

The IPTS REPORT

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Specialized Ecosites and Local Sustainability

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2 Editorial. Implementing Sustainable Development at the Local Level and the concept of Ecosites

6 Land Use Management and the Creation of new Ecosites

Ecosite models provide for a simultaneous consideration of environmental, social and economic interests in a specific area in a way that emphasises research and innovation as well as local involvement.

11 The Role of Universities in Promoting Sustainability

Given their role in technological innovation, economic competitiveness and social cohesion, universities should play an important role as local knowledge centres helping society to meet the challenges of sustainable development.

17 Spin-out Effects of Ecosites on Local Economies

Ecosites, which are demonstration sites dedicated to innovation and knowledge transfer, can play an important role in implementing sustainable development policies at local level.

22 Reintegrating Ecological and Economic Goals: sustainable production and natural capitalism

As today's environmental problems are increasingly perceived as having reached crisis point, greater emphasis is being placed on reintegrating ecological with economic goals. "Natural capitalism" is one approach to achieving sustainable development in this way.

27 Brief Note: Bridging EU Sustainability Policies and Local Experiences: the Role of the European Commission's Joint Research Centre

We are pleased to announce that readers can now obtain advance notice of the articles appearing in future editions of *The IPTS REPORT* by e-mail. To subscribe to our e-mail newsletter, send an email to listserv@listserv.jrc.es with the words "subscribe IPTS-REPORT" in the body of the message.

reader is invited to build a critical viewpoint including the relatively little known concept of 'Ecosite' but not excluding other actors and conceptual options.

Another commonality: attempting to frame spontaneity

Beyond the three characteristics outlined above for the experiences analysed in the articles of this issue and which could be schematically summarised as 'successful', 'expanding' and 'migrating', another clear area of common ground is the bottom-up approach.

It is worth drawing attention to the fact that none of the experiences and the analyses takes the EU level and strategies in the field of sustainable development as its starting point. Action starts at the local level as an attempt to meet a need that is perceived at the local level. Moreover, it is 'action' that is being taken and is at the centre while the conceptualisation that is made of it comes 'a posteriori' and tries to identify and characterise specific elements and factors which may be worth considering at different levels and in different contexts.

Shared conceptual foundations

Sustainable development has been moving steadily towards the top of the world policy agenda in recent years while at the same time both driving and feeding on local experiences which already existed. Anyhow, growing momentum or – in more graphic terms – a 'coagulation' of attention can be sensed not only at various policy levels but also in other circles ranging from environmentalists to researchers and the academic and other actors in the most diverse range of economic sectors, as well as the public at large.

Certainly, very different levels of penetration and diffusion of the concepts and the practices

related with sustainable development are to be found. Possibly, it is in the nature of a flexible, complex and relatively recent concept to follow such a path and, possibly, but not necessarily, a certain degree of uniformity and homogeneity in its understanding is increasingly emerging. It is likely, though, that the opposite – heterogeneity and diversity – will continue to characterise the broad concept and wide practices which can be related to sustainability.

Beyond the above considerations, which perhaps sound more philosophical than scientific, common elements characterise sustainable development approaches. It is within this framework that the concept and the promising elements of Ecosites need to be analysed.

Policy background

Following the 1987 Brundtland Commission Report, an important step was accomplished in terms of awareness-raising on the occasion of the 1992 Rio de Janeiro World Conference on Environment & Development.

The United Nations Commission on Sustainable Development CSD (1995-2000) suggested four main categories to be considered and monitored: social, economic, environmental and institutional. With the objective of monitoring the Agenda 21 process, 40 chapters covering 100 programme areas and 3,000 recommendations were prepared.

At the European level, further to the definition of the European Union Strategy for Sustainable development³, concrete steps are now being taken in the field of policy implementation and policy monitoring. The Structural Indicators used to report yearly on achievements at European Spring Councils and the Impact Assessment schemes used at EU level constitute relevant examples, along with the European Statistical System (ESS) Task Force on

the approach taken in the article on *Natural Capitalism* is fully complementary to it. Indeed it provides very interesting and useful insight into the institutional and corporate management elements and motivation pushing economic actors towards greater social and environmental responsibility. To a certain extent, it provides an interesting and innovative answer to the questions 'why does it work?' and 'where is the gain?' in practice.

The concluding brief note illustrates some of the activities of the European Commission's Joint Research Centre in building the links with local scientific research and innovation efforts while at same highlighting its role as centre of excellence and reference in a number of relevant areas for sustainable development. Again the focus is on concrete actions and direct hands-on involvement.

Keywords

sustainable development, local level, Ecosites, conceptual foundations, commonalities through contributions

Notes

1. This Special Issue of the IPTS Report has arisen out of the Ecolink final workshop held in Mèze at the Ecosite du Pays de Thau in September 2003. It also stems from iterated exchanges with the JRC-IES Ecodev Action and the activities it carries on.
2. An interesting text in this respect is the article by S. Funtowicz, J. Ravetz, M. O'Connor 'Challenges in the use of science for sustainable development' in *International Journal of Sustainable Development*, Vol. 1, No. 1, 1998.
3. Useful information to all relevant documents related with the EU Sustainable Development Strategy adopted at the European Council in Gothenburg in 2001 can be found at

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

Acknowledgements

Thanks are due to all the authors contributing to this issue, as well as to Mr Gámez and Mr Mata of InBio, Costa Rica, for their input, and for whom unexpected communication problems caused delays forcing publication of their article to be postponed to a future issue of the IPTS Report.

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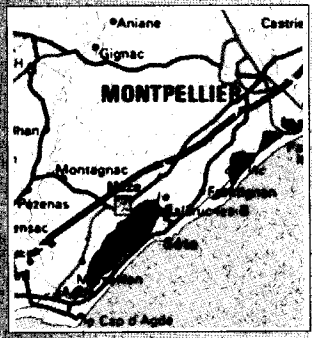
The Ecosite du Pays de Thau (Hérault, France) is a useful starting point from which to obtain ideas for a concept and, in particular, the ten-function Ecosite model.

In 1985, around a waste water lagooning station for the city of Mèze (8000 inhabitants), a small Ecosite was set up (see map in figure 1). Apart from the lagooning station itself, this site today produces energy in water treatment, waste recycling and environmental conservation, and is also involved in environmental services and aquaculture (purification engineering, water treatment, biotechnologies, ornamental fish farming). There is also a training centre where courses and awareness/environmental education tours are run for the general public, attracting around 25,000 visitors each year. The site currently employs over 100 people and provides for local authorities such as an organic waste composting platform, neighbourhood recycling of oyster farming waste and a sorting centre for recyclable waste.

The Ecosite du Pays de Thau is considered benchmark in the field of local sustainable development and is a source of inspiration.

How could the experience of the site such as that given perhaps gives no clues as to how a small town could undergo a radical transformation in just 20 years. How could a part of the public which was not initially involved in local development, become a continuously expanding one? How can the Ecosite be made open to the public?

Figure 1. Location Map of the Ecosite du Pays de Thau



The site is an ecologically rich site, favourable to shellfish and, particularly suitable for oysters. It was threatened by the pollution of the neighbouring cities' waste waters.

The solution was to improve the natural environment and, at the same time, keeping the activities which were already in place. This was a real sustainable development issue before the term "sustainable development" was coined.

The solution was found in an original and imaginative way by Yves Pietrasanta, the mayor of Mèze and a member of the Montpellier 2 University of Sciences. The solution he put forward involved: a local sewage station rather than the expensive solution proposed by the national government; a pipeline running around the Thau coastal lagoon to join a sea outlet. This was an environmentally friendly and innovative solution rather than a traditional pipeline which would be hard to blend in to the landscape, entail high energy consumption and high levels of bacteria.

At the time the proposed solution was too "unstructured" and "empirical" the mayor set up a research centre and proposed that it be made a "pilot site" for lagooning. He proposed that local authorities provide financial support to the centre and that professional people from the area be involved. This proposition was accepted readily as lagooning was less expensive than the originally planned pipeline. These savings were therefore used to finance the initiative.

The success of the simultaneous consideration of environmental, social and economic issues was based on innovation and research, and "territorial solidarity" by involving local authorities and the public. This has generated a development operating at many levels. The results achieved are: a research centre; research carried out at the site led to the development of knowledge (which has been exported worldwide by start-up companies created on the site) and to a number of activities (oyster farming unit and later an ornamental fish farm supplied with oysters from the station were also set up on the site); new jobs have been created; and finally how arising from these activities have led to new training activities and to the development of new jobs and respond to new demand in the environmental-services jobs sector (purification engineering, biotechnologies, natural environment management, scientific promotion, etc.).

The Ecosite du Pays de Thau has generated curiosity among both local public and holidaymakers, and has become a demonstration site which attracts 25,000 visitors and 400 school classes a year. This is a source of general public interest, which are often too abstract when not accompanied by concrete actions.

An Ecosite can potentially be created based on any of the above by adding the specific ingredients that it lacks. However, is the addition of multiple components, their integration at a specific site, and the synergies between them which make the difference between an Ecosite and possible alternatives.

Interest of the 10 functions for project developers

For local sustainable development initiatives and projects, the interest of the ten-function model is that it enables a pragmatic approach to the application of sustainable development on a local scale which is complete and relatively easy to interpret. Thus, it provides project developers unfamiliar with the conceptual framework of sustainable development with an operational framework in which specific ideas and initiatives can be integrated in a practical and user-friendly way. At the same time, as well as being exhaustive and adaptable, it is an ideal basis on which to integrate other approaches to sustainable development being applied in other areas of activity. Of particular importance is the fact that it provides a solid basis for project developers and/or stakeholders in local planning, by considering the environment systematically together with local social and culture aspects.

Adapting to specific situations

It is clear that the 10-function objective is not something that can simply be applied immediately *in extenso* to a project.

Results are not necessary from each function. Rather the aim is integrate the process progressively and achieve on-going improvements. The main overall aim is to improve the environment. At all events, it has to be inserted into the local context and within the means available to the project developers. The functions included in the model can be translated into practice in various ways. For

instance, the "research" function is often seen as a problem. However, the aim is not necessarily to build an on-site research centre. Whether it is possible to do so may depend on the specific setting, the local administrative framework, etc. Alternatively this goal could be achieved through partnerships with university researchers or –making office space available to external scientific teams.

Clearly, the promoter of the project does not need to take direct responsibility for all 10 functions, as some of them can be delegated. For instance, the training function can be delegated to an official training centre; the awareness-raising function can be led by a partner association; the economic development and job creation function can mean setting up or hosting companies compatible with the Ecosite concept.

Generalisation of the process for all ecosites-ecocentres

Each site has strong and weak points: a "check up" should be done for all ecosites and a programme based on cycles of 5 to 7 years. This approach enables the degree of progress of a site today to be measured, without lowering its ambitions or watering down the specific features of the Ecosite concept. It is not only the site on "D day" which would define the Ecosite but its actual state and its development plan. If the ten-function design is not followed, there is a risk the framework will be applied too loosely and the difference from other existing concepts or labels will not be preserved, thus undermining the added value of the Ecosite concept, while at the same time potentially devaluing the Ecosite label.

The 10-function approach offers a balanced and realistic framework which can be adapted to the needs of each individual Ecosite and, at the same time, ensure quality and uniqueness in the medium to long term.

The ten-function approach needs to be applied progressively so as to achieve on-going improvements

The promoter of the project can delegate some of the ten functions to other bodies

The Role of Universities in Promoting Sustainability

Hans-Peter Winkelmann, *Copernicus-Campus*

Issue: Universities need to be perceived as important partners for sustainable local and regional development. Given their role in technological innovation, economic competitiveness and social cohesion, universities should play an important role as local knowledge centres helping society to meet the challenges of sustainable development.

Relevance: Universities can contribute to local and regional sustainable development in a variety of ways: in the area of education, through the incorporation of sustainable management practices in their teaching activities; furthermore in the area of lifelong learning, through tailored further education programmes for business and administration, and, finally, they can support the transfer of know-how and technology.

Introduction

Around two hundred years ago the industrial revolution made large-scale industrial production possible, thus bringing about a series of social and economic changes and spurring the development of science and technology. At the same time, this process led to damage to the environment and a widening gap in living standards between the developed and developing world.

Today, the rapid pace of global economic integration is arguably driving another revolution. This integration is supported by the availability of a good infrastructure for the transportation of people, goods, services and information. So-called "globalisation" is a process operating on several levels—economic, technological, socio-cultural—each of which is moving at a different pace. The differences

in speed at which developments in these processes are taking place can cause tensions between them. Such tensions, together with the concomitant large differences in welfare between different parts of the world have come to be viewed as a threat to international stability to some and a source of injustice to others (Dam-Mieras, 2003).

The phenomenon described above was put on the world agenda a few decades ago. Subsequently the new term sustainable development was developed as a concept linking together ecological sustainability and economic development. Clearly technological developments play a role in both, as do social sciences. Sustainable development is a complex concept linking, on the one hand, all the corners of the planet and, on the other, both present and future generations. In sustainable development the ecological, economic and socio-cultural dimensions cannot be separated. Realizing sustainable

The views expressed here are the author's and do not necessarily reflect those of the European Commission.

Progress in global communications and transport is driving a social and economic revolution on a par with the industrial revolution two centuries ago

Sustainable development is a complex concept linking multiple geographical regions and both present and futures generations

where there are threats to Europe's development in the medium term and the legacy for future generations. Consequently, education in all its forms will have to integrate the principles of sustainable development. In this context, universities and other higher education institutions play an important role in promoting the objectives of the European Union's Sustainable Development Strategy, which recognises education and lifelong learning to be among the essential policy tools to reinforce public participation at the individual level. Furthermore, the strategic goals of the Lisbon process aiming to increase the dynamism of the EU's economy and the communication of the European Commission on the creation of a European area for lifelong learning, the integration of sustainability into the European Higher Education Area seems to be indispensable in order to enhance the competitiveness of human resources required for a sustainable knowledge-based economy. This requires a structured pooling of knowledge to develop a coherent, comprehensive and successful strategy on a European scale, thus improving the efficiency, quality and relevance of the individual activities. There is a great number of individual university departments and public and private research institutions existing in the European Union that have implemented high level research projects that are closely connected with the above-mentioned problems. However, there is a lack of coordinated cooperation and integration within today's research community in Europe in the field of sustainability research.

Enhancing the knowledge-base for a sustainable society in Europe

The Lisbon European Council of March 2000 concluded that "The Union has today set itself a new strategic goal for the next decade, namely to become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and

better jobs and greater social cohesion". This conclusion represents the overall strategy for the transition to a knowledge-based society in Europe. It aims at combating poverty, unemployment and social exclusion and mitigating the implications of an ageing society. The subsequent Gothenburg European Council of June 2001 decided to complete this political commitment to economic and social renewal by including an environmental dimension to the Lisbon Strategy and adopted the European Union Sustainable Development Strategy. It contains a number of concrete proposals for practical political actions, focussing on a small number of the most acute or irreversible threats to the future well-being of society and the environment in Europe. Headline objectives and proposed measures needed to achieve them cover limiting climate change and increasing the use of clean energy, addressing threats to public health, managing natural resources more responsibly and improving transport systems and land-use management in ways that enhance sustainability.

The combination of the Lisbon-Process and the European Union Sustainable Development Strategy represents a comprehensive and coherent long-term framework for future EU policies in which economic growth, social cohesion and environmental protection are given equal priorities. The two processes, starting in Lisbon and Gothenburg, have numerous links and areas of convergence. They deal with similar problems and have similar objectives: both aim to make Europe more competitive, ensure quality and promote excellence. The clear and stable objectives for sustainable development concluded provide significant economic opportunities with great potential to unleash a new wave of technological innovation and investment, generating growth and employment, while stressing the importance of decoupling economic growth from resource use and pollution. They are therefore of fundamental importance to sustainable socio-economic development in Europe.

Education needs to be integrated in the principles of sustainable development given its importance for the legacy left to future generations

The combination of the Lisbon-Process and the European Union Sustainable Development Strategy represents a comprehensive and coherent long-term framework for future EU policies in which economic growth, social cohesion and environmental protection are given equal priorities

skills of those working in formal and non-formal learning environments. Here the question of what decisive changes teaching as a professional role will face in the coming decades needs to be answered, as teachers and trainers on different levels of education become guides, mentors and mediators. In this context, learning will be addressed as a social process. Apart from formal learning, non-formal and informal learning play an equally important role for the qualification of European people to put sustainable development into practice.

Conclusion

By analysing the critical "Copernican" role of universities to contribute to sustainable development, the challenges and opportunities higher education institutions are faced with as a result of the accelerated globalisation process must be looked at. For European universities this means that they must play an eminent role in enhancing the knowledge-base for a sustainable society in Europe in line with the targets set out by the European Council in Lisbon: "*becoming the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth*

with more and better jobs and greater social cohesion." From the COPERNICUS-CAMPUS perspective however, sustainable growth and greater social cohesion cannot be realised without paying attention to ecological and social/cultural aspects. Therefore it is crucial that, in addition to the economic function of universities, stress also continues to be placed on the cultural function of universities. From the economic perspective standardisation processes deserve maximum support. Experiences in the private sector have shown how important the standardisation of procedures can be in a globalising economy. On the other hand, social and cultural diversity could, just as biodiversity, also be seen as an important resource. As technological innovation is a complex process that cannot really be managed by top-down policy alone, academic diversity could also be seen as a potential stimulus for creativity. It is commonly agreed that universities must have 'old fashioned' academic freedom, but in addition to a European policy targeted at large scale standardisation, bottom-up empowerment is also worth pursuing. For COPERNICUS-CAMPUS as a European university network this is an important value in addition to sustainable development.

Keywords

sustainable development, universities, higher education, globalisation, COPERNICUS-CAMPUS

Notes

More information on Copernicus-campus is available at: www.copernicus-campus.org

Spin-out Effects of Ecosites on Local Economies

Paul Allen, *Centre for Alternative Technologies*

Issue: An Ecosite is a demonstration site dedicated to innovation and knowledge transfer to promote environmental protection and equitable sustainable development. In localities adjacent to existing Ecosites, a variety of successful spin-out effects have been observed. These spin-out effects vary from a simple raised local awareness to the creation of new companies and development trusts which can begin to have their own influence, reinforcing that of the original Ecosite.

Relevance: Ecosites could potentially increase the impact of their work in their own country and region through an active cross-fertilisation of experience. What is needed most urgently is access to real-life examples of how sustainable development can take place, a demonstration of the complex interaction between land use planning, food production, energy, buildings, transport, waste management and all aspects of human society on an ecological basis.

What is an Ecosite?

An Ecosite is a demonstration site dedicated to innovation and knowledge transfer (see Box 1) to promote environmental protection and equitable sustainable development. Ecosites can play an important role in implementing the EU's sustainable development policies, in particular this may be achieved through demonstrating and disseminating results from environmental research and innovation at local level. In this context their ability to contribute through wider dissemination of information to society, combined with their capacity to provide training to industries and local authorities to help them tackle local sustainability issues, will provide a valuable

support framework to the Environmental Technology Action Plan (ETAP).

But perhaps the Ecosites' greatest asset is their ability to present an accessible solutions-driven vision, which is both inspirational, yet grounded in practical real-life projects. Apart from the direct effect of the Ecosite itself as a driver in the local economy, this vision has, in many areas, sown seeds of new knowledge-based innovative enterprise within the locality through spin-out enterprises.

Policy background

The "Ecosite" concept is already proving successful in assisting a number of areas across the EU,

The views expressed here are the author's and do not necessarily reflect those of the European Commission.

An Ecosite is a demonstration site dedicated to innovation and knowledge transfer to promote environmental protection and equitable sustainable development

- Effect of an Ecosite in increasing the general level of understanding of key sustainable development issues within the population of the local area.
 - Real-life demonstration of what can be achieved; inspiring, informing and enabling others to get involved.
 - Creating a central focal point for sustainable development so everyone knows where to go to access information or make contacts.
 - Cross-fertilisation of information and sources of information across different sectors of society.
 - Sharing of research and data on sustainable technologies and lifestyles.
 - Common pool of knowledge, human skills and expertise.
 - The deliberate creation of a business 'incubator' to spin out new enterprises.
 - Increased effectiveness of new ventures as part of a local 'cluster', e.g. sharing resources and cross selling each others goods and services.
 - Role models, training and inspiration.
 - Shared physical resources, infrastructure, buildings, specialist tools etc.
- Appropriate grant support mechanisms delivered by local business development agencies.

The relative importance of these factors will of course vary from place to place, but appropriately combined they offer exciting potential to create new agents of change, embedded in the local community, which can create a bridge between EU policies and practical local action.

Ecosites contribute² (see Box 2, for example) to local development where they are already established, through a range of economic, social, cultural environmental and political impacts. Ecosites provide a meeting point between bottom-up and top-down approaches of sustainable development for actors such as investors, project leaders, politicians, financiers, entrepreneurs and, of course, the public.

There are now several examples across the EU where existing Ecosites have spun out sustainable businesses. These hold the potential for successful replication in other regions. For example, in the locality of the Centre for Alternative Technology (CAT),

The availability of shared technical expertise, customer data, information and physical infrastructure can create an incubation environment for potential spin-outs

Box 2: Economic effects of the CAT Ecosite

As a result of the spin-outs it produces, the Centre for Alternative Technologies (CAT) is now the largest enterprise in the region. In 2002 it had a turnover of €5 million, of which 60% was wages, and at least half of this was spent in the local economy, i.e. about €1.3m. Of the rest perhaps 30% is spent on local goods and services, i.e. about €600,000.

The number of visitors to CAT was 60000 in 2002, of which 98% were from outside the area. Surveys suggest that about 25% of these visitors have travelled to the area to visit CAT, and most of these are in socio-economic groups ABC1. Their stays in the area are averaging 2 nights. Apart from their expenditure at CAT they spend an average of €50 on other items in the local economy. Their overall contribution to the local economy is about €1.25 million per year. The other 75% of day-visitors to CAT are general tourists visiting the area with families. As CAT is largest and best-known tourist attraction in the area it is assumed it has some influence on visitors' decisions to holiday here rather than elsewhere. This effect is around 10%, and that these visitors stay 5 nights but with a similar expenditure. This would contribute another €1.125 million. Also, about 1500 per year visit the area and stay in local accommodation, with other expenditures spending about €150 per night, so a total of €25,000.

Overall, the CAT Ecosite has contributed directly to the local economy.

The Ecosite employs approximately 120 full-time equivalent staff, all living locally. A conservative estimate is that about 300 people supported directly and indirectly, in a total population of about 1000 in the valley, recognised as an area with high unemployment.

Ecosites provide a meeting point between bottom-up and top-down approaches to sustainable development for a variety of actors

Keywords

EcoSite, EcoLink, spin-out

Notes

1. The EcoLink project's four scientific partners are :
LAMETA Université de Montpellier I. www.lameta.univ-montp1.fr
EC Joint Research Centre (JRC) Institute for Environment and Sustainability.
<http://ies.jrc.cec.eu.int> - <http://ecodev.jrc.it/ecocentres>
Universität für Bodenkultur, Wien. www.boku.ac.at/zun
Universitat autonoma de Barcelona. www.uab.es/cea/
2. As concluded by the participants (60) of the 3rd Ecolink workshop organised by Montpellier University – France, which addressed the impact of Ecosites on sustainable local development (23-24th June 2003).
3. www.ecodyfi.org.uk
4. www.dulas.org.uk
5. www.aber-instruments.co.uk

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- Per Backe-Hansen DG Research Directorate 1, Policy aspects for sustainable development.
- EcoLink Project Summary report.

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World Resources Institute in 2000 stated that: "There are considerable signs that the capacity of ecosystems, the biological engines of the planet, to produce many of the goods and services we depend on is rapidly declining." (WRI, 2002). A recent article in *Nature* warned (Scheffer, et al, 2001) "Humanity's assault on the environment has left many ecosystems in such a fragile state that the slightest disturbance may push them into a catastrophic collapse.

Human impacts on many of the world's ecosystems could cause them to abruptly shift with little or no warning from their apparently stable natural condition to very different, diminished conditions far less able to support diversity of life, including human.² These ecosystems give us services worth tens of trillions of dollars each year, or more than the value of the global economy (Constanza, 1997). But none of this is reflected on anyone's balance sheets. These considerations give rise to a search for alternative, more sustainable, modes/ views of production.

A new approach can be based on four principles of corporate behaviour that enable companies to prosper while shifting their operations towards greater environmental responsibility.

The first principle – radically increase resource productivity – restates the basic capitalist logic of economising on scarce resources, but considers the new relative scarcities. Four fold increases in resource productivity are now the basis of economic development policy for an increasing number of countries. But such eco-efficiency is only the first step. Increasing efficiency also encompasses the development of innovative business models that focus on meeting consumer needs in ways that require fewer manufactured products and reward companies for reducing their environmental footprint. For example, Southwire Corporation, an energy intensive maker of cable, rod and wire, halved

its energy per pound of product in six years. The savings roughly equalled the company's profits during that period, which was one in which many competitors were going bankrupt. The energy efficiency effort probably saved 4,000 jobs at ten plants in six states. The company then went on to save even more energy, still with two-year paybacks.

Similarly, Dow Chemical's Louisiana Division implemented more than 900 worker-suggested energy-saving projects during 1981-93, with average annual returns on investment in excess of 200%. Both returns and savings tended to rise as time went on, even after the annual savings had passed \$100 million, because the engineers were learning new ways to save faster than they were using up the old ones.

The second principle, Biomimicry², describes an approach to industry based on nature's wisdom. This approach utilises the 3.8 billion years of design experience of living things to guide industrial innovation, eliminate waste through better design, and avoid the use of toxic materials. It focuses on the creation of closed-loop systems (like those in nature) so that waste and toxins are eliminated from business processes. In business, biomimicry calls for a shift away from conventional "heat, beat, and treat" manufacturing methods, which require enormous energy inputs and often create toxic by-products. Instead, it emphasises production-based on models that are derived from the natural, generally more benign, productive processes of living creatures.

It has been pointed out (Benyus, 1996) that spiders make silk, which is strong as Kevlar but much tougher, from digested crickets and flies, without needing boiling sulphuric acid and high-pressure extruders. The abalone, a marine gastropod, makes an inner shell twice as tough as ceramics, and diatoms make seawater into glass; neither needs furnaces. Trees turn sunlight and soil into cellulose,

A new approach can be based on four principles of corporate behaviour that enable companies to prosper while making their operations more environmentally responsible

The first principle of the new approach is to radically increase resource productivity

The second principle calls for a shift away from conventional manufacturing methods that require enormous energy inputs and often create toxic by-products, to production processes modelled on those of living creatures

ment. On the other hand, many scientists, politicians, and business people are feeling an increased pressure to implement sustainable solutions within their organisations. They are recognising the race against time to implement solutions that protect the future.

The challenge that humans face is to develop a new framework that perceives the planet as a synergistic whole, rather than competing parts. Organisations, particularly existing large corporations, need to begin working together in order to manage ecosystems properly, in contrast to the destructive ways that have been utilised in the past.

Environmental need has created market demand. The sustainability market (including products and services) is rapidly expanding as individual and organisational awareness about the current state of our environment increases.

Many organisations are answering the demand for greater sustainability by proactively implementing internal green business practices and greater levels of responsibility in external projects. Indeed, subsectors within most industries are greening their business one way or another, often in anticipation of, or in response to, changes in consumer preferences. Furthermore, organisations

that are implementing green business practices are realising that the marketplace is rapidly becoming savvy enough to distinguish between real sustainability efforts and "green washing", which occurs when an organisation says that it will implement sustainable business practices (most often due to pressure from NGOs or other external organisations) but fails to back up its claims with supporting actions. Organisations implementing green business practices are extremely interested in communicating with customers, shareholders, and the public about their sustainability efforts, positioning themselves as responsible organisations that give back to the global community.

As today's environmental problems become increasingly recognised as having reached a crisis point, the emphasis will increasingly be on reintegrating ecological and economic goals. Because it is both necessary and profitable, it will subsume traditional industrialism within a new paradigm of production, just as industrialism previously subsumed agrarianism. As the various groups that have defined the environmental movement (e.g. government, environmental organisations, NGOs, etc.) and business each contribute components to the solution, we can find the necessary catalysts for change. However, for this to succeed all sides must be open to the others' contributions. ●

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About the authors

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B R I E F N O T E

Bridging EU Sustainability Policies and Local Experiences: the Role of the European Commission's Joint Research Centre

Jean-François Dallemand, Heinz A. Ossenbrink, Lucy Mottram, José Manuel Zaldivar, Emile De Saeger and Carlo Lavalle, *JRC-IES*

The need to increase research on sustainability has been acknowledged at JRC level by the creation of the Institute for Environment & Sustainability (IES). In addition, the JRC gives scientific and technical support to political activities at EU-level, through the Environmental Technology Action Plan ETAP (DG RTD, DG ENV)¹. Within the overall framework of sustainable development, the ECODEV Action has been defined within the institutional contribution of the JRC-IES to the Sixth Framework Programme of Research.

The ECODEV Action² concentrates specifically on: 1) technical/scientific support to a European network of Ecosites or Ecocentres; 2) best practices as implemented by selected local initiatives; 3) indicators of sustainable development at local level; 4) use of Information Technology within initiatives of sustainable development at local level; 5) training.

The Ecosite concept has been implemented successfully over the last twenty years in Mèze (Montpellier, France) with the creation of the "Ecosite du Pays de Thau". In 2001 and 2002, the JRC & the Ecosite du Pays de Thau established a cooperation on the topic of the characterisation of Ecosites. An Ecosite can be seen as a Local Agenda 21 initiative including direct or indirect links to applied research activities. This study was used at a

later stage in order to build the ECOLINK European network supported by DG Research. As a follow-up of the ECOLINK Project a European Federation of Ecosites has been established. Another point worth mentioning is that the JRC is also supporting the sustainable energy³ policy of the Commission's services with the Scientific Reference System on Renewable Energies and Energy End-Use Efficiency (<http://streference.jrc.cec.eu.int/>), which was set up to enhance availability, quality and interpretation of renewable energy (RE) and energy end-use efficiency (EEE) data. (This Reference System is part of SETRIS, the JRC's Sustainable Energy Technologies Reference & Information System)⁴.

Urban monitoring is another example of an application related to local sustainable development. In the framework of applied research initiatives of the Institute for Environment and Sustainability, the MOLAND (Monitoring Land Use/Cover Dynamics) activity⁵ focuses on the assessment, monitoring and modelling of past, present and future urban and regional development, in the context of sustainable development. MOLAND contributes to the preparation and definition of the Thematic Strategy for the Urban Environment of the 6th Environmental Action Plan of the European Union, following the guidelines set by the EC Directorate-General for the Environment. MOLAND also addresses the issues mentioned in the European

The views expressed here are the authors' and do not necessarily reflect those of the European Commission.

- "representativeness" of different regions in Europe to cover a range of climatic and ecosystem characteristics and to assure that multiple soil and water pollution problems are considered;
- involvement of academic bodies and agencies with natural resource responsibilities within the watersheds while setting goals and establishing research priorities.

The development of a decision support system is also one of the project's activities.

Finally, one more example of local experience in environmental issues is the Population Exposure to Air Pollutants in Europe (PEOPLE) project. Among the health-related activities conducted at the Emissions and Health Unit of the Joint Research Centre, the PEOPLE project is of particular relevance to human exposure. The project is assessing outdoor, indoor and personal exposure levels of and to air pollutants in approximately ten European large agglomerations in the EU 15 and new EU member/candidate countries. The study focuses on the emissions from transport and smoking, using benzene as a tracer. In each of the cities selected, citizens are invited to participate in the project through the media. In each city up to 150 volunteers have been selected, according to pre-defined selection criteria which allow exposure to be analysed as a function of the specific activities of the volunteers: non-smokers not exposed to automotive sources (control group), smokers, commuting citizens using a car as their means of transport, citizens using public transport, citizens using a bike or walking. Each citizen carries a sensor for 12 hours (to enable personal exposure measurements) on a specified day of the week. These measurements are possible thanks to the use of a recently developed diffusive sampler allowing measurements in short periods of time. Measurements are performed for

24 hours in a wide range of indoor and outdoor locations around the city to gain an understanding of the level of pollution around the city on the sampling day. The short-term measurements (12 and 24 hours) observed during the campaign are corrected depending on the average concentration of the pollutant over a year.

- So far measurement campaigns have been conducted in the cities of Brussels and Lisbon in October 2002, and in Bucharest and Ljubljana in May 2003. More campaigns will follow in Madrid during autumn 2003 and in other cities in 2004.

The results of the first campaigns in Brussels, Lisbon, Bucharest and Ljubljana have shown that:

- The EC air-quality standard for benzene ($5 \mu\text{g}/\text{m}^3$ to be met by 2010) is likely to be met in most cities, except in hot spots and in a number of new EU Member States;
- The outdoor concentration levels are highly dependent on the degree of implementation of air pollution policies, in particular in the case of emissions from mobile sources (car emissions, benzene content of petrol);
- Indoor air pollution levels are generally higher than outdoor levels (factor 1.5 in average) and also depend on the transport and smoking habits of the residents;
- Personal exposure levels systematically exceed the outdoor levels (factor 2 in average), and depend essentially of the behaviour and living habits of the citizens (means of transport used, smoking habits), and the outdoor concentration levels.

The high level of citizen participation in the PEOPLE project underlines its importance as a tool for raising awareness of the problem of urban air pollution.

About the authors

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Dr. Heinz A. Ossenbrink holds a PhD in Nuclear Physics and joined the JRC Ispra in 1982, when he went into the field of photovoltaic solar energy. Since 1994 he has been the Head of the Renewable Energies Unit at IES and has become one of the world's leading experts in this field. He has authored/co-authored over 100 publications, is programme chair for the European PV Solar Energy Conferences, and a member of International Standards Committees and Executive Boards.

Lucy Mottram received training in renewable energies, sustainable development, ecology and environmental issues and worked in field ecology and habitat monitoring. She is currently working on ecotopes and ecocentres at JRC-IES.

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A B O U T T H E I P T S

The Institute for Prospective Technological Studies (IPTS) is one of the seven institutes making up the Joint Research Centre (JRC) of the European Commission. It was established in Seville, Spain, in September 1994.

The mission of the Institute is to provide techno-economic analysis support to European decision-makers, by monitoring and analysing Science & Technology related developments, their cross-sectoral impact, their inter-relationship in the socio-economic context and future policy implications and to present this information in a timely and integrated way.

The IPTS is a unique public advisory body, independent from special national or commercial interests, closely associated with the EU policy-making process. In fact, most of the work undertaken by the IPTS is in response to direct requests from (or takes the form of long-term policy support on behalf of) the European Commission Directorate Generals, or European Parliament Committees. The IPTS also does work for Member States' governmental, academic or industrial organizations, though this represents a minor share of its total activities.

Although particular emphasis is placed on key Science and Technology fields, especially those that have a driving role and even the potential to reshape our society, important efforts are devoted to improving the understanding of the complex interactions between technology, economy and society. Indeed, the impact of technology on society and, conversely, the way technological development is driven by societal changes, are highly relevant themes within the European decision-making context.

The inter-disciplinary prospective approach adopted by the Institute is intended to provide European decision-makers with a deeper understanding of the emerging S/T issues, and it complements the activities undertaken by other Joint Research Centres institutes.

The IPTS collects information about technological developments and their application in Europe and the world, analyses this information and transmits it in an accessible form to European decision-makers. This is implemented in three sectors of activity:

- Technologies for Sustainable Development
- Life Sciences / Information and Communication Technologies
- Technology, Employment, Competitiveness and Society

In order to implement its mission, the Institute develops appropriate contacts, awareness and skills for anticipating and following the agenda of the policy decision-makers. In addition to its own resources, the IPTS makes use of external Advisory Groups and operates a Network of European Institutes working in similar areas. These networking activities enable the IPTS to draw on a large pool of available expertise, while allowing a continuous process of external peer-review of the in-house activities.