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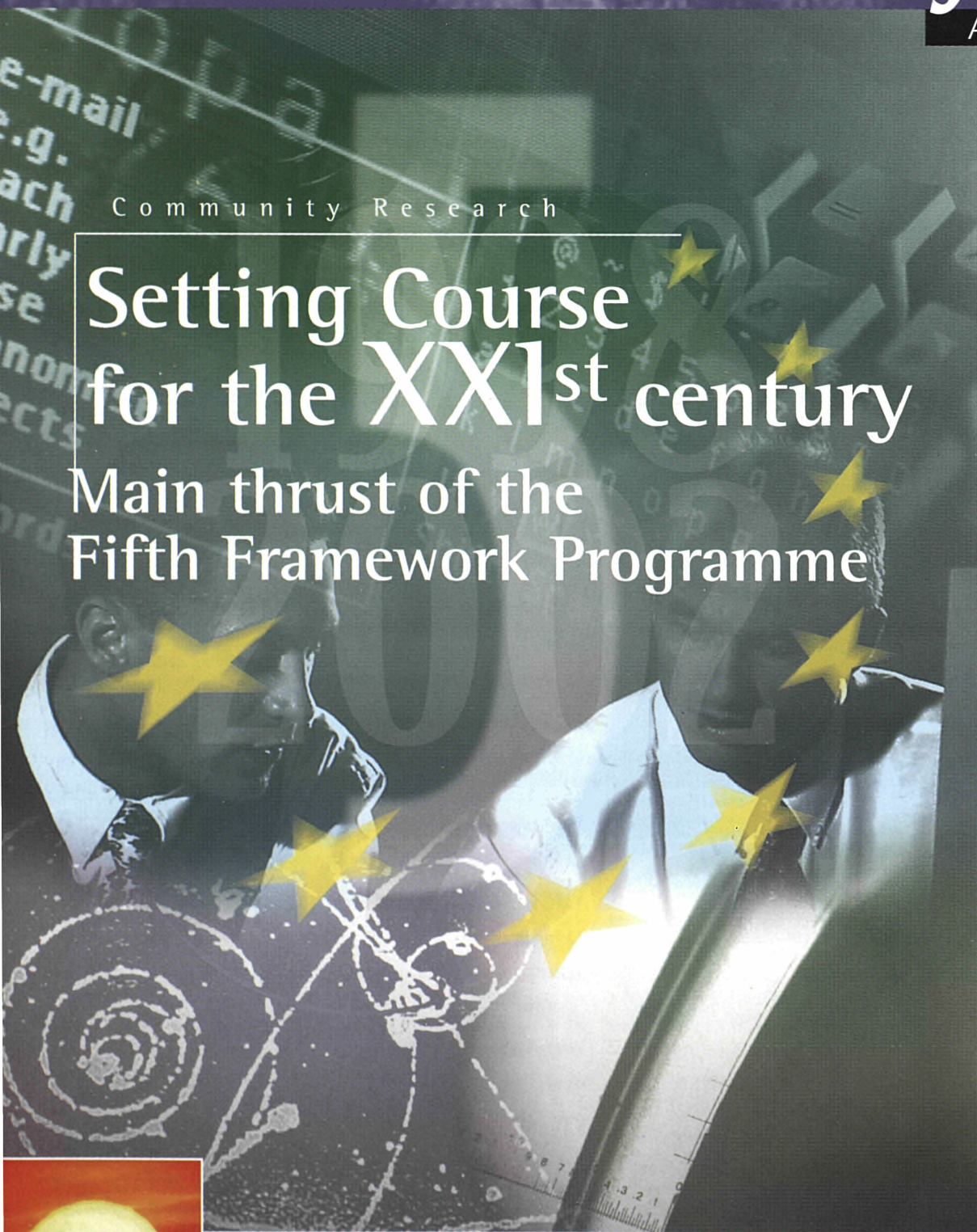
# RTD *info* | 15

April-May 97

Community Research

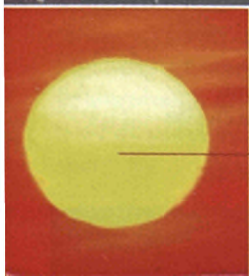
## Setting Course for the XXI<sup>st</sup> century

### Main thrust of the Fifth Framework Programme



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## Priority for sustainable development



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**R**TD Info is a newsletter on research and technological development supported by the European Union. It covers general aspects of Community research such as project results and research policy, as well as practical information including dates of calls for proposals, events, conferences, publications, and so on. RTD Info is aimed not only at current and potential participants in Community research programmes, but also at a wider public of industrialists, decision-makers, students and others who are interested in developments in European research. Published quarterly, RTD Info is available in English, French and German. Subscription is free. To subscribe, fill in the form below.

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# Setting Course for the XXIst century

Michel Vander Eeckhout



*On 9 April, the European Commission announced its proposals for launching the Fifth Framework Programme for 1998-2002. These proposals will be debated in the European Parliament, and on 14 and 15 May at the Council of European Research Ministers. RTD Info asked Edith Cresson, Commissioner in charge of research, education and training, to explain the main thrust and major new features of the forthcoming Framework Programme.*

“ Making European research more visible to the man in the street ”

[European Commissioner Edith Cresson]

**C**ommissioner, you have often said that the Fifth Framework Programme would be innovative and was even meant to mark a distinct break with its predecessors. In what way is it innovative, and how would you summarise the principal characteristics of this new programme?

**Edith Cresson:** As far as the Commission is concerned, the Fifth Framework Programme represents a change of direction from its predecessors. The most important new feature of the Fifth Framework Programme as envisaged by the Commission is a much more determined move towards concentration and selectivity in the Union's research action than in the past.

Why? The aim is three-fold: firstly, to increase the socio-economic impact of the European research effort, or in more practical terms, its positive effects on business competitiveness, employment, and the daily lives of ordinary Europeans; secondly, within a context

of "tight money" and a cost/benefit perspective, to allocate European public resources in an optimum manner; and, last but not least, to give European research a higher profile in the eyes of the general public and make it easier for them to understand.

The shift towards concentration and selectivity will be put into practical effect in several ways: firstly the Framework Programme has been restructured into only six major programmes, each

with its own specific objectives. And secondly, the content of the programmes has changed so that alongside activities to develop generic technologies and basic research, each of the "thematic" programmes will include a selected number of "key actions", each corresponding to major social and economic objectives of the European Union.

This concentration effort will not stop there, but is intended to continue throughout the process of

preparing and implementing the Fifth Framework Programme, right up until the research proposals are evaluated. This is a *sine qua non* for it to be effective.

What exactly are "key actions"? In what way do they tie in with the "Research/Industry Task Forces" set up in 1995? How were the themes of these key actions chosen?

The "key actions" are the real innovations of the Fifth Framework Programme. They are instruments for implementing a global approach to research issues. Their aim is to concentrate the resources of all the disciplines and technologies concerned on a series of well-defined themes. They have been developed and implemented in close consultation with the players involved. The key actions are not unrelated to the Task Forces but they are both different and broader in scope.

Indeed, the Task Forces are not "actions" but internal Commission structures set up to coordinate various types of activity on a given theme, as well



*A brochure setting out the European Commission's proposals (February 1997) is available in English, French and German (see order form on p.2).*

as contacts with the scientific community, industry and users. In implementing the "key actions" the Fifth Framework Programme will build upon the experience acquired by the Task Forces during the Fourth Framework Programme.

The themes of these key actions are directly linked to the objectives of the programmes in which they are set. They have been chosen on the basis of a series of explicit criteria which have been applied with absolute rigour. These criteria relate to social demand, such as the impact on employment; to economic developments and technological prospects; such as expectations of growth or important technological breakthroughs, and finally to the concept of "European added value". The use of these criteria should facilitate evaluation of the programmes once they are complete by making it much easier to determine to what degree the objectives have been attained.

**To what extent did the Commission take into account the views of the Member States, research organisations, industry associations, etc. in defining the content of the Fifth Framework Programme?**

In its recommendations, the panel set up to undertake the five-year evaluation of the Framework Programme forcefully stated that the Framework Programme is an instrument at the service of the Union and its policies and should not be simply a catalogue of the wishes and requests of

Member States or of various interest groups. It was within this perspective that the programme was conceived. Having said this, the Commission is not of course the only source of ideas about what needs to be done in the field of European research in order to achieve the Union's major objectives. Many of the numerous suggestions made to the Commission about the Fifth Framework Programme were particularly relevant and these are reflected very clearly in the Commission's proposals.

In designing the architecture and defining the content of the Fifth Framework

**programme change for participants? Will the terms of admission and participation change? Will they be better than in the past?**

If there is one point on which everyone agrees, it is that very special attention will need to be paid to management questions when implementing the Fifth Framework Programme. For two main reasons: firstly it is both possible and necessary to improve current management methods beyond the progress made in recent years; secondly and most importantly, by its very nature, the Fifth Framework Programme calls for a new

move away from a rather compartmentalised management system divided into fields, to a more collegiate form of management which allows for fast adaptation and reaction.

In parallel, further improvements are due to be made in facilitating access (especially for SMEs), reducing lead times, and streamlining procedures.

**It has often been said that the greatest weakness of European research and industry is its poor ability to convert research results into new products, procedures and services. In what way is the Fifth Framework Programme intended to remedy this situation?**

The problem cannot be entirely resolved by the Framework Programme alone, since it is a research programme with limited resources. However, for the first time this problem will be taken into consideration to a really significant degree. Indeed, the Commission is proposing to set up mechanisms within the thematic programmes and the "Innovation" programme to stimulate the exploitation of project results and, more broadly, to facilitate the access of enterprises, especially SMEs, to venture capital and to funds for innovative business creation.

The determination to take into account this aspect of exploiting results and innovation in the Union's action is another major new feature of the Fifth Framework Programme compared with its predecessors. It could yield quite rapid results. ■

## Timetable for the preparation of the Fifth Framework Programme\*

<b>April 1997:</b>	Transmission of the Commission's final proposal to the Council of Ministers and the European Parliament
<b>February-March 1998:</b>	Adoption of the Framework Programme
<b>May-July 1998:</b>	Adoption of the specific programmes
<b>October-December 1998:</b>	Launch of the first calls for proposals

\* Projected dates

Programme, the Commission also took into account the conclusions and recommendations of the five-year evaluation reports on the Framework Programme and the specific programmes which I have just mentioned, in particular those in the general evaluation report on the Framework Programme by the "Davignon Group" (Editor's note: see following article).

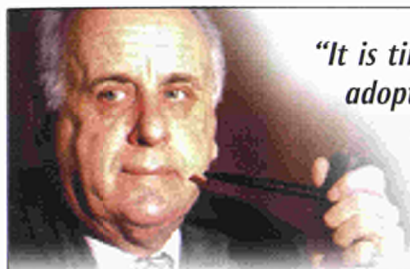
**In practice, what will the implementation of this new Framework Pro-**

management approach.

The documents approved by the Commission focus on the content and the scientific and technological objectives of the Framework Programme. They touch only briefly on management issues, as these will form the subject of a detailed document at a later stage. However, one point which should already be made clear is the determination to ensure that the execution of programmes and actions is more flexible and better coordinated. This will involve a

# Time for a New Leap Forward

Photo News



[Viscount Davignon was one of the First Framework Programme's "founding fathers" in 1984.]

*"It is time for a change because times have changed". This was the energetic tone adopted by the high-level evaluation panel commissioned by the European Union to formulate recommendations for the Fifth Framework Programme. The Commission's proposals have taken its observations fully into account.*

**T**he Framework Programme is not fulfilling its promise. It lacks focus and is underachieving. This is not the fault of individuals but of a structure which inhibits the formulation of real strategy and makes effective implementation difficult." This was the uncompromising opening statement of the report by the group of 12 independent experts chaired by Etienne Davignon - who, in 1984, in his capacity as Vice-President of the Commission in charge of research and industry, was one of the founding fathers of the First Framework Programme<sup>(1)</sup>.

However, the report emphasises the quality of the research carried out within the framework programmes as well as the network of talent they have brought together.

In the view of the evaluation panel, the launch of the Fifth Framework Programme provides a unique opportunity for Community research to take "a new leap forward". The report's main recommendations revolve around two aspects of the programme: its strategy and its operation.

## Three key criteria for choosing a European strategy

*"For too long the Framework Programme has tended to be an aggregate of na-*

*tional and sectoral desires and ambitions. It must be more than that in the future,"* maintained the group of experts. Despite the high quality content and results of the many projects, Community research policy lacks coherence and a real European perspective. A new ap-

proach must be based on three key criteria: **■** maintaining and reinforcing a high level of scientific quality and excellence in all the actions undertaken; **■** pursuing clearly-defined European social and economic objectives; **■** contributing "European added value".

## Last round of discussions

The "Davignon Report" received its first significant exposure at a major final debate on guidelines for the Fifth Framework Programme, held by the European Commission in Brussels on 28 February and 1 March of this year, where representatives from the scientific community, industry, and other sectors of society - who had already been widely consulted throughout the course of preparatory work lasting almost a year - also analysed and commented on the working paper summarising the Commission's proposals for a new European RTD strategy, prior to its finalisation. On the whole, these proposals received a rather positive response.

proach must be based on three key criteria:

- maintaining and reinforcing a high level of scientific quality and excellence in all the actions undertaken;
- pursuing clearly-defined European social and economic objectives;
- contributing "European added value".

## Changes in legislation

According to the experts, this strategic leap forward implies first and foremost a fundamental revision of both the way Community RTD policy is decided, and the legal framework for its

implementation. "A new legal basis is urgently required for the Fifth Framework Programme", the report stresses. Indeed, at present the detailed content of the Programme is first subject to an onerous co-decision procedure between the European Parliament

and the Council of Ministers, with the latter giving its final approval only after a unanimous vote by the Member States. All too often this decision-making method results in a compromise between an array of different national and/or sectoral approaches and hampers the implementation of a joint research strategy with a genuinely European perspective. The panel has therefore issued an urgent appeal to political officials currently working to reform the European institutions within the framework of the Intergovernmental Conference. It is

recommending that RTD policy should as soon as possible be made subject not to the rule of unanimity but to qualified majority voting.

Apart from this legal change, the experts recommend a simplification of the framework programme's structure and a concentration of the research undertaken. In addition, they are advocating two substantial improvements:

- Fixing the budget for each specific programme on a five-year basis lacks flexibility. Holding in reserve a certain proportion of funds (the allocation of which could be re-examined after three years, for example) would make it possible to respond to new challenges and opportunities arising from rapid scientific and technological change.

- The Commission should be given greater responsibility and independence in managing RTD strategy. It would be answerable to a new "Union Committee", a unique and independent supervisory body responsible for verifying that Commission decisions comply with strategic objectives. This Committee would also play a central role in advising the Council of Ministers and the European Parliament. **■**

(1) Viscount Etienne Davignon is now Chairman of Société Générale de Belgique.

# Main thrust of the Fifth Framework Programme

*Three major thematic programmes - centred on key actions - and three horizontal programmes. Compared with the 18 or so areas of Community RTD currently in existence, the draft plan for the organisation and content of the Fifth Framework Programme for the period 1998-2002 has been simplified considerably. The diagram below illustrates the structure being proposed <sup>(1)</sup>.*

## Three Thematic Programmes

The Commission is proposing to group Community research into three major themes that are considered essential in reinforcing the Union's science and technology base:

- unlocking the resources of the living world and the ecosystem;
- creating a user-friendly information society;
- promoting competitive and sustainable growth.

This arrangement into groups reflects the desire to focus efforts on a limited number of social and economic priority objectives by means of a multidisciplinary approach.

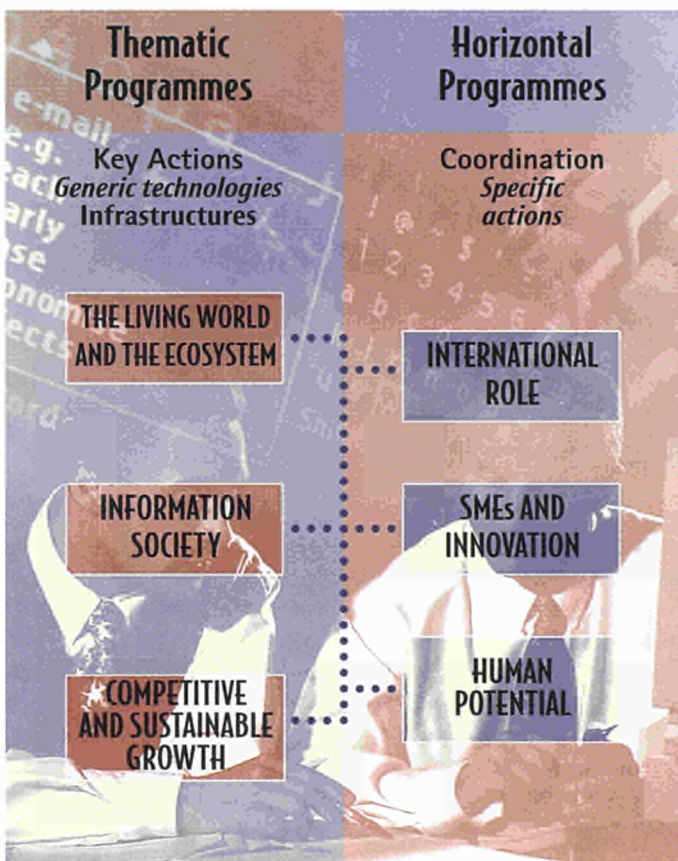
■ Within each thematic programme it is also proposed to implement **key actions** in well-defined sectors (see table opposite). The content of these actions would be defined and their implementation monitored in close cooperation with both those concerned directly with research and users. They will focus on bottlenecks of every type (scientific, technological and socio-economic) hindering the resolution of the problems concerned. This innovative approach is aimed in

particular at promoting the creation of an integrated science and technology area by mobilising both public and private European and national resources.

ther to further technological knowledge or know-how directly linked with the development of one or more key actions, or to raise the standard of scientific and tech-

ried out require **basic infrastructures**: large installations, centres of excellence, and networks. The support provided within each programme for such infrastructures will aim to optimise exploitation on a European scale, with the dual objective of reinforcing international research and recouping costs.

Close ties between these three thematic programmes - as well as with the horizontal programmes analysed below - will be paramount and in some cases will lead to genuine inter-programme integration. Such integration is all the more necessary since the fields of research covered by the key actions all require a multidisciplinary approach. The same applies to technologies such as satellite detection, which provides a tool for research in a variety of fields (environment, agriculture, urban planning, etc.).



*Proposed organisation for the Fifth Framework Programme*

■ To boost these key actions, each thematic programme will also include broader, more **general activities for developing generic technologies**. The aim of such activities will be ei-

nological excellence of European research in emerging fields.

■ Finally, in most of the fields covered by the thematic programmes, the research activities to be car-

*(1) This draft structure is based on the proposals adopted by the Commission on 9 April 1997, which have been submitted to the Council of Ministers and the European Parliament.*

Finally, an important place will be accorded to the demonstration of technologies and to the early introduction of standards to integrate such technologies into international markets. For this reason greater account will be taken of user requirements for safety and quality - right from the technological design stage.

### Three horizontal programmes

The aim of these cross-disciplinary programmes is to promote:

- international cooperation in RTD;
- the innovation and participation of SMEs;
- the human potential vital to Europe's scientific and technological excellence.

These three fields are central to the Union's research and other major policies, including external relations, industrial policy, education, training, and personal mobility. The activities of the proposed horizontal programmes are therefore of two types:

- activities directly linked with the objectives of the thematic programmes. These will essentially take the form of coordination, support and guidance activities, to encourage, for example, the participation of SMEs and the mobility of researchers within key actions;
- activities geared to meeting more general Community policy objectives.

## Three themes broken down into sixteen proposed key actions

(Draft structure of the Fifth Framework Programme - April 1997)

### Resources of the living world and the ecosystem

- |   |  |
|---|--|
| 1. Health and food                                | 4. Management and quality of water                   |
| 2. Control of viral and other infectious diseases | 5. Environment and health                            |
| 3. The "cell factory"                             | 6. Integrated development of rural and coastal areas |

### Creating a user-friendly information society

- |   |   |
|---|---|
| 1. Systems and services for citizens        | 3. Multimedia content                         |
| 2. New methods of work and electronic trade | 4. Essential technologies and infrastructures |

### Promoting competitive and sustainable growth

- |   |   |
|---|---|
| 1. Products, processes, organisation      | 4. Marine technologies                  |
| 2. Sustainable mobility and intermodality | 5. Advanced energy systems and services |
| 3. New perspectives in aeronautics        | 6. The city of tomorrow                 |

### 1. Confirming the international role of European research

International cooperation represents an essential dimension of the Union's research policy within the current context of growing economic globalisation. The aim of this programme is to:

- promote scientific and technological partnerships between entities and researchers from non-Union and European Union countries;
- facilitate the access of European Union researchers to know-how available outside Community countries;
- strengthen the presence of European industry in new markets and help its researchers to gain a better understanding of research capabilities, activities and priorities outside the Union.

Specific cooperation actions will be implemented with six groups of countries based on the principle of mutual benefit.

### 2. Innovation and the participation of SMEs

This programme is based on two precepts:

■ **Innovation is one of the key factors in industrial competitiveness and determines the impact of research in terms of growth, employment and socially desirable results.** However, in the research/development/innovation chain, Europe suffers from a real bottleneck when it comes to turning research results into marketable products. One very important aspect of this deficiency is a shortage of venture capital - which is much more developed in the USA for example - to stimulate the emergence of innovative enterprises. Spearheading a vigorous all-round innovation policy, this programme will collaborate closely with special "innovation units" set up in the various key actions. Its main task will be to rationalise and coordinate information

## Budget

The Commission is not yet ready to propose a global budget for the 5th Framework Programme. Nevertheless, the Commission considers that the percentage of the EU GNP allocated to the 4th Framework programme, on average, between 1995 and 1998, must be the minimum allocated for the global budget of the 5th Framework programme, this percentage being applied on the expected GNP, on average, between 1999 and 2002.

Following is a proposed outline of the distribution of the 5th Framework Programme's budget to the various actions:

- "European Community" Framework Programme: 91% of the total 5th Framework Programme budget.

Indirect actions: 86%. Out of this funding will come:

- 84% dedicated to the first action (three Thematic Programmes, each allocated the same resources at 28% each);
- 3.5% to the second action (International Cooperation);
- 2.5% to the third action (Dissemination and Exploitation of results);
- 10% to the fourth action (Training and Mobility of Researchers).

Direct actions: (Joint Research Centre): 5%

- EURATOM Framework Programme: 9%, out of which:

Indirect actions (Fusion and Fission): 7%

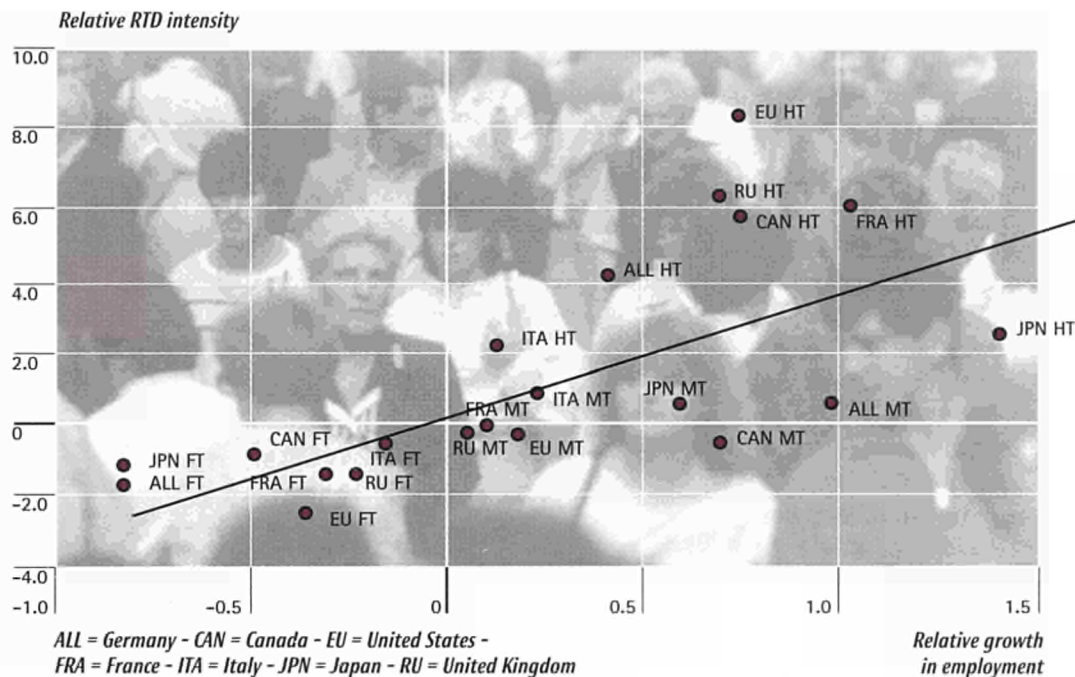
Direct actions (Joint Research Centre): 2%

# RTD intensity and employment growth

High (HT), medium (MT) and low technology (FT) industries in the G7 countries

Leading edge technologies create jobs. Average employment figures recorded over the past three decades in the G7 countries (Germany, Canada, United States, France, Italy, Japan and the United Kingdom) show a marked growth in employment in high technology (HT) sectors. By contrast, sectors with low technological content have registered a fall in employment.

Source: OECD, IST/ESA Division, 1996



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and assistance networks to disseminate results, transfer technology and promote innovation, especially concerning access to sources of finance.

■ **SMEs - which provide two-thirds of all jobs in the European Union - have proven to be particularly dynamic vehicles for innovation.** They must be given easy access to available technologies. The second objective of this horizontal programme is therefore to step up their participation in the key actions. For each of these actions, technological incentive measures (already "run in" in the current Framework Programme in the form of exploratory awards and support for cooperative research projects) will be boosted considerably.

### 3. Increasing human potential

Europe's primary asset is the quality of its researchers, engineers and technicians. This potential, which guarantees the Union's scientific and technological excellence, must be preserved, developed and optimised.

This programme will coordinate all of the training initiatives taken under specific research themes in the three major thematic programmes. It will support a policy to enhance the human capital of European research by means of:

■ research training networks in advanced and emerging fields of research;  
■ "Marie Curie" grants to allow young researchers to train in research centres or in industry;

■ easier access to European research infrastructures;  
■ grants aimed specifically at promoting research teams working in less favoured regions, etc.

The general aims of this programme will be to:

■ support innovation (methods and technologies) in education and training with a view to creating new jobs;  
■ make Europe more attractive to researchers and research investment;  
■ promote the excellence of European scientific and technological potential on the international scene;  
■ develop the knowledge required to identify the economic and social needs of European society and help the scientific and technological policies of the Union and its Member States to respond to these needs. ■



# On track towards the first fusion reactor

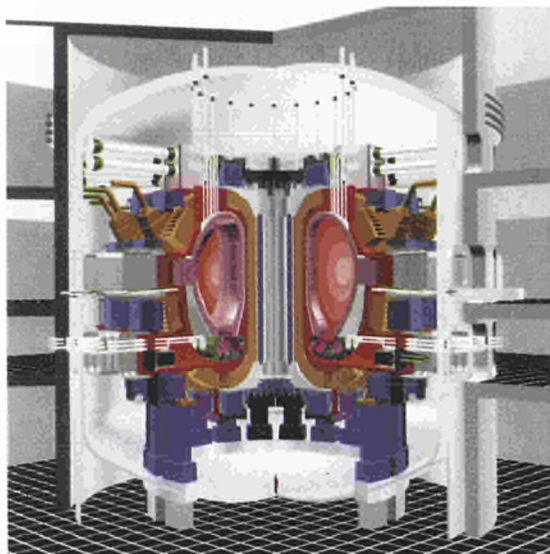
*A favourable verdict on European research into nuclear fusion : the recent evaluation report, drawn up by an independent scientific committee, recommends that work should begin on building ITER, the first ever experimental fusion reactor, planned in a partnership comprising the EU, the USA, Japan, and Russia.*

**T**hroughout the past four decades, research into nuclear fusion has been a major project for the European Union. Mastering this energy source of the future has proved a unique scientific and technological challenge, requiring a sustained research effort. So, what progress has been achieved over the past five years? What are the long-term prospects for nuclear fusion? And, in the short term, which strategic options - particularly in regard to the ITER (International Thermonuclear Experimental Reactor) project - should be adopted? These were the questions the European Commission submitted to the "Fusion 1996" Evaluation Board, set up by the Commission prior to taking strategic decisions on the 5th Framework Programme.

In its report, the Evaluation Board, which was chaired by Professor Sergio Barabaschi, points out that "... fusion is one of the few energy sources which might make a significant contribution to satisfying the growing need for electricity from the middle of the 21st century onward. Taking into account intrinsic safety aspects, potential environmental advantages and the wide availability of fuel, it is important for Europe to have this option open."

## Europe at the leading edge

The evaluation of the Fusion Programme highlights the European scientific excellence acquired in this field, particularly as a result of experiments conducted since 1983 at the JET (Joint European Torus) site at Culham



ITER model - A priority for Europe.

(United Kingdom). This work has placed Europe at the leading edge of research into fusion by magnetic confinement.

In 1991, JET achieved a world first when it succeeded in briefly producing fusion power close to 2 megawatts. The Fusion Programme has allowed European industry not only to develop unique skills in building and operating the sophisticated installations which equip JET, but also to maintain the 15 high-level scientific organisations located throughout the Member States and the Ispra Joint Research Centre. "Fusion R&D," concludes the evaluation report, "has now reached a stage where it is scientifically and technically possible to proceed with the construction of the first experimental reactor... ITER"

After JET, ITER now marks the "Next Step" in the European Fusion Programme's strategy. With total project costs estimated at ECU 6.3 billion over the next ten years, the European Union has joined forces with the United

States, Russia and Japan in order to ensure the project's future. Capable of producing 1.5 gigawatts of fusion power, the reactor should demonstrate the scientific and technological viability of this approach to power generation. Detailed plans for ITER are currently being drawn up by an international team based in three centres (San Diego in the USA, Naka in Japan and Garching in Germany). These will be completed in July 1998 and work on building ITER is scheduled to begin at the turn of the century.

## The choice of a European site

"ITER should be built in Europe, as this would maintain Europe's position as world leader in fusion," concludes the evaluation report. This would be "of great advantage to European industry and laboratories. [The construction] would, however, require an average increase of at least 50% in the Community funding for Fusion over the first decade of the next century ... and a significant contribution from the host country." Even if construction in Europe turns out not to be possible, the Evaluation Board firmly recommends maintaining "a strong participation in ITER as the first priority of the European Fusion Programme." ■

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# The lessons of the Mediterranean

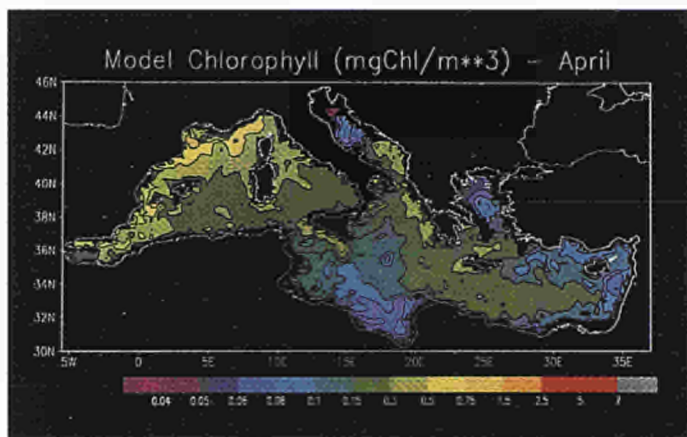
*The Mediterranean is an ocean in miniature, providing a wealth of learning for researchers. The first work carried out as part of the vast MTP Programme (Mediterranean Targeted Project) is providing data - sometimes worrying, sometimes encouraging - on the evolution of the ecosystem of this inland sea. The second phase of the project, christened MTP-II MATER, got under way in 1996 and will continue until 1999.*

**T**he Mediterranean is a remarkable test zone. In it we can record general trends, whilst at the same time identifying the effects of overlying anthropogenic pressure. This possibility of gauging the impact of human behaviour enables us to define the socio-economic measures that need to be taken and to estimate the response time," explains André Monaco of the University of Perpignan's Laboratory of Marine Sedimentology, who is coordinating the current MTP-II MATER project (MTP phase II: MAss Transfer and Ecosystem Response - see box).

## Temperature and salinity on the rise

MTP-II MATER is the second phase of the MTP programme (Mediterranean Targeted Project) which has set itself the ambitious goal of understanding the functioning of the entire Mediterranean as a vast unified ecosystem. In order to achieve this goal, MTP has combined in a single integrated approach all the research being conducted by a large number of multi-disciplinary teams (chemists, biologists, physicians, statisticians, geologists).

One of the findings of the initial research carried out



*Variation in biological productivity in shallow water - clearly more intense in the Northern and Western zones of the Mediterranean - established with the help of a numerical model developed by l'Osservatorio Geofisico Sperimentale (Trieste) under the MTP (Mermaids II project).*

between 1993 and 1996, during the MTP pilot phase, was that in the Western Mediterranean basin the temperature of deep waters has risen by  $0.13^{\circ}\text{C}$  over the past forty years ( $3.2 \times 10^{-3}\text{C}$  p.y.) and that this rise in temperature has been accompanied by a rise in salinity. Although sediments on the sea bottom indicate that relatively important temperature fluctuations have occurred over the past 15,000 years ( $0.6 \times 10^{-3}\text{C}$  p.y.), the speed of the change observed during recent years could indicate climatic change affecting the entire planet.

Clues to such a global change have also been found in the eastern section of the basin. Such changes

could be a source of concern for the functioning of the whole Mediterranean ecosystem over the coming decades.

## Anthropogenic pressure

Another worrying factor are the growing levels of phosphate and nitrate ions associated with industrial and agricultural waste that end up in the Mediterranean. This increase in nutrient elements, which has been very significant over the past thirty years, causes eutrophication of the waters, one effect of which is to trigger the invasive reproduction of certain species of algae. This phenomenon is causing serious problems for certain coastal tourist areas.

Conversely, the results from the monitoring of lead contamination are encouraging: levels have fallen since 1990, a welcome consequence of European regulations on lead additives in petrol.

## Models with many applications

"The MTP's work has made it possible to construct very sophisticated models of water circulation. This pioneering work has also been directed at producing models which integrate ecological processes that are specific to the Mediterranean ecosystem. These models could lead to the development of valuable tools, both for managing coastal zones and for forecasting the impact of climatic change," according to Elisabeth Lipiatou, the scientific officer in DG XII who coordinated the pilot phase of the MTP.

During the initial phase of the programme, a special research effort was made in the less well-known eastern zone of the Mediterranean, including the Aegean Sea. The southern part of this sea is a marine zone with one of the lowest levels of nutrient elements in the world and this is the first time that biogeochemical studies have been carried out in the re-



*A health check reveals data, sometimes worrying, sometimes encouraging, on the state of the Mediterranean's ecosystem.*

## A conference/status report in 1997

An international conference entitled *Progress in Oceanography of the Mediterranean Sea*, will be held in Rome from 17 to 19 November 1997, at which the results of the MTP Programme and the direction of future research will be presented.

gion. In 1994, these studies found a very steep rise in the quantity of nutrient elements in this zone related to changes in the circulation of deep waters. This information leads us to believe that fish populations could rise over the coming years.

### **An integrated multi-disciplinary programme**

"From a strategic point of view, the MTP-II MATER project will see even closer consultation between modellers and experimenters, so vital for understanding anything to do with these complex phenomena. Priority is being given to a multi-disciplinary approach to the problem of extreme impoverishment (known by the specialists as oligotrophy) of the Mediterranean," André Monaco explains.

"To do this, physicians, chemists, geochemists and biologists are working together in an attempt to improve existing models of

ecosystems. In the field, they will set themselves up at strategic points which control the functioning of this sea between points of land, in particular at the entrances to the Aegean Sea and the Alboran Sea. Gaining an understanding of the system over different spatial and time scales will enable them to provide an explanation for the recently observed changes and forecast future developments. The subsequent phase should lead to operational research. It should be remembered that the Mediterranean represents an ocean in miniature and that it is therefore particularly suitable for the installation of a long-term observation network closely related to the state of our knowledge at the end of the second research phase," the MATER coordinator concludes. ■



## Scientific and human synergies

With Community support to the tune of ECU 11 million allocated as part of the MAST programme (MARine Science and Technology), MTP (Mediterranean Targeted Project) combined around ten individual projects over a three-year pilot period (1993-1996). "Focusing on a targeted scientific problem, MTP has truly succeeded in creating exemplary human synergy on a European scale," states Elisabeth Lipiatou, the scientific officer responsible for the project at DG XII. "For the first time, researchers from different disciplines accustomed to working on specific sites in the east and west of the basin, have linked their studies. Many combined experiments have been conducted on a Mediterranean scale. The results of observations and modelling have been the subject of a vast multi-disciplinary debate bringing together in small groups around 200 scientists from 70 institutions in 14 European countries."

The interest aroused by this original approach, which has brought new understanding of the Mediterranean ecosystem, has resulted in the development of MTP-II, known as MATER, (MAss Transfer and Ecosystem Response). Spanning three years (1996-1999), it has received Community funding equivalent to that for phase I. MTP-II MATER involves 50 partners (including the European Union's Joint Research Centre) from 11 European countries. Three research centres in Morocco and Tunisia, funded by the Commission's International Cooperation Programme, will also be involved in the work.

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# The spy plane that came in from the cold

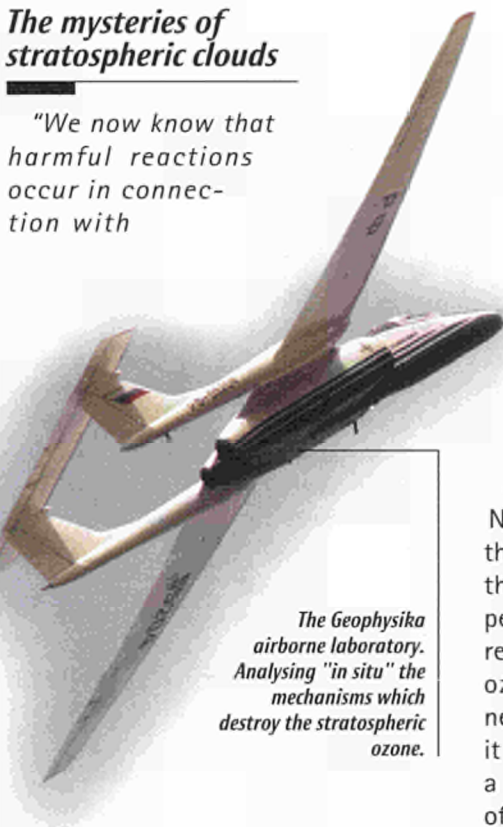
*A Russian spy plane, converted into a laboratory, has been busy tracking polar stratospheric clouds. The aim of this unique European scientific mission? To better understand the physical and chemical mechanisms involved in ozone destruction.*

**T**here is "good" and "bad" ozone. At low altitude, the increased ozone concentration produced by human activities has a harmful effect (see opposite page). At high altitude, the thin gaseous layer of stratospheric ozone which surrounds the planet is essential to all life on Earth, because it filters the sun's ultraviolet rays. But this protective shield is being depleted, especially above the polar caps. "Scientists have established that this ozone depletion is closely linked to emissions of chlorine- and bromine-based compounds," explains Georgios Amanatidis, Scientific Officer responsible for stratospheric research in the Environment & Climate programme of the European Commission. "The culprits are certain chlorofluorocarbons - or CFC gases. These have been banned since 1996, but the effects of previous emissions will continue to be felt for a number of years yet. Also, the permitted compounds which have replaced them, such as "hydro-CFCs" and other chemical products such as methyl bromide, still contain chlorine and bromine".

But human activities are not the only culprits. It seems that natural phenomena - such as the emission of vast quantities of gas when Mt Pinatubo, a volcano in the Philippines, erupted in 1991 - have also made significant contributions to damaging the ozone layer over recent years.

## The mysteries of stratospheric clouds

*"We now know that harmful reactions occur in connection with*



*The Geophysika airborne laboratory. Analysing "in situ" the mechanisms which destroy the stratospheric ozone.*

*suspended particles - or aerosols - found in polar stratospheric clouds,"* explains Georgios Amanatidis. "But the difficulty lies in understanding the mechanisms involved in this very complex process, which is very closely linked to atmospheric conditions."

In order to study these mechanisms within the stratospheric clouds themselves, the European Airborne Polar Experiment (APE) mission<sup>(1)</sup> has just carried out a series of scientific flights, which was completed on 15 January 1997. Nothing like this has ever been done before. A unique, high-altitude, former Russian military spy plane, the M-55, now renamed "Geophysika",

was converted through Italian-Russian cooperation into an airborne laboratory for the purpose. Its 1,500 kg of scientific instruments are able to function under extreme conditions (minus 80°C). Over a period of one month, 19 scientific groups from seven European countries boarded the Geophysika to carry out "in situ" measurements and experiments, at a height of over 20,000 metres above the mountains of Scandinavia and the North Pole. The preliminary results of their work show that the aerosols from the Pinatubo eruption have now dispersed and that the various chemical reactions which are damaging to the ozone layer could change over the next few years. These flights also made it possible to discover the existence of a previously unidentified upper layer of stratospheric clouds at an altitude of around 26 km, whose possible role must now be studied. ■

*(1) Supported by the European Commission, the Italian National Programme for Antarctic Research, and the European Science Foundation, the mission was carried out in conjunction with the German POLECAT programme.*

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<http://www.area.fi.cnr.it/ape/apehtml.htm>

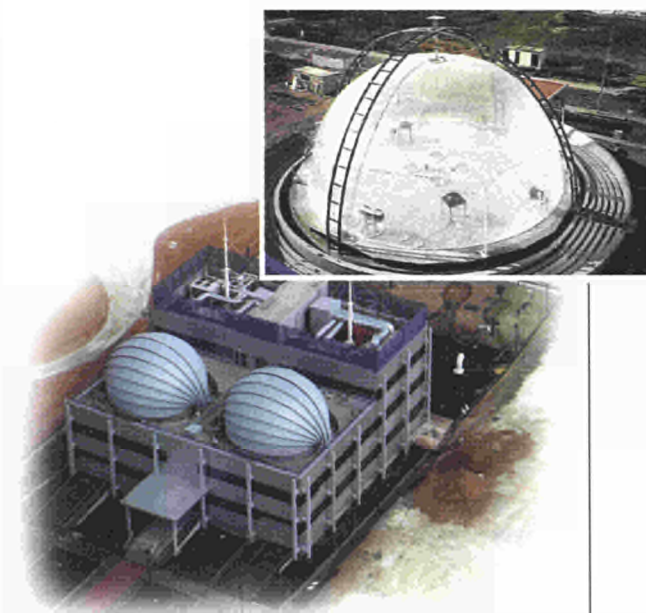
# EUPHORE tracks photochemical smog

*In Valencia, Spain, the EUPHORE photoreactor, which receives substantial European Union funding, analyses the "photochemical smogs" that regularly poison the air of our major towns and even the countryside. In particular, this simulation tool will make it possible to evaluate the effectiveness of alternative fuels in eradicating this scourge.*

Over recent years nearly all European countries have been confronted on sunny days with problems linked to the photo-oxidation of the polluting gases emitted by road traffic and industry. This "photochemical smog" has increased the levels of ozone and other photo-oxidants in the air of most major towns. Such pollution can have many harmful effects: breathing problems - which can be very serious or even fatal - serious damage to plant life, and damage to historic buildings.

## From warnings to action

The situation is causing so much concern that the European Union has adopted safety and prevention standards. The Community "ozone regulations" stipulate that when ozone levels exceed 180 micrograms per cubic metre of air, the authorities must alert the population through the media. At 240 micrograms the danger point is considered to have been exceeded and all possible means must be employed to reduce pollution levels (traffic restrictions, shutdown of certain industrial activities). Scientists seeking to shed light on the complex mechanisms involved in this atmospheric photo-oxidation



*The EUPHORE photoreactor (Valencia/Spain). Top left, one of the simulation chambers.*

are confronted with the problem of studying chemical processes at work in unstable atmospheric conditions.

## Smog chamber

This is the reason behind the European project to build the EUPHORE photoreactor. The aim is to allow researchers to simulate and measure the photochemical processes under real atmospheric and luminosity conditions. In 1992 the decision was made to base EUPHORE at Valencia, Spain, due to the hours of sunshine offered by the site. Construction of the double-

chamber reactor was completed in April 1995, with funding from the Spanish Government and region of the Valencia and ECU 1.5 million from the European Commission. Each simulation chamber consists of a semi-spherical Teflon bag with a volume of 200m<sup>3</sup>, which allows the sun's rays to penetrate, and whose equipment makes it possible to vary the concentration and nature of the gases that enter. In this closed and fully-controlled environment, sophisticated measurement instruments, and in particular spectrographic instruments, analyse the chemical reactions pro-

duced when polluting gases are mixed with pure air. "EUPHORE can be considered to be the most sophisticated technical tool in Europe for studying atmospheric pollution phenomena under real conditions," stresses Giovanni Angeletti, who represents the Commission on the EUPHORE management committee.

"The research conducted there should ultimately result in the development of effective strategies for combating summer smogs. In particular, EUPHORE could be used to carry out a concrete evaluation of the impact of new alternative fuels."

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angeletti@dg12.cec.be

# News in Brief

## European RTD Policy

**European strategies for space applications and earthquake protection** - In December 1996, the EC proposed a series of strategic measures for the development of technological satellite applications (telecommunications, navigation, Earth observation etc.). These measures are principally designed to strengthen the cooperation between the EU, the ESA, specialised European and national space agencies (e.g. EUMETSAT) and users.

A second proposal concerns international collaboration in the field of protection against earthquakes, aimed predominantly at developing research at the Community level, within the framework of the Environment and Climate, BRITE-EURAM, Training and Mobility of Researchers, and Standards, Measurements and Testing programmes, along with the research carried out on this subject by the JRC (PR : 10/12/96 and 17/12/96).

### Launch of Euroscientia Forum

- Launched by the European Forum of Science and Technology (itself created by the EC in 1994), this quarterly multilingual magazine considers the social, cultural, historical, political and ethical debates provoked by scientific and technological progress. Four issues are scheduled, covering the themes of: "Science, technology and European diversity", "European scientific policies", "Technology and communication in Europe", and "Science and culture in Europe" - Fax : +32-2-299.42.07 - E-mail : anita.mallada@dg12.cec.be

## Industrial and materials technologies

Fax : +32-2-295.80.46 / 296.70.23  
E-mail : imt-helpdesk@dg12.cec.be  
EUROPA : br-eur1.html

**Publications** - *Aeronautics Related Research - Synopses of current projects selected under the 1995 calls for proposals* -

## Programme addresses on EUROPA

The EUROPA Internet addresses given for the various programmes referred to in the following two pages should all be prefixed with the address of the DG XII site:

<http://europa.eu.int/en/comm/dg12/>

Information bearing the reference PR is also available as a press release at:

<http://europa.eu.int/en/comm/dg12/press.html>.

These press releases can also be obtained from the Communications Unit: Fax : +32-2-295.82.20.

## Publications

The publications listed opposite, where the EUR number is followed by an asterisk \* are **subject to charges**. They can be ordered from *The Office for Official Publications of the European Communities* -

Fax : +352-48.85.73.

EUR 16972 EN \* - ISBN 92-827-8894-6 ■ *Evaluation of the economic effects of the EURAM, BRITE and BRITE-EURAM programmes - Portugal, Ireland, Greece, Spain and SMEs* - EUR 16877 EN \* - ISBN 92-827 ■ *Technical Steel Research - Coordinated study "steel-environment"* - EUR 16955 EN \* - ISBN 92-827-8283-2 ■ *Reports of the CRAFT Working Groups: Guidelines for the creation of a European R&D Consortium - Examples of Craft Projects (July 1996 REV.) - How to Write an Exploratory Award.*

**For your diary** - *10th COMAD-EM (Condition Monitoring and Diagnostic Engineering Management) Congress and Exhibition* - Helsinki, Finland, 9-11/5/97 ■ *ESRL '97 - International Conference on Security and Reliability* - Lisbon, Portugal, 17-20/6/97 ■ *Conference on Industrial Technologies* - Toulouse, France, 27-30/10/97

## Environment & Climate

Fax : +32-2-296.30.24  
E-mail : environ-infodesk@dg12.cec.be  
EUROPA : env11.html

**Research and Biodiversity** - The European Working Group on Research and Biodiversity

(EWGRB) held a brainstorming session in Stockholm, from 9 to 13 April 1997, aimed at identifying research priorities. The results of these discussions are posted on the Internet at <http://www.odn.se/~ewgrb>

**Storm warning: the FASTEX experiment** - From 6 January to 28 February 1997, a huge measurements campaign was carried out, to study the mechanisms of storm formation above the North Atlantic with the goal of improving meteorological forecasting in Europe (PR 20-3/97).

**For your diary** - *Conference: Human Dimensions of Global Environmental Change* - 12-14/6/97 - IIASA, Laxenburg, Austria

**CD-ROM** - *EUPHIDS* (European Pesticide Hazard Information and Decision Support System) - information and guidance for the evaluation of the effects of agricultural pesticides on the environment and health.

## Marine sciences et technologies

Fax : +32-2-296.30.24  
E-mail : mast-info@dg12.cec.be  
EUROPA : marine1.html  
**For your diary** - *3rd Conference*

*on the Exchange Processes at the Continent/Ocean Margins in the North Atlantic* - Vigo, Spain, 14-16/5/97 ■ *1st annual ELOISE Conference - European participation in the LOICZ project (Land-Ocean Interactions in the Coastal Zone)*, organised by IGBP - Arcachon, France, 21-23/5/97 ■ *Project Data Management workshop - Space Applications Institute, JRC, Ispra, Italy, 11-13/6/97* ■ *Workshop: Sea-Air Exchange : Processes and Modelling* - Kjeller (Oslo), Norway, 11-13/6/97.

**Erratum** - There was an error in the 'For your diary' in RTD Info No. 14. The third MAST and EURROMAR days were stated as being scheduled to be held in May '97. In fact, this event will take place next year, from 23 to 27 May 1998.

## Biotechnology

Fax : +32-2-299.18.60  
E-mail : life-biotech@dg12.cec.be  
EUROPA : biot1.html

**210 projects on the Internet** - Following the first two calls for proposals, background information on the 210 projects currently running (which represent Community funding of ECU 280 million) is available on the Internet.

**96 projects funded following the 3rd call for proposals** - Using bacteria to repair environmental damage, research into cellular vaccines for cancer, and the development of low-cost biosensing are just three of the new research themes chosen in March from almost 400 proposals received by the closing date of October 1996 (PR 24/3/97).

**Marie Curie Fellowships** - Of the 61 applications for fellowships received by 1 November 1996, 30 have been granted. This brings to 200 the number of fellowships (which are normally for a period of 2 years) that have been financed since March 1995, representing a total of ECU 15 million in fund-

ing. A list of companies eager to welcome fellows and their areas of research is now available on the Internet. Companies wishing to join the list are invited to send details.

**For your diary** - *European biotechnology for a sustainable society*, First Euro-Bio Congress, Amsterdam, the Netherlands 25-27/6/97 ■ *"Perspectives on protein engineering: challenges for structural biology"*, conference organised in the framework of the 1st meeting of the Structural Biology Platform, Norfolk (United Kingdom), 28/6-1/7/97 ■ *European Congress on Biotechnology: "Biotechnology at the dawn of the 3rd millennium"* Budapest (H), 17-21/8/97.

### Biomedicine and Health

Fax : +32-2-295.53.65  
E-mail : alain.vanvossel@dg12.cec.be  
EUROPA : biomed1.html

**125 projects funded** - The development of new therapies for AIDS, multiple sclerosis, Parkinson's disease, research into transmissible spongiform encephalopathies, and new European participation in the global "Human Genome" programme are among the new series of projects which will receive funding totalling ECU 87.5 million (PR 14/1/97).

### Agriculture and Fishing

Fax : +32-2-296.43.22  
EUROPA : agro1.html

**4th FAIR call for proposals: funding granted to 62 new agro-industrial projects** - Among those approved are: the development of new tests for the diagnosis of "Mad Cow" disease, research into "green" agrochemicals, safety in the food processing industry, and the creation of recyclable industrial products using biological resources. The funding totals ECU 59 million (PR 19/3/97).

**Publications** - *Artisanal European Cheeses* - EUR 16788 EN -

ISBN 92-827-7211-X ■ *Study of nutritional factors in food allergies and food tolerances* - EUR 16893 EN - ISBN 92-827-9554-3

### Non-Nuclear Energy (Joule)

Fax : +32-2-295.06.56  
EUROPA : joule1.html

**83 new projects funded** - 15 of these concern the rational use of energy, 41 renewable energy resources, and 27 fossil energy.

**Publications** - *Joule III - Synopses of projects 1995-96* - EUR 17356 EN - ISBN 92-827-9174-2 ■ *Joule II - Guidelines on specifications for the supply of medium-sized wind turbine generators* - EUR 16685 EN \* - ISBN 92-827-5657-2 ■ *Wind Turbine Noise* - EUR 16823 \* /Springer - ISBN 3-540-60592-4

### Task Force: The Car of Tomorrow

Fax : +32-2-299.18.47  
E-mail : eric.ponthieu@dg12.cec.be

**Publication** - Newsletter No. 3

### Nuclear Fission Safety

Fax : +32-2-296.62.56  
EUROPA : fission1.html  
**For your diary** - *Training Course: Radiation in Interventional Radiology*, Madrid, Spain 12-14/5/97 ■ *Actinides '97*, Baden-Baden (Germany), 21-26/9/97 - J. Fuger - ITU - Fax : +49-7247-951.354

**Publications** - *Evaluation of responsible elements for the effective engaged dose rates associated with the final storage of radioactive waste: EVEREST Project* - EUR 17122 EN - ISBN 92-827-8621-8 ■ *CHEMVAL 2: A coordinated research initiative for evaluating and enhancing chemical models in radiological risk assessment* - EUR 16909 EN - ISBN 92-827 8674-9

### Nuclear fusion

Fax : +32-2-296.42.52  
EUROPA : fusion1.html  
**Publication** - *Fusion Programme Evaluation* - EUR 17521 - ISBN 92-827-9325-7

### International Cooperation

Fax : 32-2-296.60.20  
E-mail : inco-desk@dg12.cec.be  
EUROPA : intco1.html

**Scientific and technological cooperation EU/South Africa** - Following the agreement signed last December, South African researchers now have access to all the EU's specific programmes (with the exception of nuclear) and vice versa (PR 10/12/96).

**Publications** - *Cooperation in technological research and development with developing countries and international organisations* - EUR 16971 FR \* - ISBN 92-827-8323-5 ■ *Evolution of R&D and integration between North African states* - EUR 16950 FR \* - ISBN 92-827-8555-66779-5

### Training and mobility of researchers

Fax : +32-2-296.32.70  
E-mail : tmr-info@dg12.cec.be  
EUROPA : tmr1.html

**The Hale-Bopp comet seen from the Canaries** : A team of European scientists has carried out a major series of research observations on the Hale-Bopp comet, during a stay at the European Northern-hemisphere Observatory in the Canaries. At the same installation, a second team of fellows has discovered the presence of previously unknown "Brown Dwarf" stars in the Pleiades constellation (PR 19/3/97).

**40 Euroconferences, 25 Summer schools, 4 practical training sessions...** : a list of some 193 events - of particular interest to young researchers, and supported by the TMR pro-

gramme has been approved. Project proposals for the next selection process must be submitted by 30 September 1997.

**For your diary** - *3rd Conference of Marie Curie Fellows*, organised by NORFA, Snekkersten, Denmark, 20-31/5/97

**Research networks Publications** - *Environmental Chemistry* - ISBN 92-827-9100-9 ■ *Envirotrace* - ISBN - 92-827-9101-7 ■ *Free-electron lasers* - ISBN 92-827-5442-1 ■ *European Network on Antibody Catalysis* 1993-95 - ISBN 92-827-7360-4

### Publication and exploitation of results

<http://www.cordis.lu/innovation/home.html>

**Publication** - *Innovation in Europe: a guide to the services of the Innovation Programme* - ISBN 92-827-5052-3

### SME Coordination Unit

Fax : +32-2-295 71 10  
E-mail : marc.van-achter@dg12.cec.be  
EUROPA : sme1.html

**Publication** - *Participation of SMEs in the 4th Framework Programme* ■

### Agenda of the next Research Council

The next meeting of research ministers is scheduled to be held in Brussels on 14 and 15 May 1997, under the presidency of the Dutch minister for economic affairs, Mr. Hans Wijers. The ministers responsible for research in the 10 Central and Eastern European countries which have signed association agreements with the EU have also been invited. Among the main subjects on the agenda are: the preparation of the Fifth Framework Programme, the Innovation Action Plan, and international research cooperation (see Internet : <http://www.cordis.lu/dutch/inter.html>)

# Ongoing/Upcoming calls for proposals

(from April 1997)

Programme (and main contacts)	Publication	Deadlines	Areas (and specific contacts)
<b>EDUCATIONAL SOFTWARE &amp; MULTIMEDIA</b> Contact: Fax: +32-2-299.37.38 E-mail: edu.mm@bxl.dg13.cec.be	17.12.96	16.6.97	Joint call on educational multimedia software: submission of final proposals (coordinated call involving: Information Technologies, Telematics Applications, Targeted Socio-Economic Research; Socrates, Leonardo da Vinci, Trans European Network Telecom).
<b>INFORMATION TECHNOLOGIES (ESPRIT)</b> Contact: Gerda Colling Fax: +32-2-296.83.88 E-mail: esprit@dg13.cec.be	15.3.97	15.4.97(*)	Call in 2 steps in various tasks of the following domains: technologies for components & subsystems; long term research; high performance computing & networking. (* )1st step deadline
	15.3.97	17.6.97	Call in various tasks of the following domains:- open microprocessor initiative; technologies for business processes; integration in manufacturing; IT for mobility; electronic commerce.
	15.3.97	16.9.97	Open call in various tasks of all domains.
	15.4.97	31.3.98	Open call: Intelligent Manufacturing Systems (jointly with the BRITE-EURAM programme). CONTACT : IMS Secretariat - Fax : +32-2-299.45.72
	17.12.96	16.6.97	Joint call on educational multimedia software: see Educational Software & Multimedia Task Force.
<b>TELEMATICS APPLICATIONS</b> Contact: Fax: +32-2-295.23.54 E-mail: telematics@dg13.cec.be	17.12.96	15.04.97	4th call covering all areas, except for Telematics Engineering.
	15.3.97	15.4.97(*)	Call in 2 steps in the following tasks: validation of the interconnection of national research networks up to 155Mbits; validation of access methods to advanced communication services; managing the network as a resource. (* )1st step deadline
	17.12.96	2.6.97	Call covering support actions, sub-sector 7: Integrated Applications for Digital Sites (IADS): submission of final proposals.
	17.12.96	16.6.97	Joint call on educational multimedia software: see Educational Software & Multimedia Task Force.
	15.9.95	15.4.97	Open call: support actions (awareness-boosting; dissemination of results & promotion of telematics; international cooperation; training).
<b>INDUSTRIAL &amp; MATERIALS TECHNOLOGIES (BRITE-EURAM III)</b> Contact: Fax: +32-2-295.80.46 / 296.70.23 E-mail: imt-helpdesk@dg12.cec.be	17.12.96	(see column 4)	3rd call : production technologies (area 1); materials & technologies for product innovation (area 2); technologies for transport measures (area 3). • Basic research linked to areas 1,2 & 3: closing date 30.4.97; • Industrial research in area 3: closing date 30.4.97; • Industrial research in areas 1and 2: closing date 15.9.97.
	15.4.97	31.3.98	Open call: Intelligent Manufacturing Systems (jointly with the ESPRIT programme). CONTACT : IMS Secretariat - Fax : +32-2-299.45.72
	15.12.95	17.12.97	Open call for thematic network projects (areas 1, 2, 3).
	15.12.95	20.5.98	Open call for support & accompanying measures.
	15.6.95	30.7.98	Open call for accompanying measures
<b>STANDARDS, MEASUREMENTS &amp; TESTING</b> Contact: Pierre Mériquet Fax: +32-2-295.80.72	17.12.96	15.5.97	Dedicated call (CEN, ETSI, CENELEC) in support to Community policies.
	17.6.97	27.11.97	



Programme (and main contacts)	Publication	Deadlines	Areas (and specific contacts)
	17.6.97	27.11.97	Call for research linked to written standards & technical support for commerce; measurements in the service of society.
<b>MARINE SCIENCE &amp; TECHNOLOGIES</b> <b>Contact:</b> • R&D: Martin Bohle-Carbonell • PME: Christos Fragakis • Formation: Elisabeth Lipiatou Fax: +32-2-296.30.24 E-mail: mast-info@dg12.cec.be	15.3.96	27.6.97 12.6.98	Concerted actions (27.6.97) / Preparatory accompanying & support measures (12.6.98): Areas: standards for training & work; modelling; ocean data management & quality control for research & operational applications; use of heavy experimental equipment, research vessels & their modular equipment, large computing facilities & other technical resources in the European Economic Area; design of components & systems for heavy advanced equipment; calibration techniques & standards for marine instrumentation & observational equipment.
<b>BIOTECHNOLOGY</b> <b>Contact:</b> R&D: Alfredo Aguilar Fax: +32-2-299.18.60 Demonstration: Fax: +32-2-295.53.65 ELSA: José Elizalde Fax: +32-2-296.05.40 E-mail: life-biotech@dg12.cec.be	15.6.97	September 97	Calls in the following areas: cell factories; genome sequencing; animal biotechnology; cell communications in neurosciences; transdisease vaccinology; structure/function relationships; bio-safety; biodiversity; infrastructures; horizontal activities. Demonstration projects in all areas.
	17.12.96	15.9.97 15.3.98 15.9.98	Advanced practical workshops <i>CONTACT: Andreas Klepsch - Fax: +32-2-299.18.60</i>
<b>AGRICULTURE &amp; FISHERIES</b> <b>Contact:</b> Xavier Goenaga Fax: +32-2-296.43.22 Demonstration: Fax: +32-2-295.53.65	15.9.97	15.12.97	Call in the following areas: generic science & advanced technologies for nutritious foods; agriculture; forestry & rural development; fishing & fish farming.
	15.12.94	11.6.97	Preparatory, accompanying & support measures <i>CONTACT: Xavier Goenaga - Fax: +32-2-296.43.22</i>
<b>NON-NUCLEAR ENERGY (JOULE component) R&amp;D Projects</b> <b>Contact:</b> (see column 4)	17.1.97	6.5.97	R&D shared cost actions: rational use of energy in buildings, all renewable energies (except hydroelectric power), clean technologies for solid fuels. <i>CONTACT: Michel Poireau - Fax: +32-2-295.06.56</i>
	15.12.94	17.12.97	Open call: preparatory, accompanying & support measures. <i>CONTACT: Priscila Fernandez-Canadas &amp; Massimiliano Dragoni - Fax: +32-2-295.69.95</i>
<b>NON-NUCLEAR ENERGY (THERMIE component) Demonstration projects</b> <b>Contact:</b> Wiepke Folkertsma Fax: +32-2-295.05.77	15.12.94	17.12.97	Call in the following areas: energy RTD strategy (rational use of energy, renewable energies, fossil fuels); dissemination of energy technologies (international cooperation, information & communication tools); preparatory, accompanying & support measures (financial instruments, environmental impact of energy technologies); technology stimulation measures for SMEs; exploratory phase of demonstration projects for SMEs.
	15.9.97	(to be confirmed)	Call for targeted type A demonstration projects (rational use of energy, renewable energies, fossil fuels).
<b>NUCLEAR FISSION SAFETY</b> <b>Contact:</b> Rainer Simon Fax: +32-2-295.49.91	17.1.95	1.11.97	Concerted actions.
<b>TARGETED SOCIO-ECONOMIC RESEARCH</b> <b>Contact:</b> Stephen Parker Fax: +32-2-296.21.37 E-mail: tser-secr@dg12.cec.be	September 97 (to be confirmed)	December 97 (to be confirmed)	Science & technology policy options; research into education & training; research into social integration & exclusion (only in certain areas).
	17.12.96	16.6.97	Joint call on educational multimedia software: see <i>Educational Software &amp; Multimedia Task Force</i> .
<b>INTERNATIONAL COOPERATION</b> <b>Contact:</b> (see column 4)	15.2.95	1.3.98	Grants (Japan, Korea). <i>CONTACT: Louis Bellemin - Fax: +32-2-296.98.24</i>
	15.4.97	11.9.97	Science & technology cooperation with developing countries. <i>CONTACT: Timothy Hall - Fax: +32-2-296.62.52</i>
	15.4.97	10.10.97	Inco-Copernicus (CEC-NIS) <i>CONTACT: Rudolf Meijer - Fax: +32-2-296.33.08</i>
<b>DISSEMINATION &amp; EXPLOITATION OF RESULTS</b> <b>Contact:</b> (see column 4)	15.6.97	15.9.97	• European networks & services of technology transfer & innovation support. • European Innovation Monitoring System. • Regional actions <i>CONTACT: Robin Miège - Fax: +352-4301-33389</i>

Programme (and main contacts)	Publication	Deadlines	Areas (and specific contacts)
	15.9.97	15.12.97	Increasing public awareness (transfer of best practices) <i>CONTACT: Mario Bellardini - Fax: +352-4301-34983</i>
<b>TRAINING &amp; MOBILITY OF RESEARCHERS</b>	15.3.97 16.9.97	16.6.97 15.12.97	Marie Curie Research Training Grants (post-graduate, post doctoral & return grants).
<b>Contact:</b> Jürgen Rosenbaum Fax: +32-2-296.32.70 E-mail: <a href="mailto:tmr-info@dg12.cec.be">tmr-info@dg12.cec.be</a> <a href="http://www.cordis.lu/tmr/home.html">http://www.cordis.lu/tmr/home.html</a>	15.3.97	16.6.97	Access to large-scale facilities.
	16.6.97 15.12.97	30.9.97 31.3.98	Euroconferences, summer schools & practical training courses.
<b>MEASURES FOR SMEs</b>	15.12.94	11.6.97(*) 8.4.98(**)	Technology stimulation measures for SMEs in the programmes: Industrial & materials technology; standards, measurements & testing; environment & climate; marine sciences & technology; biomedicine & health; agriculture & fisheries; non-nuclear energy. • Exploratory awards(*). • Cooperative research(**).
<b>Contact:</b> Giorgio Clarotti Fax: +32-2-295.71.10 E-mail: <a href="mailto:marc.vanachter@dg12.cec.be">marc.vanachter@dg12.cec.be</a>			

## Technology stimulation measures for SMEs:

- Exploratory awards (\*); - Cooperative research (\*\*).

Programme (and main contacts)	Publication	Deadlines	Areas (and specific contacts)
<b>INDUSTRIAL &amp; MATERIALS TECHNOLOGIES</b>	15.12.94	11.6.97 (*) 8.4.98(**)	<i>CONTACT: Klaus Kögler - Fax: +32-2-299.46.35 E-mail: <a href="mailto:imt-helpdesk@dg12.cec.be">imt-helpdesk@dg12.cec.be</a></i>
<b>STANDARDS, MEASUREMENTS &amp; TESTING</b>	15.12.94	11.6.97 (*) 8.4.98(**)	<i>CONTACT: Enma Calvet - Fax: +32-2-295.80.72</i>
<b>ENVIRONMENT &amp; CLIMATE</b>	17.1.95	11.6.97 (*) 1.4.98 (**)	<i>CONTACT: Jitka Vennekens / E-mail: <a href="mailto:jitka.vennekens@dg12.cec.be">jitka.vennekens@dg12.cec.be</a></i>
<b>MARINE SCIENCE &amp; TECHNOLOGIES</b>	15.12.94	11.6.97 (*) 8.4.98 (**)	<i>CONTACT: Christos Fragakis - Fax: +32-2-296.30.24 E-mail: <a href="mailto:mast-info@dg12.cec.be">mast-info@dg12.cec.be</a></i>
<b>BIOMEDICINE &amp; HEALTH</b>	17.1.95	11.6.97 (*) 8.4.98 (**)	<i>CONTACT: Viviane Thevenin - Fax: +32-2-295.53.65</i>
<b>AGRICULTURE &amp; FISHERIES</b>	15.12.94	11.6.97 (*) 8.4.98 (**)	<i>CONTACT: Xavier Goenaga - Fax: +32-2-296.43.22</i>
<b>NON-NUCLEAR ENERGY (JOULE component) R&amp;D Projects</b>	15.12.94	11.6.97 (*) 8.4.98 (**)	<i>NB : Exploratory awards only for cooperative research projects. CONTACT: Ingrid Tenten - Fax: +32-2-299.18.47</i>
<b>NON-NUCLEAR ENERGY (thermic component: demonstration projects)</b>	15.12.94	17.12.97	<i>Exploratory phase of demonstration projects CONTACT : Wiepke Folkertsma</i>

## Marie Curie Research Training Grants

Post-graduate, post doctoral & return grants in all areas of the following programme  
INFORMATION ON INTERNET: <http://www.cordis.lu/tmr/home.html>

Programme (and main contacts)	Publication	Deadlines	Areas (and specific contacts)
<b>INDUSTRIAL &amp; MATERIALS TECHNOLOGIES</b>		1.6.97	<i>CONTACT: Fax: +32-2-295.80.46 / 296.70.23 / E-mail: <a href="mailto:imt-helpdesk@dg12.cec.be">imt-helpdesk@dg12.cec.be</a></i>
<b>ENVIRONMENT &amp; CLIMATE</b>	15.12.95	20.8.97 20.3.98 20.8.98	<i>CONTACT: Angel Arribas San Martin / E-mail: <a href="mailto:angel.arribas@dg12.cec.be">angel.arribas@dg12.cec.be</a></i>
<b>MARINE SCIENCE &amp; TECHNOLOGIES</b>	17.12.96	20.8.97	<i>CONTACT: Elisabeth Lipiatou / Fax: +32-2-296.30.24 / E-mail: <a href="mailto:mast-info@dg12.cec.be">mast-info@dg12.cec.be</a></i>
<b>BIOTECHNOLOGY</b>	15.6.96	1.7.97 1.11.97 1.3.98 1.7.98	<i>CONTACT: Alessio Vassarotti / Fax: +32-2-299.18.60 E-mail: <a href="mailto:life-biotech@dg12.cec.be">life-biotech@dg12.cec.be</a></i>
<b>BIOMEDICINE &amp; HEALTH</b>	17.1.95	31.12.97	<i>CONTACT: Alain Vanvossel / Fax: +32-2-295.53.65 E-mail: <a href="mailto:alain.vanvossel@dg12.cec.be">alain.vanvossel@dg12.cec.be</a></i>
<b>NON-NUCLEAR ENERGY (JOULE component) R&amp;D Projects</b>	15.6.96	1.7.98	<i>CONTACT: Ingrid Tenten / Fax: +32-2-299.18.47</i>



# Energy: priority for sustainable development

*On 17 January 1997, the JOULE component of the RTD Non-Nuclear Energy Programme (NNE) launched its final call for proposals under the 4th Framework Programme. This call, which closes on 6 May, is mainly concerned with research into renewable energies. The available financing could reach ECU 100 million. In the next few pages, we turn the spotlight on a strategy which reflects the European Union's desire to meet the challenges of sustainable development.*

## The three fundamentals for a European energy strategy

*The European Union's RTD strategy in the field of non-nuclear energy revolves around three central concerns : security of supply, environmental protection, and the rational use of energy. Three concerns which are inextricably linked.*

### 1. Security of supply

Europe's present energy vulnerability is completely different in nature from the oil crises of the 1970s. The oil and natural gas deposits of the North Sea and the Netherlands have been extensively exploited over these past 25 years. Nuclear power stations have also supplied a steadily increasing share of electricity consumption. With the growing exploitation of newly discovered oil deposits throughout the world, we have also seen a marked diversification in the geographical origin of non-EU deposits.

Yet, despite these developments, European dependence on energy imports remains

high - around 50% at present. At the same time, there is every indication that the energy consumption of European countries is going to increase, as it is doing in the world's other industrialised regions. Even more markedly, the continued growth in world energy demands due to the mainly unsatisfied needs of a large

part of humanity will exert increasing pressure on the Earth's limited oil resources. European energy policy must therefore ensure a balanced and sufficiently open diversification of energy sources.

The Union still possesses significant coal reserves, and this is even more the case for the Central and Eastern European



*Clean technologies may open a new future for coal*



*Energy production from renewable resources, historically under utilised in Europe, will double by the year 2010.*



countries with which it is now establishing closer links.

Another major potential source of supply is the family of renewable energies, and most importantly wind and solar power, energy from biomass and waste, and geothermal energy.

With the sole exception of hydroelectricity, none of these energy sources has yet reached a mature stage of development. Considerable investment in research and demonstration is necessary if greater benefit is to be drawn from these renewable energy sources, both in industrialised countries and world-wide. As they offer inexhaustible supplies - and thus correspond perfectly to meet the objective of sustainable development - these energy sources are of major importance for the future.

## 2. Protecting the environment

Meeting the environmental challenges resulting from energy demand at the European and global level is the second strand to Europe's RTD strategy in the energy field. Here, too, the objective is sustainable development. Mankind is now coming to realise that its activities are growing at a rate that may lead to increasingly disturbing changes, not only in the

immediate daily environment, but also on a global and planetary level.

Emissions into the atmosphere caused by energy consumption - and CO<sub>2</sub> emissions in particular, which are blamed for global warming - are one of the main causes of these changes. Research to develop new energy systems that are clean and efficient is therefore crucial. Although a number of energy sources

are involved, the inherently non-polluting nature of certain renewable energy sources (such as solar and wind power) justifies increased efforts to develop them.

## 3. The rational use of energy

The third priority is totally in keeping with the first two. The rational use of energy, whatever its origin, saves resources and reduces pollution.

However, the economic and social implications of energy management are equally important. In the context of keen competition between different energy sources, reducing the price of energy gives it a decisive advantage on the market and benefits users. An economically efficient European energy sector has a positive impact on the standard of living and quality of life



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of the general public, industrial competitiveness and, at the end of the day, the job market. ■

*Energy management, the key to sustainable development.*

## Objective 2010 : doubling Europe's use of renewable energies.

The priority given to research into renewable energy sources would be of little value if it were not also part of a more general drive to mobilise all those involved in energy policy.

This is the aim of the wide-ranging open debate launched by the European Commission which, in November 1996, published a new Green Paper entitled "Energies for the future : renewable energy sources"<sup>(1)</sup>. The point of departure is clear : "Renewable energy sources are at present unequally and insufficiently used in the European Union. Despite their considerable potential, they account for a low and disappointing 6% of the gross domestic energy consumption."

Such a situation calls for an ambitious and realistic goal, namely to double the use of these energies by the year 2010. To achieve this, the Commission will be holding a series of meetings throughout 1997 with all the players in Europe's energy policy. It will then use the conclusions reached as a basis for increasing co-operation between Member States in this field - some are already pursuing a very dynamic policy to promote renewable energy sources - and for involving all Community policies able to contribute to achieving this goal, such as RTD and energy, agriculture, regional and fiscal policy, the internal market, foreign affairs, etc.

(1) Reference : COM(96) 576 final

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# Wind, sun and life

## Wind power

It was certainly the European countries with a long tradition of harnessing wind power, such as Denmark, the Netherlands, Germany and Greece, which contributed most significantly to the renewal of interest in this source of energy in the wake of the oil crises of the 1970s. With more than 3,000 megawatts installed power, the Union currently possesses more than half the world's total wind-power production capacity. 90% of manufacturers of the mechanical and electrical equipment used in wind-parks are based in Europe and the sector as a whole employs almost 20,000 people.

There has been considerable technological development in this field, to which the JOULE and THERMIE components have made a major contribution, especially in developing high-power wind-parks through two successive programmes, WEGA I and II (Wind Energy Groß-Anlagen). During the WEGA II phase, five plants of between 750 and 1,500 kW were built in the framework of the JOULE programme and four other installations were started up for demonstration purposes with the help of THERMIE. The research concentrated and continues to concentrate mainly on the aerody-

namics of machines and their weight reduction, the resistance to wear of components, reducing noise pollution, power control, integration into electricity distribution networks, etc. The commercial performances of the major wind-parks now reach competitive levels compared with other forms of energy. The



A PV power plant in Sweden

price per installed kilowatt is less than ECU 900 and the cost per kilowatt hour of electricity consumed is ECU 0.05.

The research and demonstration efforts in the field of wind power remain an important feature of the present NNE programme. As the energy market becomes increasingly open to the private sector so new opportunities present themselves, at both European and international level, for increased use of this renewable and

intrinsically clean resource. It is one way of allowing European industry to retain its technological lead.

## Photo-voltaic solar energy

The support of European RTD programmes in the photo-voltaic (PV) solar energy sector has actively sup-

porting capacity of no more than 350 MW and European production is around 25 MWh per year (25% of global production). Europe's most profitable applications are in supplying decentralised energy needs, such as the electrification of individual homes in rural areas or supplying isolated autonomous systems (motorway telephones). Over the past few years PV systems have been incorporated in buildings (facades, roofs) and linked up to electricity distribution networks. This application is widely covered by the NNE programme.

With the support of JOULE, European RTD has obtained excellent results in improving the efficiency and reliability of solar cells. New manufacturing processes (thin films, continuous production) have been developed, leading to a considerable reduction in the costs of solar panels, thereby making PV energy more accessible. The JOULE programme also supports innovative research into other PV system components (batteries, regulators, converters). A number of projects are devoted to pre-normative research with the aim of helping to standardise new PV products in order to improve their penetration in the energy market, particularly in the construction sector.

plemented the efforts of the individual Member States and industry. It has helped, for example, to reduce by a factor of 10 the cost of energy produced by this relatively young technology (launched industrially in the 1970s) which today employs some 8,000 people in Europe.

Despite strong growth (around 20% a year), the PV market remains comparatively modest when compared with present energy consumption. World-wide, PV installations have a gen-



Downstream of RTD, THERMIE demonstration projects have shown the world the efficiency of a high-power PV plant (1 MW), such as the one in Toledo (Spain), and the real potential offered by the use of collectors that concentrate solar energy on the smaller surfaces of high-performance solar cells. At the same time, several projects are working on the production of PV energy below 1MW, adapted to particularly decentralised uses.

### Solar thermal energy

In Europe, it is mainly thanks to extensive co-operation between Spain and Germany that the various thermal solar energy technologies have been developed (see box on opposite page). It is this cooperation that resulted in the imposing Plataforma Solar de Almería, Europe's main test and demonstration site for the large-scale production of electricity of solar thermal origin.

To date largely experimental, this renewable energy source still faces the problem of competitiveness: the cost per kWh generally remains twice that of a fossil fuel plant. JOULE is at present supporting technological validation projects for new processes and new components of solar thermal plants. The aim is to increase the reliability of energy supply and reduce costs by obtaining higher operating temperatures. This is possible by combining di-



*Parabolic mirrors concentrate the sun's rays in the centre of the dish*

rect solar heating from the steam with additional heating from fossil fuels.

In a strictly European perspective, solar thermal systems are only a viable proposition in southern countries. However, close to Europe, the Mediterranean basin countries, together with the Near and Middle East, are increasingly interested in this renewable and non-polluting energy source. It is this potential for international development which is the present focus of European research, backed up by a major demonstration effort. THERMIE is at present considering, for

example, providing financial aid for the construction of two pilot plants in Spain and Crete. A study is also under way for the construction of a site in Morocco in the framework of EU co-operation with southern Mediterranean countries.

### Bio-energy

European R&D in the field of bio-energy has led to significant progress over the past 20 years or so. One major application in particular has become increasingly widespread, both in areas with a high population density which produce a high volume of waste and in ru-

ral and remote areas : the combined production of heat and electricity from bio-gases or solid fuels including coal and biomass waste. Another area of application is developing in the manufacture of bio-diesel fuels and ethanol derivatives for internal combustion engines.

This research is equally vital in bringing a number of technological advances to maturity and exploring new methods of biomass conversion. Within the JOULE programme, there are a number of R&D projects seeking, for example, to increase the sustainable use of biomass for electricity production and fuel manufacture by developing thermo-chemical conversion. The emphasis is on solid fuels and especially on bio-energy coming from forestry and agriculture. This gives Europe's rural communities the opportunity to develop an alternative or complementary activity which could generate new jobs in outlying areas, while also being particularly beneficial in environmental terms <sup>(1)</sup>. ■

*(1) In addition to the research conducted into the energy aspects of biomass within the JOULE-THERMIE programme, a number of R&D and demonstration projects are also being conducted under the FAIR programme, notably on the biochemical processes of fermentation, esterification, digestion and hydrolysis.*



*The exploitation of bioenergy from forestry and agriculture. A potential source for job creation in outlying areas.*

## Three solar thermal technologies

Extremely high temperatures can be produced by using mirrors to concentrate solar energy. This then makes it possible to heat a fluid able to turn an electricity-generating turbine. Three technologies are used :

- longitudinal parabolic mirrors which concentrate the sun's rays on a trough in the centre of the dish;
- mirrors in the form of parabolic dishes where the heating occurs at the focal point;
- banks of flat mirrors (heliostats) set at an angle which concentrate radiation on a central receiver placed at the top of a tower; this system produces the most power.

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# From the laboratory to the marketplace

*Under the 4th Framework Programme for Community RTD (1994-1998), the non-nuclear energy research budget amounts to ECU 1,030 million <sup>(1)</sup>. This funding is allocated to two distinct but highly complementary components :*

- RTD projects launched under the JOULE component of the Non-Nuclear Energy programme (NNE, managed by DG XII), which receive approximately ECU 460 million;
- projects specifically concerned with the demonstration of technologies, placed under the aegis of the THERMIE component of the NNE Programme (managed by DG XVII), with a budget of ECU 570 million.

**B**rought together for the first time under a single heading, the JOULE and THERMIE components of the Non-Nuclear Energy (NNE) programme are merged in a joint Research, Technological Development and Demonstration (RTD&D) action. The link between these two compo-

<sup>(1)</sup> More than 8% of the 4th Framework Programme's total budget.

nents is, in fact, essential in a sector where there are so many energy sources and production methods in constant competition. In order to gain market share, the results of scientific and technological progress must be practically demonstrated in "full scale" systems in order to convince potential users of the real efficiency and profitability of applications.


In most cases, the association of the two areas of research and demonstration is reflected in joint calls for proposals on common subjects.

### Four RTD topics

Within the NNE programme, RTD projects (JOULE component) concentrate on three priorities -

security of supply, environmental protection and the rational use of energy - which form the basis of European energy policy (see article on page 19). The projects are structured around four core topics :

#### 1. RTD energy strategy

Energy production, distribution, and use, 



and related technologies, stand in a complex relationship with economic growth, the quality of life, and environmental issues, on global, regional and local levels. RTD projects launched in such a context must help the European Union take all these dimensions into account when formulating a continuous and coherent policy for energy.

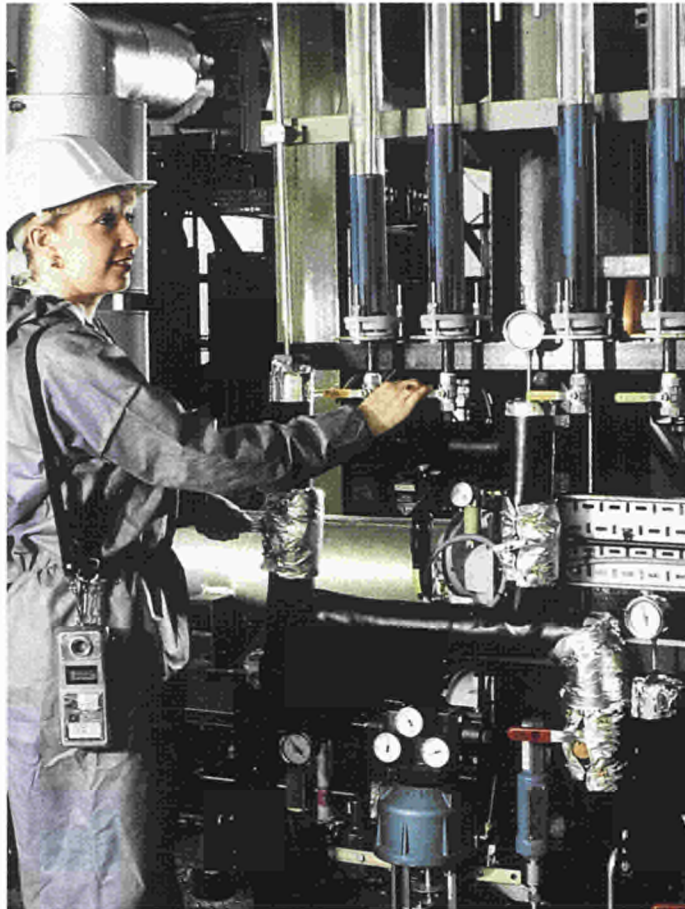
## 2. The rational use of energy (RUE)

Whether in terms of preserving resources, protecting the environment (reduction of polluting emissions and CO<sub>2</sub> in particular) or economic competitiveness, research devoted to creating a better use of energy is more relevant today than ever before. JOULE supports projects for the development of a rational use of energy in construction, industrial processes, in the energy industry itself - especially the high-tech area of fuel cells - and in the transport sector. In this way JOULE is significantly contributing to realising the objectives of the "Car of Tomorrow" Task Force in developing a vehicle which is both clean and competitive.

Finally, we should not forget that the RUE sector also includes promising technologies for the commercial use of renewable energies.

## 3. The development of renewable energies

Given the need for sustainable development, the increased use of renewable energies has been a priority



*A pilot project developed by British Coal Corporation under a Community research project on coal/biomass co-gasification.*

objective for the European Union for a number of years already. These types of energy are under-exploited both in Europe and worldwide. They consequently represent one of the major components of the Union's RTD strategy.

When adopting the programme, the Council of Ministers and the European Parliament expressed the wish that more than half - 58.6% to be precise - of RTD awards in the non-nuclear energy sector be granted to renewable energy projects. A number of fields are of particular interest: thermal solar and photo-voltaic energy, wind power, energy from biomass

and waste, geothermal energy, and the applications of renewable energies in construction and storage. A more general area is the market integration and penetration of renewable energies.

## 4. Fossil fuels

Fossil fuels (natural gas, oil and, to a lesser extent, coal) still meet more than 80% of the European Union's energy requirements. Despite increased use of alternatives, this type of supply will continue to dominate for a long time to come, especially with Europe's abundant coal deposits.

However, the use of these

fuels raises the increasingly critical problem of atmospheric emissions, where oxides of sulphur and nitrogen harm the environment locally, and CO<sub>2</sub> globally. It is thus essential to maintain a sustained RTD&D effort to reduce these emissions and improve the use of fossil fuel resources. JOULE supports projects in the field of solid fuels and improved exploration and production procedures for hydrocarbons. A specific component is devoted to developing ways of reducing pollution caused by road transport, through new fuels for example. ■

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# The utility of launching targeted calls

*The first JOULE call for proposals taught us a great deal about how to improve the quality of proposals and reduce the frustration of participants. Mr Ezio Andreta, Director of RTD Energy actions at DG XII, advocates increased use of targeted calls aimed at strategic objectives. An avenue to be pursued for the 5th Framework Programme?*

[Mr Ezio Andreta, Director of RTD Energy actions at DG XII]

“ Targeted calls improve the global quality of the proposals ”

**W**hen deciding to give priority to financing RTD on renewable energies under the 4th Framework Programme, the European Union made a definite choice for a lasting energy strategy. But did the European scientific and industrial world respond positively to this impetus?

■ **Ezio Andreta** : The first JOULE call for proposals, launched in December 1994 and closed five months later, was an initial test from which we learned a great deal. We received a very high number of proposals in the field of renewable energies, to which we had been instructed to allocate 58.6% of the total available budget. But of these 500 or more proposals, fewer than 100 satisfied the quality criteria and finally received Community support. As a result, out of the ECU 200 million committed following the call for proposals, less than the target 58.6% was allocated to this area.

**How do you explain this abundance of project proposals which finally resulted in a disappointing selection?**

It was probably because the scientific and industrial community active in the field of renewable energies was not used to such resources being available for RTD in this sector. We should remember that this remains a relatively small community in Europe. We noticed two major failings. First of all, there was insufficient participation by motivated industrial partners able to provide the opportunity to act on the results of research. Secondly, the subjects of research were too wide-ranging, probably because the call failed to concentrate on well-defined RTD priorities.

**What lessons have you learned from this experience ?**

Two lessons. On the one hand, an appreciation of

just how difficult it is to organise and manage major calls for proposals covering all areas of a programme and, on the other hand, the need to provide participants with more information on the programme's objectives and the rules of participation. In order to correct the first point, a supplementary call, which was very clearly targeted at renewable energies, was launched in December 1995. The plan at the start of the 4th Framework Programme had been to launch no more than two calls covering the work programme in its entirety. However, this additional proposal brought a response to match our efforts: out of the 121 proposals received, 51 projects - making a success rate of 41% - were accepted for Community aid totalling ECU 39 million. Companies were involved in nearly all these projects and accounted for 50% of the partners, among them many SMEs. This means that of the ECU 246 million to date allocated by JOULE,

ECU 140 million has gone to renewable energies.

In regard to the second point, we felt it essential to make participants more aware of the evaluation criteria. We have therefore published practical guides to help candidates draw up their calls so that they can evaluate for themselves to what extent they meet the selection criteria. Before investing time and money in preparing a project, participants have the option of testing the validity of a pre-proposal with the Commission. Finally, the JOULE programme managers held "information days" in all the Member States in order to explain the procedures and aims of the Community action to interested scientists and industrialists.

By providing increased information and targeting actions in this way we were able to correct the situation rapidly. In particular, we were able to increase the overall success rate substantially and managed to include a very significant percentage of newcomers - industrial partners in particular.

**What is the point of launching calls for proposals which are lim-**

EST



### ited in scope to certain technological subjects?

It is important to realise just how much the use of targeted calls can improve the management of RTD programmes. This type of call allows you to achieve greater success rates, thus creating less frustration among participants, while at the same time improving the overall quality of proposals. In addition, the cost of managing such calls is much lower than for wider

calls. In the present context, where the need for flexibility is seen as a major necessity, restricted calls focused on certain strategic objectives are perhaps an option to be taken up by the 5th Framework Programme.

### How is the programme developing at the moment?

In September 1996 we launched a new call focusing on priority subjects concerning the four sectors of the RTD programme, includ-

ing three subjects on renewable energies <sup>(1)</sup>. Of the 249 proposals received, no fewer than 50% were from newcomers. Also, given the budget available, the success rate should be very satisfactory, with around one proposal in three being accepted.

Finally, renewable energies are the main ingredient of the last JOULE call for proposals of the 4th Framework Programme which was launched on 17 January and

closes on 6 May 1997. We have high hopes for this call as it has a provisional budget of around ECU 100 million. ■

*(1) Editor's note : Renewable energies in buildings, the energy of biomass and waste, energy storage and other options.*

## JOULE : specific support for SMEs and training

*In addition to the "traditional" RTD projects, there are two other kinds of support measures on offer. One is designed to encourage the participation of SMEs in RTD projects and the other, through the Marie Curie research grants, seeks to promote the training and mobility of researchers.*

There is an "open" and continuous call for technology stimulation measures for SMEs, with evaluations approximately every four months. This support can be in the form of:

- 1) exploratory phase awards allowing SMEs to finance the costs of preparing and launching an RTD project. Upon completion of this stage, the SMEs in question can then request support in the framework of a call for proposals for traditional projects (of the collaborative type), or for cooperative projects (see point 2);
- 2) support for cooperative research projects (CRAFT actions). This formula allows groups of SMEs with insufficient research resources of their own to commission university research laboratories or research centres to carry out RTD activities for them.

Five per cent of the programme's total allocations - which means ECU 22 million - is in principle reserved for technology stimulation measures for SMEs.

Following the five evaluations already carried out (the most recent being in October 1996), 17 proposals for exploratory phase awards (out of 38 received) have been approved. To date, just one cooperative research proposal has been submitted and accepted.

"These participation figures are too low", stresses Ezio Andreta, director of RTD Energy actions. "By the year 1998, the funds available could allow us to finance at least 40 exploratory awards and

between 10 and 20 co-operative research projects. The JOULE NNE "contact points", set up in all Member States, are being used in order to increase awareness and help SMEs make the most of the opportunities available to launch RTD projects in the energy field."

The upcoming dates for submitting applications are given in the ongoing/upcoming calls section on page 16.

### JOULE training grants

Since 1996 and in cooperation with the Training and Mobility of Researchers (TMR) programme, Marie Curie grants have been awarded specifically for research in the field of energy. Awarded for periods of 12 to 24 months, the recipients are post or pre-doctorate students interested in training, preferably within the programme's RTD projects or otherwise in close cooperation with them.

A total of 13 grants were awarded following the evaluation of the 14 applications received for the first time in September 1996. You will find the next deadlines for submitting applications in our ongoing/upcoming calls section on page 18.

\* The last call for proposals of this kind expires on 6 May 1997.

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# Research gets to grips with youth

*Sociological research into the economic, social and cultural problems facing young people is insufficient and lacks a European dimension. To bridge this gap, in 1995, the "Youth for Europe" programme, coordinated by DG XXII, added "studies" to its other activities. Two calls for project proposals have already been published; a further call is scheduled soon.*

**T**he European Union has 60 million inhabitants under the age of 25, constituting a social group with a specific identity. Regardless of frontiers, young people share common educational needs, cultural aspirations, and consumer behaviour. They are in the front line when facing the problems of changes in technology and employment. They are also capable of taking initiatives that reveal a great potential for generosity and creativity.

In many cases, these initiatives could serve as models in society's search for new strategies in the battle against unemployment, social exclusion, and racism. These actions are dynamic, numerous, and spontaneous, but their effectiveness is often limited by a lack of theoretical background or reference to a global strategic plan.

Sociological research into the world of youth has, generally speaking, been slow in coming compared with that on other social problems. Some study work has been undertaken on the problems of this social group, in support of the various policies initiated on behalf of young people in the Member States, but where they exist,



these studies suffer from a lack of cooperation at the European level. Research partnerships are occasionally formed, but the co-operation tends to be confined to neighbouring Latin or Germanic geographical zones. Yet the customs and cultures of Europe's youth differ greatly from north to south, and deserve to be better known and shared.

## **Studies to develop policies**

Responding to this need, in 1995 a new Studies section was added to the "Youth for Europe" programme, which enables the European Commission's Directorate General for Youth, Education and Training (DG XXII) to fund research

projects dedicated to analysing the realities of the world of young people. The budget available is certainly modest (about ECU 500,000 per annum), but by selecting quality projects, it should get things moving. These studies should serve to stimulate policies within Member States and guide the Commission in adopting its various initiatives.

For this reason, priority within this new section of the "Youth for Europe" programme has been given to information and the dissemination of the studies' results. Thus, among the important criteria for obtaining Community financial support, project proposers must indicate precisely how information will be communicated to governmental or

non-governmental organisations concerned with young people.

## **Sensitive questions**

Launched in 1995 and 1996, the first two calls for projects enabled the Commission, assisted by a scientific committee, to grant support to a total of 29 research projects. The principal themes concentrate on such highly sensitive questions as:

- the phenomenon of the "new poverty" affecting increasing numbers of young people;
- the sources of discrimination (and their eradication) to which young immigrants (in particular young women) fall victim;
- the issue of the sense of unity which needs to be established between different generations.

It would be premature to draw conclusions from this research, some of which is still under way. A new project call should be launched within the next few months. ■

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# More reliable diagnostic kits

*Following an agreement concluded with the International Federation of Clinical Chemistry, the JRC's Institute for Reference Materials and Measurements is now responsible for the certification, at the European level, of reference biomedical materials used for diagnostic kits.*

**H**ospitals and laboratories are using an increasing number of diagnostic test kits. These "ready to use" analytical devices make it possible to verify diagnostic information about a patient's condition quickly, simply, inexpensively, and with a minimum margin of error. Capable of replacing more complicated analyses, they are making a contribution to improved treatments and the overall management of health care.

Produced by pharmaceutical companies and clinical laboratories, these kits use an increasing number of reference biomedical materials (see inset), which must have strictly defined properties to enable standardised calibration of the test systems.



*Researchers at the IRMM have some 30 years experience in the field of manufacture and certification.*

sion and the International Federation of Clinical Chemistry (IFCC). For Commissioner Edith Cresson, such an initiative will confirm "the enlargement of the Commission's role in the scientific field and the recognition of an independent scientific capacity at the European level."

## **Urgent needs**

Researchers at the IRMM have some 30 years experience in the field of manufacture and certification. In 1996, the Institute sold some 8,500 reference materials worth ECU 1.2 million (see inset).

This activity will develop further, given the new synergies set up with the IFCC. Grouping together 70 laboratories and research organisations (in the fields of clinical chemistry, clinical biochemistry, clinical pathology, etc.), this association also covers 40 commercial companies producing testing

systems. For its president, Professor Siest, "There is, world-wide, an urgent and growing need to have efficient, certified biomedical reference materials, to support public health programmes." This new accord should, among other things, make it possible to respond quickly to demands for new chemical techniques which are being increasingly used in laboratory medicine, notably in the domain of biomedicine and molecular pathology. ■

## **The IRMM, specialist in cutting-edge biomaterials**

At the present time, the IRMM provides a very wide range of certified reference biomedical materials. In particular:

- proteinic plasmas and serums used for blood coagulation tests or for detecting lipid anomalies, various cancers, infections, certain forms of diabetes and cases of anaemia;
- enzymes used for detecting hepatic, cardiac or pancreatic pathologies, cerebrovascular accidents, prostate cancer;
- hormones for pregnancy or fertility tests and the treatment of endocrine pathologies;
- electrolytes and metabolites (blood, serum) used in screening for heavy metal intoxication, diagnosing cardiac, neurological and renal functions or bone metabolism, monitoring the treatment of manic-depressive psychoses.

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## **European Certification**

To guarantee reliability, these standard bio-materials must be "certified" by an internationally recognised, high-level, independent organisation. Only a validation of this kind can ensure that measurements carried out by different methods and laboratories will lead to comparable results - indispensable for epidemiological and toxicological studies.

The Institute for Reference Materials and Measurements (IRMM) of the Joint Research Centre, located in Geel (Belgium), is now responsible, at the European level, for the certification of these biomedical materials. This choice is in answer to the desire to harmonise and raise health care standards in Europe. It was given concrete form last October by the signing of an agreement between the European Commis-

# Transuranium technology at the cutting edge of the battle against cancer

*In partnership with the Institute for Transuranium Elements (ITU) at Karlsruhe, two medical teams – one American, one French – are currently carrying out the first tests for the treatment of leukaemia and bone-marrow cancers by alpha radio-immunotherapy.*

**M**ethods for treating localised cancers using conventional radiotherapy techniques are incapable of distinguishing tumour cells from healthy ones. However, results obtained recently from a project undertaken by the Joint Research Centre of the European Commission, have opened new avenues for attacking cancers at the cellular level.

## Guided Missiles

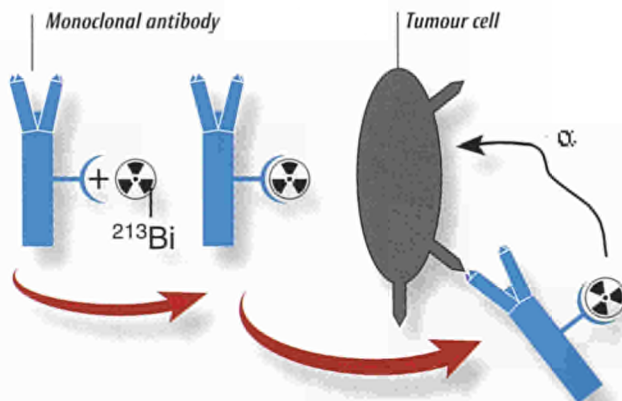
The technique known as radio-immunotherapy (RIT) consists of attaching radioactive atoms to monoclonal antibodies capable of recognising cancerous cells. Injected into the patient, these "cellular missiles" then go off in search of their tumour targets and destroy them with the aid of the radiation they carry.

The RIT treatments applied up till now are based principally on beta-emitter marking. This type of radioactive source has made it possible to obtain significant results – but the technique has limitations. Because it does not have sufficient power, the destructive capability of the "missile" remains limited and its precision is proving unsatisfactory: the radiation

emitted, which is too "long", causes considerable damage to the healthy cells.

A promising alternative consists of replacing the beta emitters with alpha emitters. The alpha carriers are more energetic and also have a much shorter range – making it possible to concentrate more radiation on the cancer cell. It was also necessary to develop adequate production sources of alpha-emitters, which are more difficult to handle.

A centre of excellence in the study of nuclear materials, the Institute for Transuranium Elements (ITU) at Karlsruhe in Germany – one of the seven institutes of the European Commission's Joint Research Centre – has been carrying out a great deal of work in this field for several years. This research has made it possible to identify a particularly interesting isotope in the family of actinides – bismuth-213, which is generated by the nuclear decay of actinium-225. In addition to the emission of alpha radiation and an appropriate system of decay, bismuth-213 has a very short half-life: only 45 minutes (as compared to 10 days for actinium-225). This characteristic is important, because it means that after a very short time the



*Combining a radio-nuclide alpha emitter with a monoclonal antibody capable of recognising cancer cells.*

patient is no longer subject to any radiation. It also presents a challenge because of the speed required to apply the treatment.

## First clinical trials in New York

An initial series of clinical trials on voluntary patients suffering from acute myelogenous leukaemia was started in 1996 at the Memorial Sloan-Kettering Cancer Center in New York. Three bismuth-213 generators were subsequently installed in the hospital with the cooperation of the ITU. The Institute devised the whole extraction procedure so that the medical team could proceed with the tests and also arranged the transatlantic delivery of actinium-225.

Although it is too early to

claim success, the trial results are promising. According to Doctor David A. Scheinberg, who is in charge of the trials being carried out in New York, "The first observations we have collected seem quite clearly to show efficient targeting by the alpha particles, their safety, and their cancer-fighting potential."

## Pan-European Collaboration

In France, the ITU is collaborating with the Institut National de la Santé et de la Recherche Médicale (INSERM) and the Laboratoire de Physique Subatomique et des Technologies Associées (Subatech) at the Ecole des Mines in Nantes, which, since December 1996, has been home to the first alpha-RIT centre in



Europe. Here, radio-chemists separate bismuth-213 from actinium-225 supplied by the ITU, and it is then used directly on-site by the medical teams of Professors Bataille and Chatal. These specialists carry out in vitro RIT tests on tumour cells from human bone marrow afflicted by a cancer known as myeloma. In the near future, researchers envisage treating bone-marrow taken from patients suffering from myeloma directly, by purging it of its cancer cells, and then re-injecting it.

Meanwhile, in Heidelberg, the University Hospital and the Deutsches Krebsforschungszentrum (Cancer Research Centre of Germany) are planning work with the ITU on alpha-RIT tests for other types of cancer.

### **Inventing new sources**

The production of actinium-225 - currently obtained by the decay of thorium-229, itself drawn from stocks of uranium-233 derived from nuclear fission - is very slow and yields rel-

atively small quantities. This factor constitutes a severe limitation if patients are to be treated in larger numbers.

For this reason, the ITU is trying to produce actinium-225 by other means. "Several methods are envisaged, but our efforts will be directed particularly towards irradiation of radium-226 in the cyclotron," explains Professor J. van Geel, Director of the ITU. "Our ambition is to make it possible for Europe to acquire sufficient production capacity from these nu-

clides and thus establish a place for the ITU in the international distribution of the radioactive isotopes used in radio-immunotherapy." ■

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COST: Area Survey

# New materials for innovative products and technologies

*Within COST's international cooperation and coordination activities in the field of new materials, the majority of projects, which, naturally, are oriented towards industry, are aiming to develop new products and technologies.*

**T**oday, the improvement of materials' performance plays a key role in many technological areas. There are currently 15 COST "Actions" running in this field, incorporating over 650 specific R&D projects. Not only universities and research institutes are participating, but also a significant number of industrial partners, particularly in the energy sector, foundries, and the engineering industry, car manufacturing and the construction industries. Environmental issues connected with the use of materials are also tackled

addressed in several projects.

This COST area involves a broad international partnership. An average of 12 COST countries are represented in each Action, and institutes from non-COST countries, such as the USA, the Ukraine, Russia, India and Bulgaria, are involved in some of these Actions.

### **A survey of materials actions**

**Power engineering industry** - COST 501, the largest and longest running Action in the field of materials, is working to develop high-

temperature materials for use in high-performance power plants. The results obtained so far combine to increase the thermal efficiency, lifetime, and cost-effectiveness of a plant. The new materials developed will be tested in a JOULE-THERMIE demonstration project featuring a new type of pulverised-fuel power plant using an "ultra-supercritical" steam cycle.

**Foundries** - In the field of solidification modelling and casting simulation, the recently completed Action COST 504 has produced results of high industrial rele-

vance and immediate application. The numerical modelling and simulation of materials and processes is being continued in COST 512.

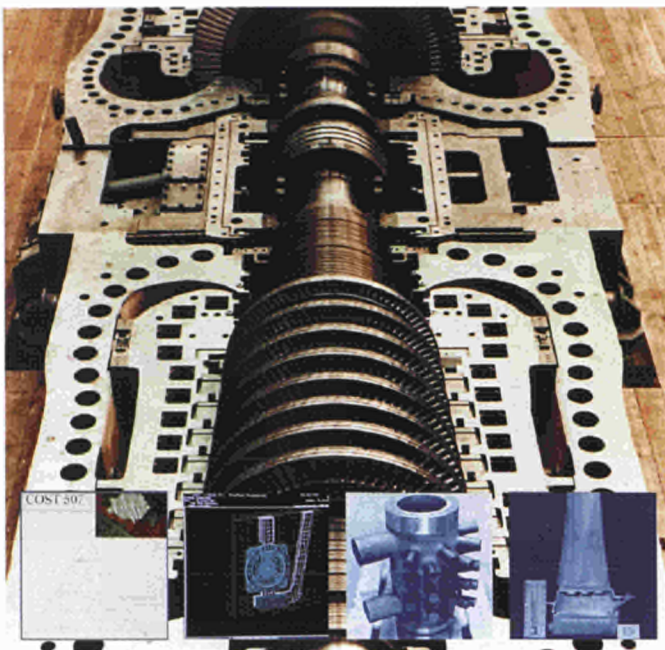
**New metallic materials** - In several Actions (COST 503, 506 and 513)<sup>(1)</sup> metal matrix composites, intermetallics, powder metallurgical materials, etc. have been developed for demanding applications. In COST 513 the research has taken advantage of the availability of a fine-grain titanium-aluminium-based alloy which a number of groups are working on. This approach has some obvious advantages,

not least of which is that the role of various thermo-mechanical processing routes is being investigated in terms of optimising properties.

**Coatings and coating processes** - These aspects have been studied in several Actions (COST 501, 515 and 516). The results offer new possibilities for applications to be used in difficult circumstances (and subjected to wear, corrosion, high temperatures, etc.). COST 515 focused on plasma and ion-beam surface engineering. Thanks to these techniques, the surface properties of metallic details used in machinery can be perfectly tailored to enhance wear resistance, thus prolonging the lifetime. Another factor influencing the lifetime of machinery is the quality of lubrication. This is dealt with in COST 516 - Tribology. One of the aims is to develop renewable, environmentally adapted lubricants.

**Light metallic alloys** - COST 507 Action, running for about eight years, focuses on light metallic alloys based on aluminium, titanium and magnesium. The aim is to reduce time-consuming experimentation in the design of new materials, by providing a thermodynamic database for alloy design that allows rapid calculation of necessary constituents. The software developed is now available to European industry.

**Cleaner metals** - The Action COST 517 was launched at the end of 1996 with the main objectives of developing and implementing quantitative methods for the evaluation of inclusion contents (below 200 nm) and



investigating the relationship between microstructure-properties and inclusions.

**Ferroelectric thin films** - This topic, which is of very recent interest and fast-rate growth, has been studied in COST 514. Although interest in these materials arose from their application in computer memories, there are other fields of application (e.g. piezoelectric or infra-red sensors, acoustic-optical devices, etc.).

**Materials in corrosive environments** - Corrosion

of the embedded steel in reinforced concrete, mainly due to corrosive agents such as carbon dioxide and chlorides, often leads to a serious deterioration of buildings, marine structures, bridges, etc. The COST Actions 509 and 521 were launched to develop the preventive, monitoring and maintenance measures able to address the safety and economic implications of this worrying problem. In addition, COST 511 has studied the negative effects of microbial systems on metals in

contact with water or moisture. Results obtained have led to a better understanding of the reactions occurring in the biofilm, thus allowing the improvement or development of new antimicrobial strategies. The research will continue as a new planned Action, COST 520 (in project).

**High-temperature testing and measuring techniques** - COST 510 deals with the development of these techniques, which are required for the characterisation of structural materials for high-temperature applications (above 1500°C). Some of the new testing methods and related equipment developed are very close to market requirements.

**Non-metallic high performance materials** - This important category of new materials, used in an ever increasing range of applications, is covered by COST 518 (for ceramics and polymers). A new Action, COST 519, is for glass. ■

*(1) The results of Cost 503 will be published in 1997 in five volumes covering all the research topics and main achievements of the Action.*

## COST's 25-year rendez-vous

Established in 1971, the COST cooperation between national research projects and programmes of 25 European countries now looks back on 25 years of history. To mark the occasion, a COST Ministerial Conference will be held in Prague (CZ) on 27 May 1997. The aim of the meeting is to consolidate COST's future role, based on findings from the evaluation and the recommendations of a recently established High-level Reflection Group. Furthermore, the Ministerial Conference is expected to welcome new Member States into the initiative. More general information on COST may be obtained on Internet by accessing the site : <http://www.cordis.lu/cost/home.html>

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# Finding a needle in a jar

*As production line speeds increase, the task of detecting foreign objects in jars of prepared foods becomes harder. The TriAXIS project will meet food industry needs by combining clever use of existing X-ray technology with new image processing software.*

**E**ven in a large food processing plant, the contamination of a jar of sauce by a sliver of glass or metal is a rare event. Yet every time a contaminated jar is sold, the manufacturer may have to recall the product, and could face major litigation. A single splinter can cost a company millions.

Current food inspection systems use a single X-ray source to produce a two-dimensional image of each can or jar. Their reliability depends largely on the sophistication with which they can analyse the image in real time, but even the most advanced systems face a fundamental problem: a thin splinter of glass which happens to be aligned with the X-ray beam is likely to pass undetected.

According to the researchers of Intelligent Manufacturing Systems, the UK SME which led this project supported by the Commission's AIR programme, reliable defect detection needs a 3D approach. "The visibility of an object depends on the density and the size of its image," explains Mark Graves. "If it appears end-on, the image may be too small for detection. If seen from the side, it may not be dense enough."

## Intelligent images

The system built by IMS and its partners employs two X-ray beams, set at right-angles to each other, to scan the product simultaneously from separate viewpoints. But it does more than simply double the chances of detection. New software algorithms developed by the University of Wales, Cardiff, enable

it to compare and contrast the two views intelligently, building a three-dimensional image and using knowledge-based methods to detect contamination. The high resolution of the processed image makes the system extremely reliable, regardless of the orientation of contaminating particles.

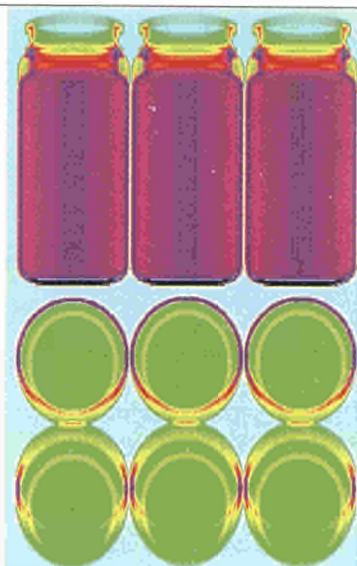
TriAXIS should be the first system to offer high-reliability testing in real time at production-line speeds. It was designed to meet the specifications of the food industry as outlined by Unilever, the project's end-user partner.

## The speed challenge

Unilever's production lines of bottled sauces and canned soups turn out nearly 500 units per minute, packaged in 3x2 trays. "That presented us with an additional challenge," says Dr Graves, "but it also gives us a great opportunity. The food processing industry as a whole is moving towards 3x2 trays of cans and jars."

IMS's design for the image processing unit is modular, so that additional chips can be installed for greater speed. And thanks to its high-resolution image processing, the new system can easily identify objects, even through two rows of jars.

In fact, scanning the finished trays has distinct advantages. They pass more slowly than the individual jars, making automatic rejection of a contaminated unit simpler. In addition, because the system is right at the end of the production line, the chance of further contamination is completely avoided.



*With the TriAXIS system, two X-ray beams, set at right-angles to each other, allow a 3x2 tray of cans or jars to be scanned simultaneously from separate viewpoints.*

Trials of the prototype will be completed in spring 1997, and IMS expects Unilever to install the first industrial system soon afterwards. Each partner will then commercialise TriAXIS or its component elements on its own markets.

**Reference :** AIR 1054 Contract

**Partners:** Intelligent Manufacturing Systems and University of Wales, Cardiff (UK); Pulsarr Industrial Research and Unilever Research Lab. (NL); Soplelem-Sofretec and Thomson Tubes Electroniques (F).

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