Ministry of the Environment, decided to organise a structured country-wide car-free day. The Ministry contacted the French Environment and Energy Management Agency (ADEME). Together, they mobilised 35 cities in France to hold the event “In town, without my car!”.

The event was originally conceived as a communications project to raise awareness among the city and commuter populations to think differently about their transport choices. This was followed by evaluation and follow-up activities, and mobilisation of the participating communities and local authorities. Despite some apprehension on the part of shop owners and restaurants, the event was a resounding success. The following year, Italy joined France’s initiative with 95 participating cities.

The Ministry of the Environment collaborated with ADEME to develop and propose the LIFE project, European Day “In town, without my car!”. The project, deemed highly innovative, was granted funding. The project also had the backing of political will mobilised by European Commissioner for the Environment, Margot Wallström. The political support was crucial in motivating other Member States to join. Commissioner Wallström’s support was pivotal in getting the momentum going and in getting this to grow from a great idea to a concrete, formalised, regular event.

In addition, the participation of "soon to be" Member States helped a great deal by providing an opportunity for these countries to take part in an EU level project. The momentum created by first the Member States who signed on for the car-free day on 22 September, plus the candidate countries joining the initiative tipped the nay-sayers to say yes, and jump on the bandwagon.

Another strong factor in getting the project off the ground was the beauty of the model: different levels of participation were organised to take place at different moments, creating a layering effect, which became an example of good practice. Finally, the partnership element was very important in cementing the initiative.

The model was simple yet highly effective:

> The project launched a call for cities throughout Europe to support the "In town without my car" day at EU level.

> The strategy to get countries to commit to the event involved the drawing up of a European Charter: the Member States were asked to sign the Charter, thereby stating officially and publicly their commitment to, and compliance with, the general outline and guidelines of the initiatives. A Call to sign the Charter was sent to the Ministry of the Environment in the Member States, to be signed by the local authorities. The Charter was sent to the Member States each year to reinforce the initiative and again, cement their commitment. Each year, the Charter became more stringent, adding additional components, such as recycling, waste management, etc.

> NGOs found this initiative provided a platform to get their message across – better quality of life, cleaner air, improved access for the disabled – across to local authorities.

> The initiative also targeted citizens who are not really aware of environmental issues, but who are nevertheless touched by the mobility situation, such as the handicapped, the elderly, children. This day also came to encompass not just urban mobility, but also waste, recycling, the future of the planet, special groups (the elderly, children, expectant mothers), so that all citizens could take ownership and feel drawn to participate and contribute to the cause.

To ensure that the initiative provided a "win-win" situation for all – including shops and restaurants – retailers and restaurateurs were encouraged to participate in the activities and create a street fair ambiance, with goods displayed outside the shops and restaurants, and tables with food and drinks on the sidewalk. The project also developed a good practices' guide for shop owners, which was made available on the project website.

European Mobility Week 2002

The success of the EU Day "In town, without my car!" led to the launch of the European Mobility Week, with the support of the European Commission's DG Environment on 19 April 2002 in Brussels (during Green Week) by European Commissioner Wallström and other stakeholders. The event was also supported by large companies such as the EU railroad companies, EU associations for the handicapped, for road safety, just to name a few.

The European co-ordination of European Mobility Week provided the participants with a Vademacum to help them in the practical organisation of the week.

A wide range of initiatives tackling different aspects of urban mobility were carried out on each day of the week in partnership with local organisations and associations. NGOs and businesses had the opportunity to involve their local branches in joint projects with local authorities so that progress was made towards more sustainable mobility on a permanent basis.

EU mobility week 2003

In 2002, European Mobility Week succeeded in establishing itself as a truly European initiative with 320 cities from 21 countries participating. Following this success, a second edition was organised in September 2003.

This second edition of the European Mobility Week, organised from 16-22 September 2003, consisted of an entire week of awareness-raising events focusing on various aspects of sustainable mobility.

"Accesibility" was the central focus for 2003. The aim was to create a pleasant city, which provides sustainable mobility for all people, meeting the specific needs of different groups in our society. With this main theme, European Mobility Week 2003 wanted to contribute to the European Year of Persons with Disabilities.

In relation to this main theme, events were organised on:

> public transport (accessibility of vehicles and stops for wheelchairs, prams, trolleys, elderly people, etc.);

> cycling (dedicated infrastructures for safer cycling, presentation of special bicycle models, etc.);

> living Streets/Greenways (surveys/ workshops on how to improve streets to make them accessible and enjoyable for all, greenways for comfortable and relaxing walks, etc.);

> Responsible Car Use (assessment and advice for adaptations to car controls, parking, clean vehicles, energy efficient driver training, etc.);

> mobility management (mobility management plans, staff involvement, car-sharing, flexible working, teleworking, etc.);

> leisure and shopping (information/maps on access to shops, restaurants and leisure facilities, promotion of nearby leisure facilities, "discover your city" guided tours, delivery services, etc.);

> mobility and health (effects of air quality and noise on human health, benefits of walking and cycling, health checks, etc.);

> intermodality (increasing accessibility through measures that facilitate the combination of different modes of transport, etc.).

From 16-22 September European citizens had the opportunity to enjoy a full week of events dedicated to sustainable mobility. A wide range of initiatives tackling different aspects of urban mobility was carried out by local authorities on each day of the week and in partnership with local organisations and associations. NGOs and businesses were able to involve their local branches in joint projects with local authorities, so that progress was made towards more sustainable mobility on a permanent basis. The Car Free Day on Monday 22 of September was the highlight of the week, with the challenge of organising "In town without my car!" on a working day.

European Mobility Week 2004: 16-22 September

The LIFE project is over, but the momentum continues not only in Europe; the rest of the world is catching up. The United Nations is now participating and the initiative is spreading world-wide, with Colombia and Argentina taking the lead…

The theme for European Mobility Week 2004 was “Safe streets for Children”. The event presented a platform for local authorities as well as organisations and associations from all over Europe to:

> promote their existing policies, initiatives and best practices on sustainable urban mobility;

> launch new policies and initiatives;

> contribute to raise citizens' awareness of the damages that current urban mobility trends generate on the environment and the quality of life;

> establish partnerships with local stakeholders;

> be part of a European wide campaign sharing a common goal and a common identity with other towns and cities in Europe;

> emphasise local commitment towards sustainable urban transport policies.

European Mobility Week is based on a partnership between the core consortium (ACCESS, Energie-Cités, Klima-Bündnis, ADEME), representatives from national ministries and agencies, European and International Associations and Organisations, and the European Commission.

1997

22 September – “En ville, sans ma voiture!” France: 35 cities participate.

1999

Signing of European Charter by Member States

22 September – “European Day, In town, without my car!”: 66 cities in France, 92 cities in Italy and Geneva participate.

2001

22 September – “International car-free day”: 33 countries, 1 005 local authorities and over 100 million citizens participate.

2002

22 September – “European Day, In town, without my car!”: 1 448 participating and 322 supporting cities in the 15 Member States, 13 candidate countries and 12 other countries;

16-22 September – European Mobility Week - included 320 participating cities and 111 supporting cities.

2003

22 September – “European Day, In town, without my car!”:
1 035 participating cities and 453 supporting cities.

September – European Mobility Week: 295 cities and 428 supporting cities throughout the EU, candidate and other countries.

2004

The success of the previous car-fee days and Mobility Week meant that this year the third edition of the events was held from 16-22 September.

This year’s theme is “Safe streets for children”.

To find out how your city can participate next year, visit:
www.22september.org or
www.mobilityweek-europe.org/info/info.html

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Contact: Jean-Louis Plazy
Tel.: +33 4 93 95 79 72
Fax: +33 4 93 65 31 96

E-mail: *jean-louis.plazy@ademe.fr*
Website: *http://www.22september.org* or *http://www.mobilityweek-europe.org/info/info.html*