

# EUROPEAN

# COMMUNITIES



**Information**

**R + D**

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## COMMUNITY SCIENCE POLICY: NEW FRAMEWORK PROGRAMME

Next year for the very first time the European Community will incorporate all its research, development and demonstration (RD & D) activities in a framework programme laying down its strategy for the years 1984 - 87. This marks an important milestone both because the Ten are greatly increasing the share of the budget devoted to these activities and because this higher expenditure is accompanied by an unprecedented effort to define in advance the main goals of Community-financed programmes, the socio-economic objectives to be achieved and the balance to be maintained between the various sectors. These resources will no longer be handed out piecemeal according to the circumstances of the moment; their distribution will be governed by a political determination to do everything possible, in science as in other things, to meet the challenges of the future.

The Commission document is obviously not a detailed catalogue of all the research to be done and results to be ob-

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tained. It is more of a programming guide which, over the four years that it covers, will serve as an aid to be selected, from all the research programmes proposed, of those which are most in keeping with the principles adopted at the start. As well as being the bible of Community policy, the framework programme will contain financial estimates that will facilitate the budget decisions to be taken each year. Its authors also hope that national authorities will use it not merely as a basis for their own policies but also to stimulate discussion within each ministry on the definition of programmes and priorities for each Member State and in international negotiations with a view to harmonizing the various policies so as to avoid the frequent duplication of work which seriously handicaps European research in comparison to the Americans and Japanese.

#### Ten years on

The framework programme is of course only a start. However, it is backed up by some experience because the Community has been successfully involved in research since 1974 when it received a mandate from the Council of Ministers. In 1974, 70 million units of account were spent on research compared with almost 600 million ECU in 1983. This increase, well above the inflation rate, is clear evidence that there has been no lack of political determination to support research over the past ten years.

A review of this period calls for two comments. Firstly, the expenditure has been closely tied to circumstances. For example, the energy crisis in the 1970s had much to do with the fact that more than 70% of the money went to research on energy in some financial years. Secondly, the activities have

so far always been on a sectoral basis and obviously insufficient attention has been paid to the possible synergies between two fields (for example, are there points where industry and energy come together?) not potential incompatibilities (for example, is the use of land for fuel crops compatible with land management and the improvement of farm incomes under the common agricultural policy?).

### Consistency

When the idea of a framework was first studied, it was obvious that greater consistency was essential. This will automatically be obtained through the type of approach to the problem that has been adopted: Research funding will no longer be allocated on a project-by-project basis but will be guided solely by the objectives to be attained. Consequently the framework programme lists seven major goals, to which we will return later.

There were other questions that required thought: What should be tackled by Community research, what should be left to individual countries and what called for such a large-scale effort that only wider international action would do?

These questions had to be answered before the money aspects could be considered, the necessary overall budget determined and, above all, the most pressing priorities defined within that total. First the total budget. There is general agreement that it must continue to expand, not just for the pleasure of seeing it become bigger and better but because to be efficient Community research must reach a sort of critical means that will ensure a proper return.

This desire for an adequate dimension is one of the reasons why research activities that would be too dispersed if carried out at national level are handed over to the Community.

Just think: The European R + D + D budget has already increased from 70 to 600 million ECU and for the four years covered by the framework programme it is planned to allocate it 3.750 million ECU (at constant 1982 values). This is 940 million ECU a year, representing a growth of about 50% over 1982 without allowance for inflation.

In relative figures, this means that the research sector received 2.6% of the Community budget in 1982 while the target for 1987 is 4%. Once again the increase is remarkable.

#### Restoring the balance

Whatever the growth in the total budget, it will never be sufficient for everything. Choices have to be made, priorities defined and a degree of balance has to be restored. For example, the share of energy, which at one time swallowed up more than 70% of total expenditure, is to be reduced to around 49.4%, evidence that interest in this sector is still extremely keen but it is no longer to be allowed to enjoy the virtual monopoly that it had at one time. The main beneficiary from this operation will be industry since it is clear to everyone that its competitiveness gives cause for concern. The ESPRIT programme which is designed to put our electronic industry amongst the world leaders is already working in the same direction.

This trend will be continued and reinforced for all the information technologies and also for biotechnology, a sector which

all agree has a bright future. In the draft budget for the framework programme the promotion of industrial competitiveness receives no less than 28.2%, nearly two-thirds of which goes to techniques that are almost entirely new.

There is also some increase in the research allocations for agriculture. Indeed it seems odd that agriculture which alone swallows up 70% of the European budget (common agricultural policy) has up to now received less than 2% of the research appropriations. This share is almost doubled in the estimates for the next four years.

There is also one nearly new item, research for the benefit of the developing countries. The idea is to go beyond the traditional concept of cooperation and gradually establish a different approach which will help the Third World countries to have more control over their own destiny, even in the way of technological and scientific research which they need as much as we do.

#### Improving efficiency

Another goal in the framework programme deserves special attention. There are plans to devote a considerable part of the budget (5% by the end of the period) to improving the efficacy of the Community's scientific and technical potential. A look at the figures shows that, in mathematical terms, Europe is by no means lagging behind its main trading partners. In 1980, for example, the nine European countries spent a total of 39.500 million ECU on research, while Japan spent 15.600 and the United States 43.370, representing 2% of the gross domestic product in Europe and Japan and 2.3% in the United States. There are no significant differences there.

In brief we are not short of resources or manpower (1.100.000 people involved in R & D in Europe in 1980). What is wrong then? Commission staff and the experts they have consulted have tried to diagnose this and have come up with many and varied reasons. First and foremost there is a decline in the creativeness of researchers accompanied by (or maybe the outcome of?) insufficient multidisciplinary research just at a time when many fields need to be approached from several angles at the same time. There are also gaps: Research topics that the universities consider too applied and industry regards as too basic. Examples include agri-food technology and training.

There are also shortcomings that might be termed structural, together with a mismatch between supply and demand. We are all too ready to do research - and come up with results! - on things that are of no interest to anyone, for which there is no market, while "social" or "government" demands are ignored.

We only really become aware of this when such events as the U.S. embargo on supplies for the Euro-Siberian gas pipeline point up our dependence on American knowhow. Another structural problem: Public research organizations, which are not always very happily situated within or alongside educational establishments, are not adapting quickly enough. Also there is too much duplication of work between the different Community countries which all too frequently are chasing after the same results. Finally, too little attention is paid to the dissemination and the practical and economically viable use of the fruits of research.

This is more than enough to justify spending part of the framework programme's budget on an attempt to put right these failings in the research world and ensure that its

effects are not wasted. This scheme offers some safeguard to governments which are being asked to spend more generously.

### FAST

The seven basic goals of the framework programme were not selected haphazardly but are the fruit of much thought and study by many experts. One exercise consisting of 36 research projects is known by the acronym FAST (Forecasting and Assessment in the field of Science and Technology) a sort of spotlight directed at the 1990s. It is probably looking too far ahead to be of direct interest to the 1984 - 87 programme, but there is no doubt that this programming guide, which may be reviewed after two years and is intended to be followed by other framework programmes, is setting out on the same road. To use a metaphor, we need both the main headlights (FAST) and a dipped beam (framework programme) to illuminate this road.

The results of the work done by experts for the FAST programme are set out in some 400 pages that are difficult to summarize in a few lines. However, a few foreseeable developments stand out more clearly. These experts predict that the organization of the services sector will for a long time to come continue to be a major factor in creating jobs and making for greater competitiveness and public participation. The new technologies will be the one and only basis of new growth. Better management of land, water and natural resources will be essential. For its development, the Third World will no longer be satisfied with a mere transfer of technology and products. Finally, our society will have to find ways of adapting continuously to technological change.



It was therefore in the light of the prospective research by the FAST group, the realization that the Community research effort had to be stepped up and the diagnosis of the existing shortcomings in our research that the Commission drew up its list of seven goals and allocated them shares in the total budget for research, development and demonstration for 1984 - 87. These seven goals are:

- Promoting agricultural competitiveness, including fishing (3.5%)
- Promoting industrial competitiveness (28.2%)
- Improving the management of raw materials (2.1%)
- Improving the management of energy resources (49.4%)
- Reinforcing development aid (4%)
- Improving living and working conditions (7.2%)
- Improving the efficacy of the Community's scientific and technical potential (varying percentages rising to 5% by the end of the period).

(Another 2.9% of the budget should go to "horizontal" activities which do not really fit into any of the goals but should help to achieve each and every one of them).

Now let us briefly review each of these headings under which the research projects financed from the Community budget should be classified.

#### 1. Agriculture and fishing

Through the common agricultural policy, Europe spends enormous sums every year to regularize the market for agricultural products and guarantee farm incomes. That

has not prevented the appearance of chronic surpluses that weigh heavily on the Community budget nor the chronic erosion of both farmers' and fishermen's incomes as a result of the continuing increase in production costs.

Research in this area must therefore tackle the root of these difficulties in a sector of enormous importance to us all, as is shown by one figure: No less than one-third of the money spent by European households goes on food!

Several specific objectives are suggested by the authors of the framework programme, a few examples being:

- Better use of farm waste in order to provide additional income but also to save on fertilizers, energy and animal feedingstuffs and at the same time to reduce pollution;
- production of biomass as a fuel crop, although of course not without ensuring that it is the best, or at least a good, use of green soils regarded as marginal;
- growing of crops for products that are currently imported, in particular for high-protein animal feedingstuffs;
- guaranteeing the consumer a food quality that is not always believed to be compatible with intensive farming;
- improvement of the productivity of livestock breeding;
- more efficient and cleaner methods of disease prevention and pest control;

- better evaluation of ocean resources and the interaction between fish production and the quality of the marine environment
- modernization of fishing gear
- development of aquaculture.

2. Restoring the competitiveness of our industries

An industry which remains in the forefront of progress is one that is capable of anticipating the changes that will stem from new technological developments rather than reacting passively and defensively to attacking moves by rivals who are quicker off the mark. It is of course up to the industry itself to adopt this strategy but the Community can help it both by appointing observers to assess the value of budding technologies and conducting research to discover new technologies before the others and by financing demonstration projects on a scale to which manufacturers or even the Member States might well be reluctant to commit themselves.

Here too the framework programme lists a number of specific goals, of which we shall merely give a few examples. More than half of the funds in this sector will go to the promotion of information technology which the experts in the FAST team identified as of vital importance for the future. This will be a sort of large-scale extension of the ESPRIT programme and will from the outset include a better mastery of the basic technology, i.e. microelectronics, but also and above all a continuously updated knowledge of software and all expert systems for information processing, integrated flexible manufacturing and office automation. You may be surprised to hear that in this last field, which promises to

become the most profitable of all the information technologies, two American firms, IBM and Rank Xerox, have so far spent more than the whole of European industry.

Electronics offers a particularly good example of the difficulty which the European industry experiences in putting on the market new products that are both competitive and attractive to the user. All too often our firms prefer imported products because they are less risky. The attempt to turn the tide must be made at Community level as the industry might well be discouraged from making isolated efforts since it would rightly fear that its new product would be confined to its own home market, generally too small to give it a fair return on its investment.

Another sector on which the framework programme trains the spotlight is biotechnology. This is an effort that should bear fruit in the longer term and the present aim is mainly to create a favourable environment for the industry, to identify the key sectors likely to have the brightest future and the links to be established with the industries particularly concerned, i.e. agri-foodstuffs, energy, environment management etc.

3. Better management of raw materials

It should not be forgotten that it was the reaction of a member of the Commission to the first report by the Club of Rome which first brought home to the general public the warnings issued by that study group about the growing scarcity of some raw materials. Since then forecasts have become less pessimistic but, despite all its efforts,

Europe is still very dependent on the outside world and sometimes on a very small number of countries for its supplies of materials which economically speaking may well be termed strategic. It has been said that three-quarters of the proven or estimated reserves of numerous raw materials are situated outside the Community.

Steps must be taken both to increase the available world stocks of these materials by more efficient extraction (research on mining technology, for example) and use (recycling of waste and fines, use of lean ores, etc.) and also to find substitute materials.

Let us take wood as an example. The Community has to import more than half of its requirements. Can we reduce this dependency by increasing production? Also, what can be done to improve the economic viability of our wood processing industry?

4. Improving the management of energy resources and reducing energy dependence

Since the Community has been sponsoring scientific research, energy has been its main concern. It seems likely that not only during this framework programme, but even up to the year 2000, energy will remain the most heavily endowed goal, and in any case its appropriation will increase steadily even if its percentage share of the total budget drops.

Energy is indeed the major challenge facing our economies.

The experts have identified four major research topics:

First of all nuclear fission energy, viewed essentially from the standpoint of safety. Experience shows that a European consensus with proper scientific backing would have the best chance of exerting a positive influence on public opinion currently at odds over the nuclear controversy. This must of course cover nuclear reactors, and also the whole of the nuclear fuel cycle, including reprocessing and storage of radioactive waste.

Secondly, fusion energy. Let us not deceive ourselves, it may be one of the solutions to the energy crisis, but only in the distant future. According to experts, before the industrial stage is reached the mere trifle of 100.000 million ECU will have to be spent worldwide on research and development. Europa has been engaged in this research from the very start and that is probably why it leads the world. Towards the end of the 1980s JET (Joint European Torus) will have to be reviewed and a decision taken on how it should be continued. In any case the framework programme allocates a large proportion of its budget to the work.

Thirdly, renewable energy sources which have many advantages (reduction of dependence, encouragement of decentralized production, improvement of the environment, help towards aid for developing countries, etc.) but which have not yet proved their technical and economic viability. It will be up to the European researchers to help demonstrate this. The framework programme suggests that they should give preference (in this order) to direct solar energy, biomass, geothermal

energy, wind power and small-scale hydroelectric power.

Lastly, the rational use of energy both in industry (waste heat recovery, more energy-efficient processes, etc.) and in the home. It seems possible to save about half the current household consumption. After the praiseworthy efforts already devoted to buildings, it would now be a good idea to pay greater attention to the improvement of the existing housing stock.

5. "Different" development aid

We are not trying to do anything radically new. Much effort and money have for a long time been devoted to development aid for the most deprived countries. What the framework programme wants to do is to refocus the aid from the scientific angle and, to use a well-known expression, not so much to help these countries as to help them to help themselves. For them as for us, research is a driving force for development and the Third World will not really take off until it is in a position to make proper use of its own intellectual capacity.

The new European thinking here is to make sure that aid is firmly placed in the local context in the countries receiving it. Obviously account has to be taken of the differences in the development level of the various countries. In any case the main theme to be envisaged is agriculture and more generally food supplies.

6. Improving living and working conditions

This is also an initial response to one of the subjects suggested in the FAST report, which pointed out that by the end of the decade society would have to learn to adapt continuously to incessant technological changes. For the first programme the Commission has selected only two main topics:

- Improving safety (especially at work) and protecting health (with emphasis on new health technologies);
- protecting the environment with the aim of preventing rather than curing pollution and managing the environment over the long term through a better knowledge of fundamental ecological processes.

7. Improving the efficacy of our scientific and technical policy

Strengthening the Community's scientific and technical competitiveness by stimulating the efficacy of European research and development systems.

This new form of action is designed to strengthen the fund of European scientific and technical know-how and to give the framework programme the necessary flexibility to ensure that the European strategy is capable, as it must be, of adapting and reacting.

For this purpose the Commission intends to implement a set of "stimulation" activities designed to help teams of researchers and engineers to overcome obstacles



currently hampering their efficiency or rapidly to launch research and development operations to meet a sudden requirement or to seize on and exploit new ideas or know-how. To remedy the rising overall age of research staff, the shortage of jobs for young scientists and the lack of mobility (both geographical and intellectual amongst scientists), to break down the barriers between research sectors, between research organizations and between national research activities, to bring together scattered teams each of which is too small on its own to have maximum efficiency, etc. the Commission considers it essential to meet the needs of the research and development world by making various forms of aid available to them. All these consist of financial support for a limited period granted to research and development teams to enable them to engage extra staff, work in cooperation with other teams in a different country, have meetings with research scientists in other disciplines and rapidly exploit a new possibility.

The fields are chosen in the light of the socio-economic goals and objectives of the framework programme but the actual subjects of the research receiving support are not defined in advance as they are for the Commission's other activities. The Commission intends to be a sort of listening post for requirements expressed by those in need of help. Any requests for support in the selected fields will therefore be studied by scientists and engineers themselves, on the basis of an anonymous peer review system, which guarantees both objectivity and a high standard of decision making.

For the first framework programme, the Commission has selected, on the basis of the conclusions of dozens

of analyses, comparisons or consultations, a few fields of major importance in terms of potential socio-economic developments: Biology, chemistry, optics, information sciences, oceanography, space, surface chemistry and physics, scientific instrumentation and composite materials.

#### Horizontal activities

Something must also be said about what the Commission calls "horizontal activities", i.e. a number of projects which, because of their general nature, form one of the keys to the effectiveness of all the other research efforts. They include:

- A sort of new FAST programme to continue prospective studies;
- better dissemination of scientific and technical information
- more efficient protection of inventions which gives rise to very specific problems in the biotechnologies where it is extremely difficult to know how to protect intellectual property for those who discover, for example, a strain of micro-organisms;
- exploitation of the results of purely Community research and development activities;
- finally, the continuous evaluation of the results of these new Community-wide activities and their practical use.

This will offer European taxpayers some assurance that their money is always used as wisely as possible.