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SUSTAINABILITY FROM THEORY TO PRACTICE

Putting the principle of sustainability into practice is one of the greatest challenges facing Europe's policy-makers, enterprises and people. Cities and regions may now believe that they can find win-win solutions to their environmental, social and economic problems. But which combination of policies, support measures and environmental technologies will optimise benefits in all three domains? And how should their decisions reflect the conflicting views of residents, businesses, public authorities and land owners?

Research carried out under the Fifth and Sixth EU Research Framework Programmes has addressed sustainable development in generic and specifically urban contexts. It offers clear science-based policy guidelines, and has developed a range of practical tools and technologies to support the transition to an economic model of mutually reinforcing wealth creation, social cohesion and environmental protection.



To promote sustainable urban transport, in September 2002 Mr Busquin organised a tour of Brussels in a prototype bus powered by hydrogen fuel cells.

EU research has created integrated tools to support the local decision-making process, putting sophisticated impact assessment, performance monitoring and external cost estimation within the grasp of every European city and region. In pilot applications, local and regional policy-makers and practitioners have successfully tested new environmental technologies to renovate cultural heritage, to improve the efficiency of supply chains and to facilitate the reuse of brownfield sites and derelict land.

The 160 projects funded in this domain have not only equipped urban and land planners to identify cost-effective means of reducing environmental impacts. They have also stimulated investment in innovation by the many young enterprises which serve the rapidly expanding international market for policy-testing tools and environmental technologies, as well as by public authorities themselves. The widespread take-up of these results will be critical in enabling the Union to achieve the goal of sustainable European competitiveness established by the Lisbon and Gothenburg Councils.

Philippe Busquin

MEMBER OF THE EUROPEAN COMMISSION WITH RESPONSIBILITY FOR RESEARCH

A CENTRAL CONCERN

It is almost 15 years since the Brundtland Report of the United Nations' World Commission on Environment and Development articulated the fundamental principle of sustainable development – that economic growth can and should be made compatible with stewardship of the planet for future generations.

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SUSTAINING EUROPE

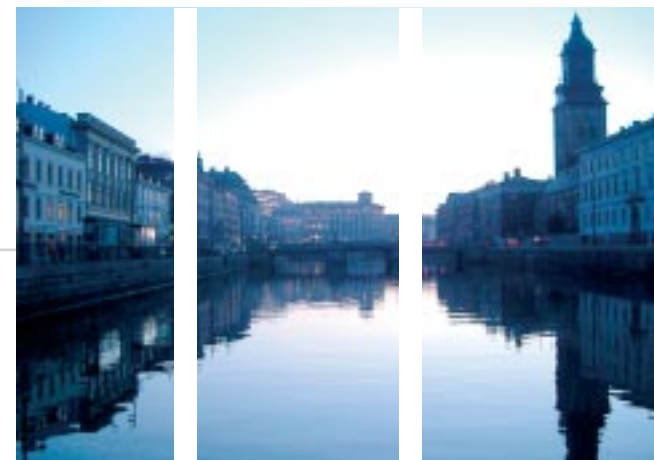
At the heart of EU policy

In March 2000, at the Lisbon meeting of the European Council, EU heads of state and government committed the Union to the ambitious goal of becoming, by 2010, “the most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth”. A year later, in Gothenburg, the Council further strengthened the environmental component of its Lisbon agenda with the adoption of the European Union Strategy for Sustainable Development⁽¹⁾. This makes sustainability a central concern of all EU policy-making, and calls on Member States, private and non-governmental sectors and local authorities to employ an integrated approach in which economic, social and environmental objectives are pursued together.

The European Union Strategy for Sustainable Development offers a positive and ambitious vision of society in which economic growth goes hand in hand with environmental protection and social well-being. The strategy rests on empirical evidence from European research that win-win solutions are possible – that environmental technologies and new approaches to decision-making can achieve prosperity without jeopardising either society or the environment. Public policy must now get smart and devise measures in which the impacts on all three domains are optimised and balanced.

(1) COM(2001)264 final

It was in Gothenburg that the EU Strategy for Sustainable Development was adopted in 2001.



Stewardship and growth

Throughout the 20th century, economic development and the exponential increase in private car ownership were the main drivers of urban planning in Europe. Investment in preventing or cleaning up the environmental consequences of economic growth was minimised, and strategies for avoiding such consequences in the first place were rarely explored. The legacies of this unbalanced development are the traffic congestion, polluted air, deteriorating infrastructure and buildings, urban sprawl, social exclusion, insecurity and criminality to which the 80% of the EU's citizens who today live in or around its cities are exposed – together with their associated costs.

The European Union has already begun to improve the overall sustainability and coherence of its own policies. Since 2003, the Commission has employed a new impact assessment procedure to evaluate the likely economic, social and environmental consequences of all major initiatives, enabling it to identify essential trade-offs and exploit synergies.



But it is chiefly by Member States, regions and cities that more sustainable urban and land use policies must be created and carried out, tailored to their own specific situations. The Union's role is to provide a supportive framework, to promote good practice, and to develop the practical tools and the environmental technologies which local policy-makers and practitioners need.

European research on sustainable urban management and land use is being driven by the EU's Thematic Strategy on the Urban Environment, currently in preparation⁽²⁾, and the recently adopted Environmental Technologies Action Plan (ETAP)⁽³⁾, which aims to stimulate the development and deployment of technologies in order "to reduce pressures on our natural resources, improve the quality of life of European citizens and stimulate economic growth".

Those responsible for managing urban and regional development and wider land-use planning need to embed sustainability within their strategic policies, and to implement it in their concrete schemes and structures. EU-funded research is providing the conceptual frameworks, the tools and methods, and the technological solutions that will equip them for this vital task.



| From fine words to good practice

The Thematic Strategy on the Urban Environment will increase the pressure on cities to improve their environmental performance – it may oblige those with populations of more than 100 000 to establish plans for sustainable urban management and transport, for example. And, since cities cannot be viewed in isolation from their regional settings, such obligations will also affect peri-urban, rural and coastal areas and their major activities – industry, agriculture, forestry, fisheries and tourism.

In order to adopt the desired holistic approach to sustainability, policy-makers and practitioners urgently need the modelling and simulation software, accounting frameworks, codes of practice and other essential tools that will enable them to select the most appropriate packages of measures – as well as technological solutions to their specific environmental problems.

Many of these tools and technologies have already been created by the EU's environmental research programme – in particular, the 'City of tomorrow and cultural heritage' key action. More work needs to be done to refine, adapt and extend them but, as this publication shows, they are already making a substantial contribution to sustainable development across Europe.

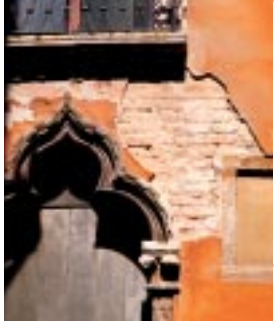
(2) COM(2004)60

(3) COM(2004)38 final

A SCIENTIFIC APPROACH TO SUSTAINABLE DEVELOPMENT

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Significant resources have been devoted to the development and piloting of sustainable development tools and technologies for cities and regions during the Fifth and the Sixth Research Framework Programmes. Projects have included both generic and sector-specific research, as well as dedicated research on urban sustainability mainly carried out within the FP5 key action 'City of tomorrow and cultural heritage'.



City of tomorrow and cultural heritage

With a budget of €170 million for the period 1999-2002, the key action has made the sustainable development of Europe's urban areas significantly easier by creating practical approaches, tools and technologies that enable policy-makers and practitioners to reconcile economic development with environmental, social and cultural objectives. Pilot schemes have already brought lasting improvements to the quality of life of many thousand European city-dwellers.

The key action co-financed over 140 research projects, covering a wide spectrum of issues relevant to the sustainable management of urban areas (see 'Research achievements'). Topics ranged from urban management, planning and governance to more specific issues such as energy and waste management, mobility and transport, air quality, housing, cultural heritage, tourism, land use and planning, redevelopment and regeneration, and social cohesion. Characterised by a unique blend of technical and socio-economic elements, the practical focus and relevance of this research effort was guaranteed by involving local stakeholders – notably, city managers and policy-makers – closely in each of the projects.

Ever wider

Although the projects primarily addressed sustainability in the city context, their integrated approach is also applicable to agriculture, forestry and coastal zone management. Many of their concrete outputs can readily be adapted to these fields, as well as to the regional and national levels.

Regional land use planning, for example, also requires the reconciliation of conflicting interests and objectives – those of agriculture, forestry, biodiversity preservation, cultural identity and heritage, and rural services such as education, health and leisure facilities. Like their urban counterparts, national and regional policy-makers want to choose the most cost-effective means to achieve sustainable land use, striking an appropriate balance between the aspirations of different groups. These complex interdependencies mean that they too need new, sophisticated tools to help them assess the net costs and benefits of various policy options.

ACHIEVING SUSTAINABILITY

Many of the key concepts, tools, methods and technologies needed to bring about sustainable development in Europe's cities and regions have been built and tested, are in everyday use, and are available for policy-makers and practitioners to apply in their own settings.

Recommended approach

The main achievements of the research effort to date have been of three kinds:

- It has created **practical tools** to enhance the capacity of city managers, public authorities and enterprises to identify from a range of options the practical measures that will be most effective in promoting and realising sustainability.
- It has contributed to the emergence of a new market for environmental products and services by stimulating the development and deployment of **new technologies** with real commercial potential – sensors for the preservation of cultural artefacts, and non-destructive techniques for the *in situ* investigation of brownfield sites, for example.
- Its science-based **policy recommendations** have supported the formulation of sustainable policies at EU, national, regional and city levels.

These three types of deliverable go hand in hand. Many projects have generated policy recommendations as outputs of their innovative tools. Others have designed technical systems to support the implementation of their recommendations.

Research has also supported international sustainable development efforts, promoting its outputs for transfer to other parts of the world and making a significant contribution to the UN Habitat Programme on Human Settlements.



Calculating the cost of sustainability

Greensense is the most recent in a series of projects to have developed new methods of 'green accounting'. Taking as its starting point the impact pathway analysis methodology developed by the Externe projects⁽¹⁾, it helped to create a framework of economic and environmental assessment that accounts for both efficiency and sustainability, attaching monetary values to environmental impacts and to the actions required to meet defined sustainability standards.

As well as contributing to the development of a standard framework of environmental accounting, Greensense offered policy recommendations based on combining criteria of economic efficiency and environmental sustainability. This will help policy-makers to minimise the costs of achieving sustainable development. The project also made improved information on current welfare losses due to environmental damage available to national statistical offices for inclusion in environmental accounts.

Further information | <http://staff.bath.ac.uk/hssam/greensense/>

(1) See <http://externe.jrc.es/>



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01. GENERIC CONCEPTS AND TOOLS

Should the costs of landfill be added to the price of packaged supermarket goods? If real sustainable development is to be achieved, public authorities must find acceptable ways to ensure that such 'collateral' costs are paid for now, rather than being accumulated as debts to be paid for by future generations.

Pay as you go

Progressively over the years, European sustainability research has developed a new conceptual framework for sustainability impact analysis and the assessment of policy options for sustainable development (see diagram on page 9). This framework permits the calculation of external environmental and health costs associated with specific policies, technologies and business practices (see *Calculating the cost of sustainability*).



Utrecht staged a play about local problems to involve citizens in the process of urban planning.

The approach was originally developed for the energy sector, where policy-makers wanted to design 'carbon taxes' that would encourage operators to take the impacts of different technologies on global climate change into account when assessing investment options.

The European Union Strategy for Sustainable Development encourages policy-makers to make wider use of fiscal and other measures to ensure that 'external' environmental and social costs are built into pricing structures. The approach pioneered by EU research projects is therefore being increasingly widely applied as a reference framework for urban and regional policy. Many of the specific concepts and tools required to support this wider application in the management of agriculture, forestry, urban and suburban areas and their relationships with rural areas, and coastal zones – including tools for socio-economic impact assessment – were developed in FP5 research projects, and work is continuing in FP6.

MANAGEMENT AND GOVERNANCE

Few dispute that sustainable development is a worthwhile objective, but many are reluctant to accept the necessary costs and changes. European research on urban sustainability and land use has developed a very wide range of tools which – used individually or in combination – can facilitate the process of making and implementing policy decisions that will achieve sustainable development in the most economically and socially acceptable manner.

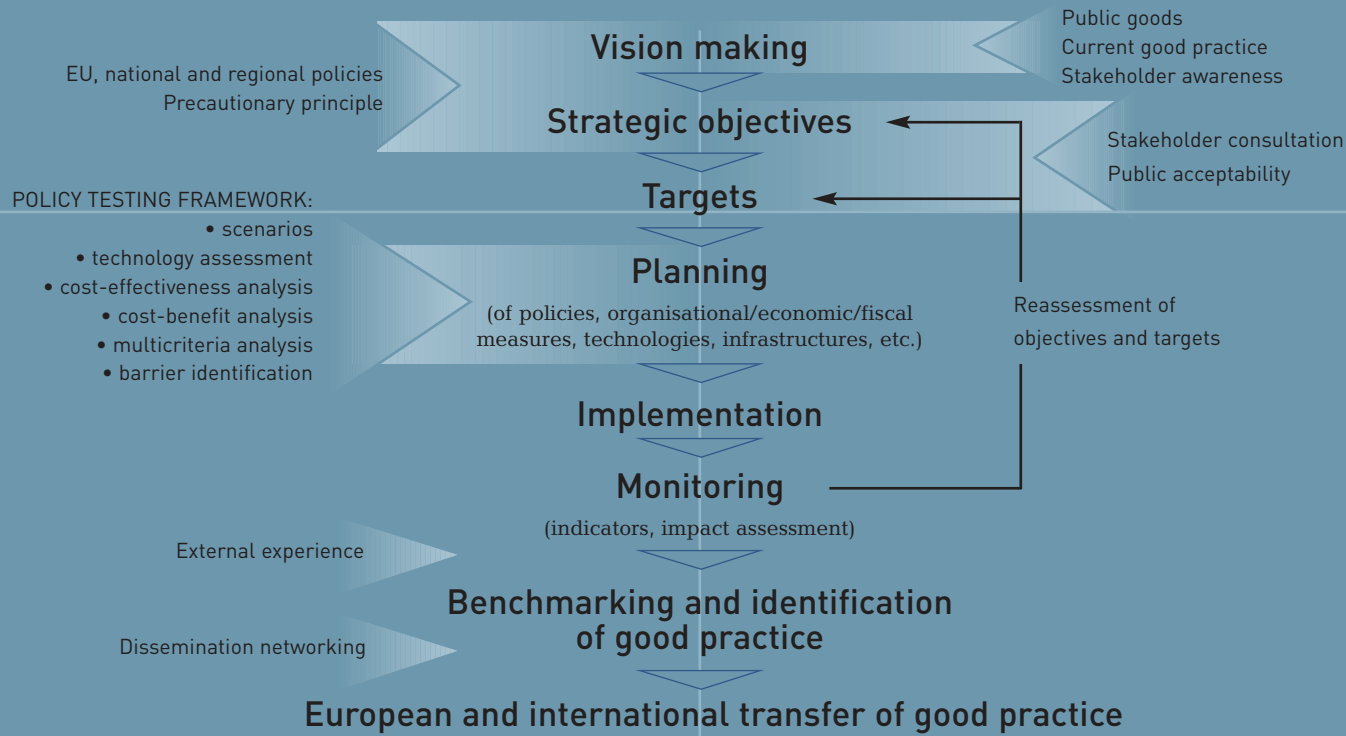
How to have a vision

Most EU-funded urban sustainability and land use research projects offer support to decision-making. The successive steps have been facilitated by new methods and tools for vision making, impact prediction, defining objectives and targets, planning, implementation, performance monitoring, benchmarking and the transfer of good practice.

Tools are designed to promote the integration of economic, environmental and social dimensions, enabling decision-makers to mitigate the long-term negative impacts of planned projects, policies or technologies, and to maximise their overall benefits. They include indicators, models and simulations tools, decision-support systems, scenarios, databases, codes of practice, guidelines, training tools, management systems and participative approaches. Specific projects have tackled problems of resource management in the fields of air quality, urban waste, energy, soil and water. Considerable success has been achieved in the creation of decision-support tools for the design of recycling and recovery strategies.

By their nature, decisions related to sustainability are highly complex, involving multiple stakeholders within public authorities, among the business and NGO communities, and in the wider public. A number of projects have addressed the process of local and regional decision-making itself in order to develop best practice in 'sustainable governance', using participative approaches and public-private partnerships to secure the active involvement of all relevant stakeholders.

DECISION-MAKING PROCESS FOR SUSTAINABLE DEVELOPMENT STRATEGIES



03. | SPATIAL DEVELOPMENT AND LAND MANAGEMENT

By the end of the 20th century, the consequences of poor urban and regional land management were familiar to policy-makers and the public. Unbalanced, short-term strategies treated housing, commercial development and infrastructures separately, and threatened biodiversity in the countryside and social and cultural diversity in the cities.

Three-dimensional planning

Sustainable land use requires strategies which optimise economic development, enhance social welfare and minimise the environmental impacts of human activity. EU research is developing the integrated approaches and tools which are essential for balanced regional development of this kind. They address both urban spatial development and its impacts on the surrounding countryside, and the management of agricultural land, forests and coastal zones and their associated activities.

Within cities, research has analysed the process of 'urban sprawl' and its impact on sustainability, and developed tools to facilitate the definition of strategies to limit the expansion of urban areas and ensure their sustainability. Such strategies include improved integration of land use and transport planning (see *Selecting the best strategy*), rehabilitation of brownfield sites, redevelopment of industrial sites and the regeneration of run-down areas.

Selecting the best strategy

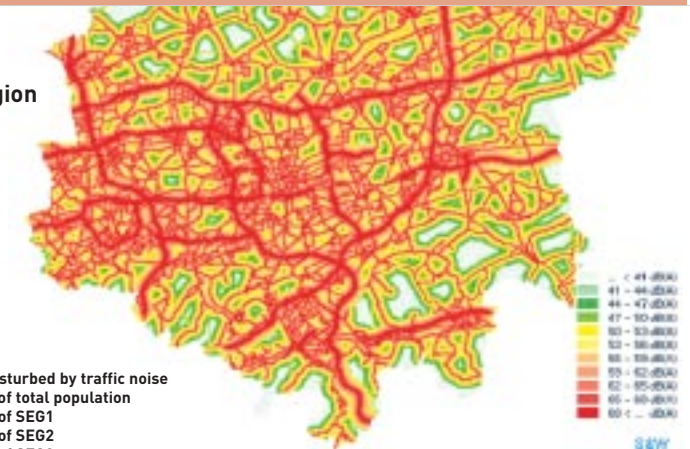
Part of the Land Use and Transport Research (LUTR) cluster, **Propolis** developed and tested tools and assessment methodologies for the design and implementation of integrated land use, transport and environmental policies. Its aim was to define sustainable long-term urban strategies and demonstrate their concrete benefits.

The project used state-of-the-art models and simulations to analyse alternative urban transport and land use policies and their long-term impacts. Policy scenarios were tested in seven cities – Helsinki, Dortmund, Naples, Vicenza, Inverness, Bilbao and Brussels – where a new decision-support tool provided aggregate environmental, social and economic indices for the alternative policy options. In the case studies, the recommended policy packages would cut CO₂ emissions by 15-20%, and traffic accidents by 8-17%. They would also reduce exposure to noise and pollutants, and improve traffic flows and access to city centres. The methods and tools developed by Propolis are readily transferable to other European cities.

Further information | <http://www.ltcon.fi/Propolis/>
<http://www.lutr.net/>

Dortmund Metropolitan Region

One of the Propolis tools permits analysis of exposure to noise by socio-economic group.



04. | THE BUILT ENVIRONMENT

European cities compete fiercely for recognition as centres of excellence in the knowledge-based economy – and for the skills and investment that such recognition brings. And today, quality of life is gaining ever greater importance as a determinant of firm and household location. The quality of Europe's urban environment will be a key factor in determining its competitiveness, its sustainability, its health and its social cohesion in the century ahead.

| Building confidence

Minimising the costs and maximising the social and environmental benefits of the urban built environment requires integrated planning and management. EU enlargement presents a particular challenge. In many new Member States, sub-standard housing and poorly maintained industrial infrastructures are in urgent need of replacement or renewal. The transfer of best practice can enhance the cost-effectiveness of this improvement, ensuring that social and economic development are not achieved at the expense of increased environmental impacts.

Among other recent achievements, the Presco project produced practical new European guidelines for sustainable construction, and helped to harmonise environmental assessment and design tools. The CRISP project created a database of indicators to measure the sustainability of urban construction projects. Tools and decision-support systems have also been developed to integrate sustainable development and tenant participation into the process of housing refurbishment (see *Sustainable housing*).



One of Sureuro's completed refurbishment schemes at Tåstruppgård, in Denmark.

Sustainable housing

Around 56 million flats have been built in Europe since 1950, and over 170 million EU citizens currently live in post-war housing estates. Periodically, housing organisations must refurbish their properties, and the demand for sustainable refurbishment is high – from national governments and city authorities as well as from tenants. **Sureuro** (Sustainable Refurbishment Europe) offers housing companies practical management tools that enable them to integrate sustainable development and tenant participation into their refurbishment management processes without exceeding conventional project timescales and budgets.

Sureuro has developed new design tools for construction companies, designers and engineers, and new models for the improved planning, design and technical specifications of refurbishment projects. Tested in the sustainable refurbishment of more than 13 000 apartments in seven European countries, Sureuro's innovative systems have been shown to deliver significant environmental improvement and energy savings.

Further information | <http://www.sureuro.com/>

05. | CULTURAL HERITAGE

Europe is rightly proud of its historical legacy of buildings and works of art, while the growth of cultural tourism gives its preservation an economic as well as a social rationale. Nevertheless, nearly 50% of Europe's cultural heritage has been lost in the last century. What remains is under stress from the effects of climate, water damage, air pollution, chemicals and mass tourism. Poor management is also a major threat.

| Multidisciplinary

Under FP5, the EU funded 42 projects in the fields of cultural heritage and tourism, encouraging around 500 stakeholders from across Europe to take a multidisciplinary, cross-border approach to the common problems of preservation and restoration. Partners have been given an opportunity to develop and compare methods, tools and materials, to identify and test the best technologies and techniques, and to spread good practice.

Informing EU policy-making

Air pollution is a major threat to Europe's built environment. It does serious damage to historical buildings and cultural artefacts, and the costs of cleaning and repair are enormous. The most effective way to protect the cultural heritage would be policies to reduce emissions of harmful pollutants. To protect human health and ecosystems, EU Council Directive 1999/30/EC sets limit values for sulphur dioxide, oxides of nitrogen, particulate matter and lead in ambient air. But the fact that these values may not be sufficient to prevent damage to materials is a serious shortcoming for the sustainable protection and management of Europe's cultural heritage.

Multi-assess has developed dose-response functions that will be used to assess pollution threshold levels for future EU Directives on urban air quality in order to minimise the pollution effects on historic and cultural objects, and for the mapping of areas facing increased risk of damage.

Further information | <http://www.corr-institute.se/MULTI-ASSESS/>

Project clusters were formed to create critical mass at European scale capable of addressing six key topic areas – the effects of air pollution and climate change (see *Informing EU policy-making*), damage to historic buildings, interior environments for the preservation of artefacts, microbiology, and the integration of cultural heritage in wider urban sustainability strategies. The projects have produced pollution threshold definitions, non-destructive tools and methodologies, models, mapping systems and sensors, and have contributed to legislation and harmonisation, standards, and the application of EU environmental directives.



An oil painting before and after laser cleaning using non-destructive UV laser technology.

Further information

FP5's key action **City of tomorrow and cultural heritage**

<http://www.cordis.lu/eesd/ka4/home.html>

Directory of all **research projects** funded by the key action (together with other relevant documents)

<http://www.cordis.lu/eesd/ka4/library.htm>

'**Environmental Research**' website on Europa

<http://europa.eu.int/comm/research/environment/>

FP6's **Global Change and Ecosystems** priority thematic area

<http://www.cordis.lu/sustdev/environment/home.html>

For specific enquiries concerning the activities presented in this brochure, please contact

rtd-sustainable@cec.eu.int

The **Sixth Environment Action Programme**,

Environment 2010: Our Future, our choice

<http://europa.eu.int/comm/environment/newprg/index.htm>

The **Environmental Technology Action Plan**

<http://europa.eu.int/comm/environment/etap/index.htm>

The **European Union Strategy for Sustainable Development**

http://europa.eu.int/comm/sustainable/pages/strategy_en.htm

Towards a thematic strategy on the urban environment

http://europa.eu.int/comm/environment/urban/thematic_strategy.htm

Impact Assessment

http://europa.eu.int/comm/sustainable/pages/impact_en.htm

MEETING NEW CHALLENGES

Strategic EU policy directions – in particular, those articulated by the Lisbon Council, and the unfolding requirements of the European Union Strategy for Sustainable Development – will continue to create an urgent demand for support from the research community, not least in the field of urban and regional sustainability.

As the Union looks ahead to the Seventh Research Framework Programme, due to begin in 2007, a number of research topics of high political relevance remain to be comprehensively addressed. These include, for example, sustainable land use management, the monetary valuation of policy options, and the development and assessment of new environmental technologies. Continuing efforts will be needed to support integrated decision-making, and in particular the adaptation of tools and approaches to new topics – the management of ecosystems, business activities and infrastructures.



Science-based business

A shift in emphasis will also be required. As this publication has shown, the principal achievement of EU research activities on sustainable land use has been to improve the understanding, assessment and implementation of sustainability. Building on this work, a phase of more applied research is now required to stimulate widespread take-up of the new tools by policy-makers and practitioners, and to develop further the environmental technologies necessary for practical implementation of sustainable policies.

Two factors make this new direction especially appropriate. First, there will be a pressing need to implement sustainability measures in the new Member States so that, as rapidly as possible, the quality of life in their cities and regions reaches that of the EU-15, and they begin to contribute to the sustainable development of the Union as a whole. Second, the EU's target of raising research spending to 3% of GDP by 2010 – and private sector spending to 2% – favours a greater emphasis on applied research. Europe's environmental technology sector is young and dynamic, characterised by knowledge-based small and medium-sized enterprises with considerable potential for rapid growth in emerging international markets. Already leading the world in the development of renewable energy applications, Europe's environmental technology sector has an economic potential similar to that of the information technology and biotechnology sectors, whose massive private sector research investment has been consistently fostered by EU research programmes.

European Commission

Sustaining Europe: EU Research for sustainable urban development and land use

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This publication describes a selection of the practical tools, technologies and policy recommendations generated by EU research in the Fifth and Sixth Research Framework Programmes in support of European efforts to achieve sustainable development. It explains how the outputs of research are already helping policy-makers, planners and practitioners to overcome the complex environmental, social and economic dilemmas of cities and regions across Europe.



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