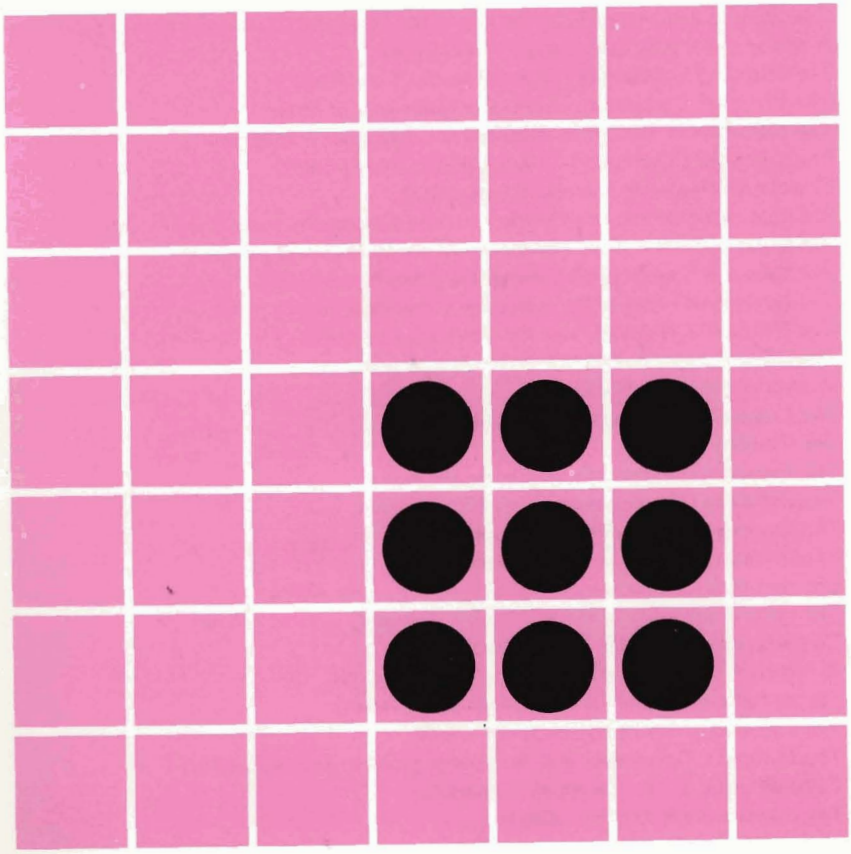
Periodical 5/1980

THE EUROPEAN COMMUNITY'S RESEARCH POLICY



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Originating department:
Division IX/C/11 — Coordination and preparation of publications

The European Community's research policy

Manuscript by Kurt-Jürgen Maaß, completed in July 1980.

This publication is also available in the following languages:

DA	ISBN 92-825-2018-8	Det europæiske Fællesskabs forskningspolitik
DE	ISBN 92-825-2019-6	Die Forschungspolitik der Europäischen Gemeinschaft
FR	ISBN 92-825-2021-8	La politique de la recherche de la Communauté européenne
IT	ISBN 92-825-2022-6	Politica della ricerca della Comunità europea
NL	ISBN 92-825-2023-4	Het onderzoekbeleid van de Europese Gemeenschap

Cataloguing data can be found at the end of this publication

Luxembourg: Office for Official Publications of the European Communities, 1980

ISBN 92-825-2020-X

Catalogue number: CB-NC-80-005-EN-C

Printed in Belgium 1980

Contents

1. Why does the Community need its research policy?

Research and science are keystones in the construction of European union. They have a greater influence than ever on economic development, the pace of progress and the shape of tomorrow's Europe. Science and research are making their imprint everywhere — on internal development, on relations with the USA and Japan, on efforts to withstand growing competition from the Third World countries; issues affecting political and economic life and our very survival are being decided in European laboratories and research centres.

Changes are coming thicker and faster. Knowledge is multiplying to an extent undreamed of not so long ago, and in some areas it is virtually doubling every three to four years. Less and less time elapses before research results have a practical impact on the life of each one of us in fields such as medicine, food production, industrial output, the products we use every day, new transport systems and the controversial areas of energy and environment. Research results are not a matter of chance but depend directly on educational systems and arrangements for promoting research all over the world.

The European Community is not a tenth European State but the sum of what is going on in the Member States; in addition it offers the advantage of cooperation in a new dimension. In many areas it is dictating practical policies. All in all it pursues one goal: the integration of Europe. Research is one of its instruments. A common research policy also strengthens and expands national research potential. The political situation in Europe, the reciprocal economic penetration, the dependence on vital imports of raw materials and energy, responsibility for the shaping of the future international division of labour and above all the task incumbent on the European Community to ensure peace, freedom and stability are raising enormous challenges to research. That is why the Community is increasingly concentrating on this important field and endeavouring to initiate developments that will also benefit all other areas of cooperation.

In the decades ahead, research will remain a driving force for economic progress. In the face of ever keener competition from the United States and Japan, Europe can only survive if it makes optimum use of its potential for innovation and development, seizes future market opportunities and constantly improves the competitiveness of its industry. The European response to the American challenge of the sixties has shown that this is practically feasible. By massive and concentrated outlay of public and private capital, Europe succeeded in at least partially making up the research and development backlog in some key areas (electronics, computers, nuclear energy, transport). As the Community coun-

tries are far more dependent than the United States on imports of vital raw materials, they must not only be prepared but must also have the capacity to remain competitive if the general supply situation becomes more critical.

In its relations with the Third World, too, the Community is dependent on results to give it new ideas for diversification of the goods and services it can supply. In the first two Lomé Conventions with 58 African, Pacific and Caribbean States, for example, the Community Member States undertook to cooperate in achieving a new division of labour between industrial and developing countries. However, the Community countries cannot afford to reduce production and increase imports given their continuing high level of unemployment and declining foreign currency revenue and therefore they must develop new branches of production and new services by stepping up their research and development effort.

There is another important aspect that must not be overlooked or underestimated: the contribution to the maintenance of peace made by a prosperous economy, political independence and a fair division of labour in the world.

Scientists and research workers are by nature internationally minded and cooperate beyond the frontiers of their own countries. However, their international activities often tend to come about by chance and are sometimes a one-way process between certain countries. The research workers themselves are in no position to ensure that the contacts they establish are with the most suitable partners. That is why coordination at European level to improve efficiency is desirable in certain fields.

The most obvious starting-point is cooperation between research workers in the Community in areas in which the capacities and resources of individual Member States are not sufficient to go it alone. A good example is the extremely costly research on the energy source of the future: nuclear fusion.

The outlay is enormous and no results are to be expected for a long time to come, but nuclear fusion could be an economic and political breakthrough that would not only solve national energy problems at a stroke (the raw material for energy from nuclear fusion is, of course, water) but would also completely change the international power structure and relations of interdependence.

The Community research policy should not imitate, or compete with, national activities but should support and work for economic and political cooperation within the Community. European cooperation in research is also a symbol of the emerging European identity and should not be underestimated as an additional integration factor.

2. What can the Community do?

As is clear from what has been said above, there are sufficient reasons for the Community having a research policy of its own. The question now is what the Community can actually do and what, even in its own view, is not suitable for Community action. Another question to be asked is what the Community is permitted to do under the Treaty of Rome.

The easiest thing is to define what the Community research policy does not want to do. It should not, as leading politicians have often said, consist of stop-gap measures. This means

that Brussels does not intend to 'discover' problems about which the Member States, although aware of them, are doing nothing. There would be no point in trying to find out what activities had been omitted from national research programmes and making a Community programme out of them.

Multilateral chauvinism is another approach that has to be rejected. This may be defined as the over-eagerness of a supranational bureaucracy which regards multilateralization as a panacea and takes the view that once a problem is raised to international level it is halfway solved. This approach is not limited to the Community research policy. In other areas of cooperation, too, it is often said that the first step must always be to tackle the problem internationally. In research as in other things, however,it is only logical first to ascertain whether the Community as a whole can offer a reasonable platform for discussion. It must be borne in mind that the interests of the Community are not necessarily identical with national interests. Even if, for example, four countries are interested in a certain research area (e.g. aviation), it does not automatically mean that a commitment at Community level is a good thing.

It must also be remembered that up to 1974, when the Council of Ministers decided on an initial research programme, the Community had no general responsibility for all areas of research, but only fragmented responsibilities in certain sectors. The main areas in which a start was made on cooperation were as follows:

— coal and steel (Article 55 of the Treaty on the establishment of the European Coal and Steel Community of 18 April 1951);

— research on nuclear energy (Article 2,4-11 of the Treaty on the establishment of the European Atomic Energy Community — Euratom, March 1975);

— agricultural research (Article 41 of the Treaty on the establishment of the European Economic Community of 25 March 1957).

In its Resolution of 14 January 1974 on an initial outline programme of the European Communities in the field of science and technology, the Council of Ministers set an extremely wide future framework when it emphasized that 'with the exception of matters military or industrially classified as secret, no sphere of action in the field of science and technology should be excluded *a priori* from the Community research policy.

What can the Community do under a common research policy?

First, it can directly finance research of its own as has already been done in the abovementioned research areas. Shortly after its establishment, Euratom set 'Joint Research Centre' referred to in the Treaty, with its four research establishments in Ispra in Italy, Karlsruhe in the Federal Republic of Germany, Petten in the Netherlands and Geel in Belgium.

The second possibility open to the Community is to commission national research scientists, research teams and research centres to carry out specific projects and thus to encourage cooperation.

Thirdly, by coordinating national research programmes the Community can influence specific research areas and perhaps also provide ideas and impetus.

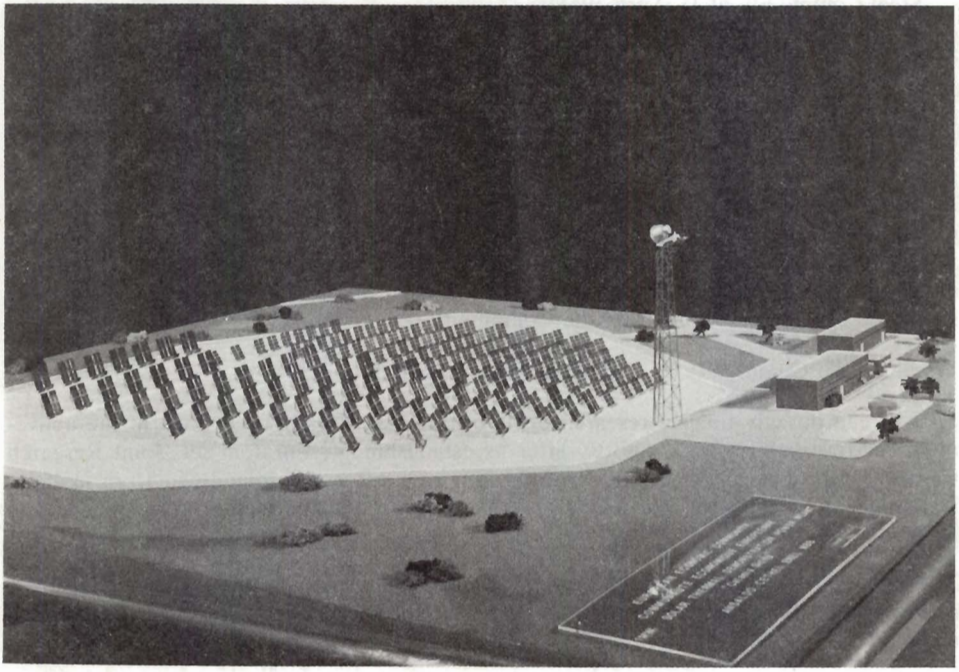
Thus the possibilities open to the Community are many and varied and, at least in theory, have the desired flexibility to enable it to take action of some kind wherever this is decided to be in the interests of the Community. In practice, especially since the extension of the functions of the Joint Research Centre and the political breakthrough to the Community's own research policy in 1974, use is made of all these possibilities.

3. Where does the Community promote research?

It is easier to make statements of principle on the need for a European research policy than to devise practical projects for its implementation. However, it is only by means of programmes and projects that fhe aims of the often vague statements of principle couched in very general terms become clear.

The following have emerged as four major areas of the Community research policy:

— security of supply of resources (energy, food, raw materials)
— promotion of internationally competitive industry
— improvement of living and working conditions
— protection of the environment.



Eurolios, the European Community's solar energy project in Catania, Sicily, in which France, the Federal Republic of Germany and Italy are participating.

The improvement of information on research results and scientific data is also regarded as an important function of the Community. Early in 1980 a data-transmission and information network (Euronet) was put into operation by a consortium of all the postal and telecommunications authorities in the Community countries. The aim of the new system is to give anyone interested direct access under fair and identical conditions to all data banks containing scientific, economic and social information in the Community. By the end of 1980 as many as 150 bibliographic and other data bases will be accessible by Euronet. In the initial stage the system is designed for 2 600 customers, but the number can be considerably increased if required. Scientific and technical data from anywhere in the Community can be obtained by telephone through the new system. Data bases in key areas such as the environment, energy, agriculture and metallurgy had already been developed earlier. The many different languages are, however, causing major problems. There are as yet no definitive solutions, but a few multilingual instruments are available such as specialized vocabularies, terminological data banks and automatic pretranslation systems.

In what follows an attempt will be made to illustrate the four major areas of Community research policy by way of examples and to describe the approaches, methods, scope, aims, topicality, relevance and focal points. This survey does not claim to be complete. A list of all current proposals and programmes is given in the Annex.

Security of supply of resources

Resources have become a matter of survival for the Community. On them depend the provision of vital goods for its citizens, regular supplies for industry without which production cannot be maintained, and the general functioning of the politico-economic system. Price stability, unemployment and the balance of payments all depend, although to varying degrees, on whether a secure supply of energy and raw materials can be guaranteed in the long term. This may be fairly described as the most important area of European research cooperation, on which all the others are dependent.

Energy

No research problem in the seventies has had such an impact on the peoples of Europe as energy. Accustomed for far too long to cheap and reliable energy supplies, the shock hit, them all the harder and showed them how paper-thin were the foundations of what they had believed to be economic stability, and how greatly individuals were affected by the ups down of world politics.

In 1978, almost 70% of the Community's research funds went to energy, whether it be conventional energy, nuclear energy or new and alternative sources of energy. Energy conservation also became a focus of scientific research.

The 1973-74 energy crisis gave the Community new food thought. Since then it has been endeavouring to reduce its dependence on politically unreliable oil imports from OPEC countries. The aim of the common energy programmes is to support these new political directions in the Community energy policy. Consequently energy research must be as flexible as possible and investigate even the less likely developments.

It is important not to commit ourselves to any specific direction but to keep every conceivable option open. The significance of these options varies according to the time scale considered.

In the short term more intensive use must be made of fossil sources of energy abundantly available in the Community countries, especially coal. The subjects investigated include the prospects of coal gasification, ways of improving mining techniques, and generally how to increase the share of domestic energy sources in the total energy supply of Community countries.

The research on energy conservation will also have to yield practical results in the short term. This has been described as Europe's largest source of energy. Extensive research activities are of course under way in the individual countries. The Community contribution is especially in the fields of energy storage, heat insulation, especially in buildings, and in general the better utilization of various forms of energy. As research into energy conservation is still in its infancy, it is an ideal subject for coordinating and combining national activities at Community level.

In the medium term the Community must also tackle the nuclear energy issue. Up to the year 2000, nuclear energy will have to supply a considerable proportion of our energy. The industrial aspect (e.g. the development of new types of reactor), which was originally a focal point of the Community's own research, is now completely in the hands of industry.

There is, however, a large area of important, even essential, research in which there is no possibility for direct commercial exploitation, and for which, therefore, the individual Member States are not unwilling to see Community research foot the bill; this includes safety research (reactor safety, radiation protection, storage of radioactive waste). The research topics include the protection of reactors against earthquakes, crashing aircraft, explosions, foods and loss of coolant. It is noteworthy that, for example, more than two-thirds of all the research activities in the Community countries on the storage of radioactive waste are now being coordinated by the Community. Reprocessing and definitive disposal have emerged as the vital issues for the future use of nuclear energy, and the prospect of a multiplicity of various regulations makes it increasingly important for the Community as such to take part in the research, to coordinate it and to ensure that one country does not find a solution at the expense of another.

In radiation protection Community research plays a prominent role. The Commission puts up more than a quarter of all expenditure on radiation protection research at national and international level within the European Community. The joint research programme is already more than 16 years old. It has gained enormously in importance with the public controversy about the risks of radiation of various kinds, whether from nuclear power stations, medical treatment, microwave devices, ultra violet sources or lasers.

Further medium-term research likely to have an appreciable impact in the next century investigates the potential of non-nuclear alternative energies such as solar energy, geothermal heat and hydrogen.

The Community recognized the future potential of solar energy at a relatively early stage, and for years it has been working on the development of flat-plate collectors and heat storage devices for the heating and cooling of buildings. Since 1976 the Community has been

coordinating research into the development of semi-conductor cells by means of which solar energy can be converted into electricity. Other research projects in the field of photochemistry and photobiology are aimed at the production of directly usable high-grade fuels.

The role that the Community can play has been demonstrated by solar-energy research; it can provide an incentive, stimulate development, take up new ideas and make a practical contribution to the Community's energy policy.

There are now a number of development projects, test facilities and general studies under way both in the Joint Research Centre and as part of the Commission's indirect research programme. Of particular interest is 'Eurelios' a one megawatt solar energy power station constructed in Sicily by a three-country consortium (Italy, France and the Federal Republic of Germany) which should be ready to go into operation in 1981. It is the first solar power station in the world in the megawatt range and will offer research workers facilities for studying special solar energy problems.

An international conference organized by the Community in Strasbourg in March 1980 centered on geothermal sources of energy. For the first time full was taken of the results obtained so far from the 135 research contracts partly financed by the Community to the extent of 13 million EUA.

In the long term it is still necessary to develop new sources of energy that will resolve the present dilemma. These include nuclear fusion, which is the showpiece of Community energy research. Virtually all the fusion research in the Community is now coordinated from Brussels and the majority of it is being jointly financed. The most important is the JET (Joint European Torus) project. JET is an experimental plant now being set up in Culham in England for the purpose of developing a fusion reactor for the future. Thanks to Community cooperation, Europe is neck and neck with the USA and the Soviet Union in fusion research. However, no commercially exploitable results are to be expected for some decades.

Raw materials

In comparison to the large proportion of Community research funds that go to energy research, the 2.3% (1978) devoted to raw materials appears very modest. The Community's main aim here is to increase its self-sufficiency in the general supply of raw materials and to reduce total demand by economic recycling. The Community countries have to import between 70 and 100% of the raw materials they need and are confronted here with increasingly serious political and economic problems. New research results can, not only increase self-sufficiency, but also make other countries with raw material reserves more interested in the Community as a trading partner that can export, for example, modern technologies for remote sensing, more efficient use of existing reserves, the exploitation of lower-grade deposits, ore treatment, etc.

In the Community territory itself an increased research effort will help to discover as yet unknown deposits of raw materials, especially copper, zinc, lead and uranium. The development of new concentration processes, for example for aluminium-bearing rock, is a costly business but is of economic importance in the long run.

The second important aim of Community research is to reduce the demand for primary raw materials and to make better use of them by:

— increased recovery of raw materials from domestic and industrial waste (e.g. non-ferrous metals and paper)
— increased recycling of specific waste such as old tyres and paper;
— full exploitation of agricultural and forestry waste through the production of valuable organic materials;
— replacement of costly imported raw materials by others which can be found on Community territory;
— design of new products for easier recovery of materials or requiring less material for the same performance.

It is up to the Community to sift out from the national interests and the Community interests topics on which a joint effort is both justified and worth while. Over and above the regional interests, it must make the implications for the world's economy clear and as far as possible take coordinating action to improve the Community's hand and increase its room for manoeuvre in negotiations with countries exporting raw materials.

Agriculture

The third area to be discussed is agricultural research, which accounts for only 1.1% of the Community research budget (1978). However, it is not fair to base an appraisal of this research solely on figures without considering the significance of work aimed at preventing problems in the distant future. The main targets include the rational use of the soil, balanced regional development, a decrease in the use of pesticides and fertilizers, reduction of the harmful effects of intensive farming on soil structure and water, more economic use of animal feed and improved animal nutrition.

A good example of successful cooperation, which started in 1976, is the imminent eradication of African and classical swine fever. Similar programmes may be expected to achieve great progress in controlling other animal diseases.

Maintenance of internationally competitive industry

The second broad area of cooperation in research policy in the European Community is designed to maintain and increase the international competitiveness of European industry. About 6% of the total research funds (1979) are assigned to this purpose. In view of the obviously accelerating decline in some of the traditional industrial structure (such as the textile, footwear and ceramics industries), which is partly due to the shift of production to low-wage countries, the Community countries must either devise cheap technologies or rely on their lead in exportable advanced technologies such as computing.

The Commission regards its draft five-year programme on molecular biology as coming under this heading. In the USA and Japan in particular, which are well ahead in such research, modern biology has produced results that are of direct benefit to industry and agriculture. They chiefly concern the development of production methods for products that could formerly only be manufactured by energy-devouring machines that pollute the

environment. Research in molecular biology is expensive as it necessitates substantial scientific and technical facilities. So far there are in the Community few centres that are adequately equipped and organized. The proposed programme should have a stimulating and coordinating effect.

The Community Bureau of References (CBR), which performs an important service function, should also help to maintain the competitiveness of industry. The CBR promotes European cooperation in the field of reference materials and methods, an important prerequisite for improving the comparability of measurements in many areas of industry and public service. In the CBR more than 500 technical experts are at work in about 70 specialized groups. Its highly specialized research work, not only helps to protect Community citizens and promote common economic and technological development, but also to helps to secure equality of opportunity in international competition for certain branches of industry.

Improvement of living and working conditions

In 1978, 6.7% of Community research expenditure went to this somewhat heterogeneous area. The main emphasis is on medicine and town planning.

In medicine the Community regards its research cooperation as a contribution to the increasingly important areas of prevention,early detection of disease and rehabilitation. The seven research programmes so far financed by the Commission are designed to combine the research efforts of all nine Member States so as to arrive more rapidly at practical results that will improve medical care for all Community citizens. Examples are the prevention of thrombosis, deafness and infant mortality.

For town planning the Community has brought together experienced planners in problems resulting from the growth of urban concentrations. Trends in the Community countries here are comparable. Cooperation helps each one to benefit from the experience of the others.

Protection of the environment

The fourth field of Community research cooperation concerns the environment. It is justified by the fact that air, water and soil pollution is no respecter of national frontiers. If only for reasons of equality of opportunity amongst industries in different Community countries, close cooperation is necessary to ensure that an industry in one country is not allowed to get away with something that is prohibited in other countries, thereby greatly increasing production costs.

Environmental policy is therefore one of the Community's major sectoral policies. It receives 5.2% of research expenditure (1978), and this is allocated to five topics:

— investigation of the effects of pollution on man and the environment,
— improvement of methods for the measurement of pollution,
— improvement of information management,
— development of new pollution abatement technologies,
— improvement of knowledge of environment matters,
— climatology.

4. How does the Community implement its research policy?

There now follows a brief description of the ways in which the Community implements its research policy, i.e. who is involved in planning, advising, decision-making and implementation and how the relevant bodies, organs, committees, etc. operate.

Planning, advising and decision-making

The Community's central decision-making body is the Council, often referred to as the Council of Ministers. The nine Member States are each represented by one Minister responsible for the subject under discussion. The Council has no permanent members; its composition changes according to the subjects to be discussed so that its meetings are attended by different heads of department on different occasions.

Virtually all activities under the research and science policy have first to be referred to the Council. The EEC Treaty states that the Council shall, acting unanimously, 'take the appropriate measures' if 'action by the Community should prove necessary to attain, in the course of the operation of the common market, one of the objectives of the Community' and the Treaty has not provided the necessary powers (Article 235 of the EEC Treaty).

The proposals for Council decisions are elaborated by the Commission, where one member is responsible for research, science and education. The Commission acts, however, as a sort of board of directors.

The Commission is advised by a network of committees composed of senior officials from the member countries and from the Commission or of scientists and experts. The most important is the Scientific and Technical Research Committee (CREST), which advises both the Council and the Commission. It is composed of two members of the Commission staff and 18 competent and responsible senior government officials from the nine member countries. The Commission is also advised by the European Research and Development Committee (CERD). Well-known people from all fields of science and technology are appointed to it in a personal capacity. In addition there are at both preparatory and implementation level numerous specialized committees, e.g. for nuclear energy, fusion research, agricultural research, Joint Research Centre, etc. (see list in Annex).

The opinions of the European Parliament and the Economic and Social Committee (a consultative body consisting of representatives of various economic and social groups in the Community) are sought (prior to any decisions).

Proposals for Community projects generally go through two selection processes before they reach the decision stage:

Process 1: the planned project is examined to determine whether it is likely to serve the aims of a Community sectoral policy (e.g. protection of the environment, energy policy, agriculture, transport, social policy). An effort is made to avoid random activities and to ensure that projects will contribute to an overall strategy. Naturally, however, the reverse is also possible, i.e. research can be designed to prepare the way for a new sectoral (e.g. security of energy supplies).

Process 2: At the second level of scrutiny the points militating in favour of Community action are examined. A few criteria have been evolved to facilitate decision-making. There are four main criteria:

1. Effectiveness: A Community project is likely to increase the effect of research work and at the same time to make the work more efficient and cheaper (examples: fusion research, molecular biology, solar energy).
2. Transnational nature: Some research and technology projects cannot be carried out if they are restricted to a single national territory (examples: transport, information and documentation, telecommunications).
3. Need for large market: Development costs and marketing opportunities require international markets (examples: data-processing, aerospace).
4. Common requirements in all Member States: All countries are seeking solutions in certain areas so that cooperation is called for (examples: environment, town planning, standardization, radiation protection).

These criteria indicate only some of the aspects to be taken into account in reaching a decision. Frequently other political issues are also a factor in Council decisions.

Implementation

After the Council has made up its mind its decisions are converged into practical projects by the Commission and its committees. The Commission consults its advisory bodies, approves the funds, monitors the progress of the research, calls for interim and final reports, ensures publication and encourages widespread use of the results and where appropriate proposes useful methods to complement or extend the research.

There are three ways of implementing the research available to the Commission:

— direct action projects conducted by the Joint Research Centre (JRC);
— indirect action projects carried out research contracts put out for public tender;
— concerted action projects carried out within a framework defined by the Communities while the Member States specify the content and implement the project.

Direct action: the Joint Research Centre (JRC)

In the late sixties and early seventies the JRC went through a serious political crisis which temporarily damaged its scientific reputation. Only recently has it managed to consolidate its scientific reputation and obtain significant research results. The number of patents applied for has also risen in recent years.

In 1957 Euratom was established in a common European effort to develop peaceful uses for atomic energy and loosen the grip of oil on its economy. At the same time, there were expectations that with a new and cheap source of energy Europe could win its rightful place on equal footing with the major economic and industrial powers.

LOCATION AND LABORATORIES AND RESEARCH CENTRES WORKING ON THE THERMONUCLEAR FUSION PROJECT IN EUROPE

Stichting voor Fundamenteel Onderzoek der Materie (FOM)
- Nieuwegein (U)
- Amsterdam
Netherlands
Year of association 1962
Research scientists 45

United Kingdom Atomic Energy Authority (UKAEA)
- Culham Laboratory
United Kingdom
Year of association 1973
Research scientists 200

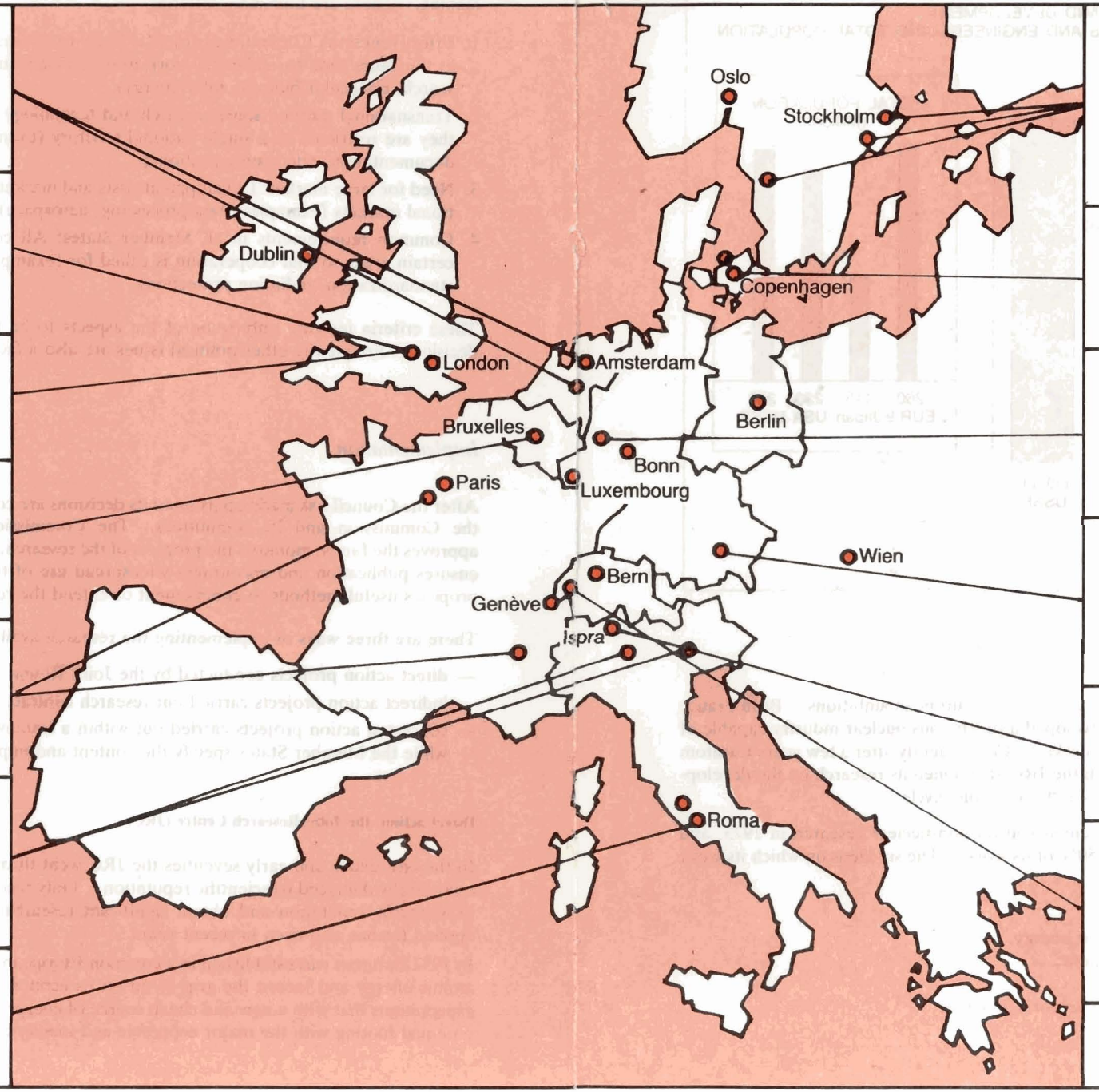
Entreprise Commune JET
Culham
United Kingdom
Year of Decision Council 1978
Research scientists 120

Etat Belge (EB) - Belgische Staat
- Ecole Royale Militaire
- Koninkrlijke Militaire School
- Université Libre de Bruxelles
- Bruxelles - Brussels
Belgium
Year of association 1969
Research scientists 25

Commissariat à l'Energie Atomique (CEA)
Fontenay-aux-Roses
Grenoble
France
Year of association 1959
Research scientists 180

Consiglio Nazionale delle Ricerche (CNR)
- Milano
- Padova
- (Napoli)
Italy
Year of association 1960
Research scientists 100

Comitato Nazionale per l'Energia Nucleare
- CNEN - Centro di Frascati
Italy
Year of association 1960
Research scientists 60



National Swedish Board for Energy Source Development (NSB)
- Stockholm
- Göteborg
- Studsvik
Sweden
Year of association 1976
Research scientists 30

Danish Energy Agency (DEA)
- Risø National Laboratory
Roskilde
Denmark
Year of association 1973
Research scientists 15

Kernforschungsanlage Jülich GmbH (KFA)
- Jülich
FR of Germany
Year of association 1962
Research scientists 85

Max Planck-Institut für Plasmaphysik (IPP)
- Garching bei München
FR of Germany
Year of association 1961
Research scientists 200

Centro Comune Ricerche (CCR) - ISPRA - Fusion
- Ispra (Varese)
Italy
Year of Decision -Council 1977
Research scientists 30

Centre de Recherches en Physique des Plasmas (CRPP)
- Ecole Polytechnique Fédérale
Lausanne
Switzerland
Year of association 1979
Research scientists 30

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- Padova
- (Napoli)
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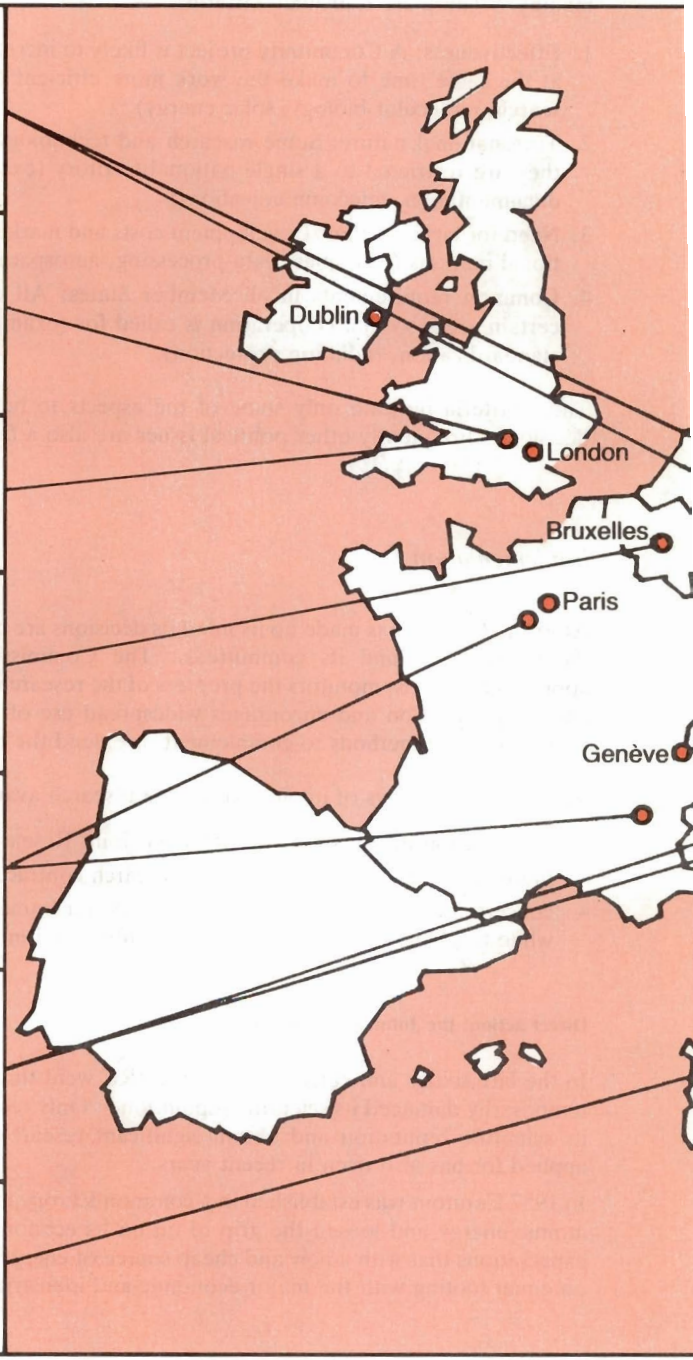
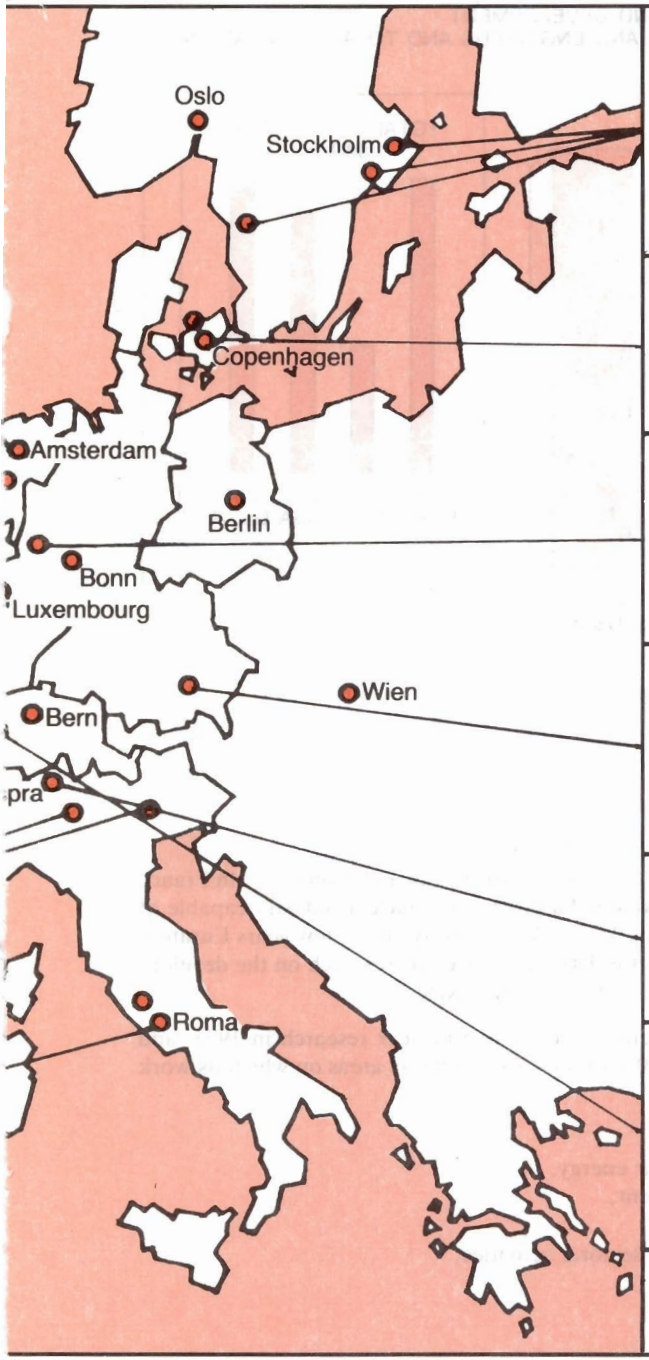
- CNEN - Centro di Frascati
Italy
Year of association 1960
Research scientists 60



RESEARCH CENTRES WORKING ON PROJECT IN EUROPE



National Swedish Board for Energy Source Development (NSB)
- Stockholm
- Göteborg
- Studsvik
Sweden
Year of association 1976
Research scientists 30

Danish Energy Agency (DEA)
- Risø National Laboratory
Roskilde
Denmark
Year of association 1973
Research scientists 15

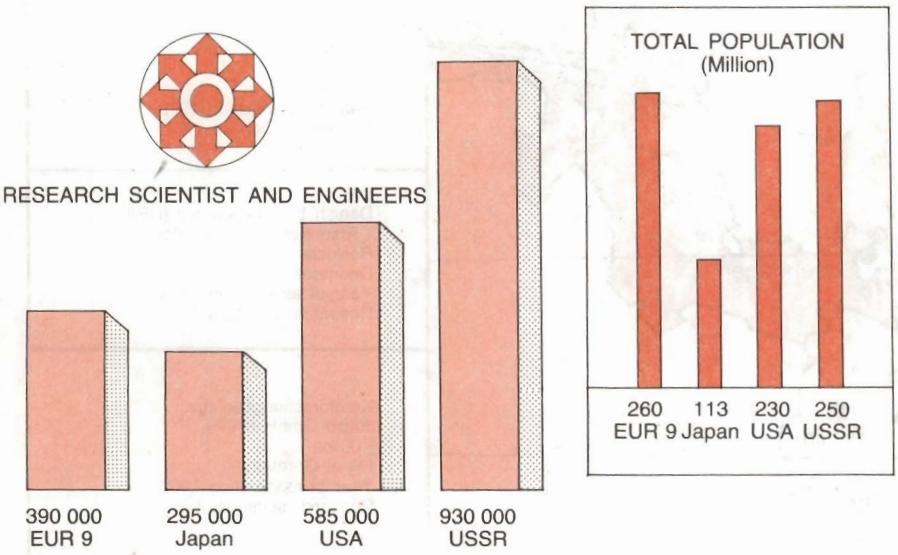
Kernforschungsanlage Jülich GmbH (KFA)
- Jülich
FR of Germany
Year of association 1962
Research scientists 85

Max Planck-Institut für Plasmaphysik (IPP)
- Garching bei München
FR of Germany
Year of association 1961
Research scientists 200

Centro Comune Ricerche (CCR) - ISPRA - Fusion
- Ispra (Varese)
Italy
Year of Decision -Council 1977
Research scientists 30

Centre de Recherches en Physique des Plasmas (CRPP)
- Ecole Polytechnique Fédérale
Lausanne
Switzerland
Year of association 1979
Research scientists 30

RESEARCH AND DEVELOPMENT :
NUMBER OF RESEARCH SCIENTISTS AND ENGINEERS AND TOTAL POPULATION



Source: 1978 estimate based on OECD figures

In practice, however, political reality was stronger than European ambitions. Both France and the Federal Republic of Germany developed a prosperous nuclear industry capable of providing keen competition on the world market. Consequently after a few years Euratom suffered its first crisis in the wake of which the JRC abandoned its research on the development of new commercial types of reactors and on the fuel cycle.

After several years, the JRC eventually embarked on non-nuclear research in 1973, and today nuclear research accounts for only 50% of its work. The six areas on which its work is concentrated today are as follows:

(a) nuclear safety and the fuel cycle,
(b) new sources of energy, especially solar energy,
(c) study and protection of the environment,
(d) nuclear measurements,
(e) specific support for the Commission's sectoral activities,
(f) operation of large-scale installations.

At present the Community's own research establishments employ about 2 260 research workers. They are fully financed by the Community. In the complicated discussions about their role, the establishments have defined three important functions for themselves:

(a) They want to carry out programmes of a 'central' nature in which they concentrate on research activities:
   — which justify the establishment of a broad research potential at Community level,
   — which call for the centralization of facilities of functions (e.g. by the creation of large-scale installations),
   — in which the JRC can act as a focal point or catalyst for coordination at Community level,
   — which can promote the application of new technologies throughout the Community.

(b) They perform a public service role meeting the needs of government organizations, universities, and industry for specialized equipment, know how, products and services. A significant factor in this respect is the independent position of the JRC and its impartial judgement.

(c) They provide services to the Commission by supplying scientific and technical expertise and support in the formulation and implementation of the Community's sectoral policies. An important development in this respect is the contribution which the JRC can make to scientific and technical cooperation with the developing countries within the development policies of the Community.

Indirect action: research under contract

The second possibility is Community research undertaken in the form of research contracts concluded with national teams, institutes or laboratories. The Community generally pays only half the costs while the remaining half has to be put up by the contractors concerned in the member countries. These indirect action projects generally involve an invitation to tender in the *Official Journal of the European Communities,* which any private or public undertaking in a Community Member State can follow-up.

The indirect action programmes are generally designed to bring together the best research teams in the Community countries. The programmes are prepared by the Commission in Brussels. The research workers continue to be employed in their own countries. There are only two exceptions (the biology and fusion programmes) in which Community scientists also work in the national laboratories in the individual Member States.

Indirect action projects, possibly in combination with the Joint Research Centre, make it possible to establish links and feedback between national and international research activities on the lines desired by the Community, providing incentives and aid in the way of funds for national research and at the same time offering means for coordinating national programmes.

Concerted action

The third form of action allows for national programmes and research work to be coordinated on a voluntary basis. A framework is defined at Community level and is then filled in

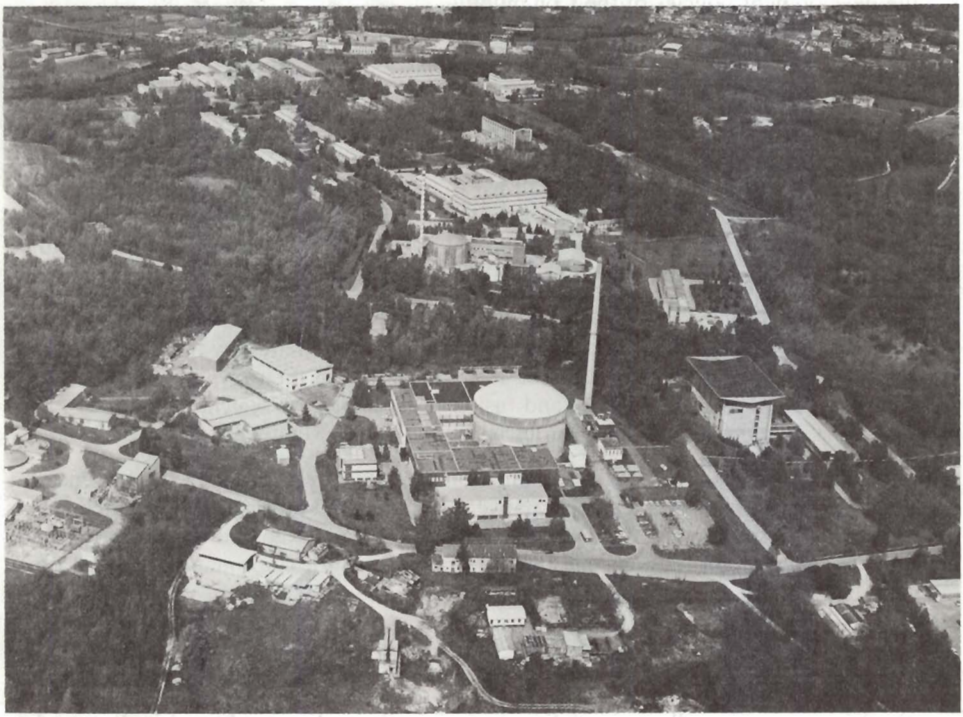
by the individual Member State on their own responsibility. The Commission does not contribute to the financing of the project but merely pays the coordinating costs.

Coordinating here implies joint definition of aims; avoidance of unnecessary duplication, organization of meetings of research teams and exchanges of scientists, and wide dissemination of research results.

5. How was the Community research policy evolved?

The institutional bases for research activities in the fields of coal and steel, nuclear energy and agriculture have already been described. They originated in the years 1951 and 1957.

(a) In addition to coal and steel research proper (such as the development of new production and mining methods) the ECSC concentrated on control of air pollution, hygiene and industrial health and safety.



Joint Research Centre, Ispra

(b) From the start Euratom suffered the requirement that decisions be unanimous. The very promising project for the development of a heavy-water reactor (ORGEL) foundered on the rocks of national self-interest, as did further Commission proposals for reactor developments in the years 1962 and 1964. The first crisis came to a head in 1965. 'A fair return' was the pretext behind which the small Community countries concealed their fear of the technological superiority of their larger partners.

(c) In 1965 the EEC formed the PREST group (scientific and technical research policy) aiming at the development of a Euratom approach to research cooperation. PREST compared the research policy situations in the individual Member States and concluded in 1967 that national activities should gradually be combined into a European association and form the nucleus of the Community's own research policy. Computers, new means of transport, marine research and meteorology were identified as some of the possible areas.

PREST also invited non-Member countries of the Community to take part in this cooperation. At an international conference of research ministers at Brussels in November 1971, attended by 13 other countries[1] in addition to the Community States, it put forward a number of proposals. As a result the countries represented signed seven international agreements on 23 November 1971, thus laying the foundation stone for research cooperation in the broader frame of 'COST'.

The significant decision was actually taken at the Paris summit conference of Heads of State or Government in 1972, which advocated the development of a common research policy. In July 1973 the Commission then put forward the first practical proposals, from which the Council of Ministers accepted four resolutions in January 1974, including an initial outline programme for science and technology. This programme was at the origin of the principles which the Community is following in its work today.

6. What is the future of Community research policy?

A complete rethink of Community research policy is now in progress. The first phase is coming to an end. In the next five-year plan (1981-85) some new ground will have to be broken. The political and economic background against which the first plan was evolved has deteriorated drastically, especially in respect of energy and raw materials, so that even greater emphasis than at present will have to be laid on these sectors. In view of the many research areas to be tackled, it is important to concentrate efforts in the best possible way and to use the existing resources even more efficiently.

This means that the Community must study ways both of introducing greater efficiency into the decision-making system with its many different committees and cumbersome procedures, and of evaluating more effectively the current research programmes. Without a

[1] Greece, Finland, Turkey, Yugoslavia, Denmark, Spain, Ireland, Norway, Austria, Portugal, Switzerland, Sweden, United Kingdom; these countries and the original six EEC members later came together in the COST Committee (European Cooperation in the field of Scientific and Technical Research) for loose-knit cooperation.

concrete evaluation of results it will become more and more difficult, especially with a directly-elected European Parliament, to justify the funds spent to the people of Europe.

In any case, opinions differ on the volume of funds required for the Community's own research policy. The Scientific and Technical Research Committee (CREST) has pointed out that the Community Member States together devote slightly more than 10% of their research funds to international cooperation (bilateral agreements, European Nuclear Research Centre (CERN) in Geneva, European Space Agency (ESA) in Paris, etc.). Less than 20% of this goes to Community research. Research is not cheap and good research in particular costs money. Numerous Community projects financed as a result of a political compromise between different countries suffer from inadequate funds. Further thought must be devoted to this point in the future.

Community-supported research should not be fashionable research, constantly trying to adapt to the fads of the moment. On the other hand, it must always remain sufficiently flexible to be able to tackle at short notice a new subject that acquires major importance under a sectoral policy.

From time to time the Commission also takes a critical look at the range of instruments available for its research policy. All in all Brussels regards the development of the JRC as satisfactory. There are indications of a new drive and efficiency; after the years of violent disputes and difficult adjustments the JRC is now expected to enter on a phase of stability in which it can perform its true function and consolidate its reputation in the scientific world.

Among the indirect action projects, there have been in some cases criticisms that their scope is too restricted, procedures are time-consuming, contracts are too fragmented and there is an inadequate overall review of the final results. However, because of joint financing, this form of action is the most likely to arouse national interest in European research cooperation. The coordinating side-effect is also viewed as an advantage.

The other instruments for the coordination of national research programmes, however, have not yet really caught on. The difficulty is that in the Member States there is no uniform concept of research policy. National systems range from extensive decentralization (United Kingdom) to rigid centralization (France). National objectives cannot be uniformly defined and are therefore difficult to compare. In some cases the ways in which research is financed also differ considerably.

The Scientific and Technical Research Committee (CREST), which is responsible for coordination, entertains no illusions about its limitations and difficulties. It endeavours to keep up with developments in the individual countries and to evaluate trends and changes in national objectives for Community research policy.

All in all, however, it is fair to say that the foundations for a successful Community research policy have now been laid. The programme has taken shape. The range of instruments has been made clearer. The Commission has taken another step forward and instituted a long-range analysis programme to pave the way for further considerations on the development of the research policy. The aim is to give thought, far in advance of future decisions on projects and programmes, to the research projects that will be required in specific fields. This programme is known as FAST — forecasting and assessment in the

field of science and technology — and invitations to tender were published for the first time in April 1980. Its work concentrates on three problems areas:
— work and employment,
— the information society,
— the biosociety.

The FAST programme — a Community indirect action programme — is limited to five years in the first instance and has been allocated 4.4 million units of account. The idea is that in the three fields mentioned above FAST will identify and define long-term priorities for research that can make a direct contribution to forecasting or solving problems and conflict looming up in the future.

ANNEX

Common policy
on science and technology
R&D programmes

1.5.1980

		1977	1978	1979	1980	1981	1982	1983	1984	1985
I. DIRECT ACTIONS										
— JRC ..	AD	346 M	2.340 P	Ⓡ	2.280 P					
					510,87 ME		2.280 P			
II. INDIRECT, CONCERTED ACTIONS AND OTHER RESEARCH PROGRAMMES										
1. LONG-TERM SECURING AND RESOURCES										
1.1. Energy										
1.1.1. New forms of energy										
— Solar energy	AI	Ⓡ	17,5 M	6 P		46 ME		9 P		
— Geothermal energy	AI	Ⓡ	13 M	4 P		18 ME		7 P		
— Utilization of hydrogen	AI	Ⓡ	13,24 M	4 P		8 ME		4 P		
— Energy saving	AI	Ⓡ	11,38 M	6 P		27 ME		5 P		
— Systems analysis	AI	Ⓡ	3,86 M	7 P		6 ME		9 P		
1.1.2. Nuclear fission										
— Plutonium recycling	AI		4,75 ME	3 P		20 ME		9 P		
— Management and storage of radioactive waste	AI	Ⓡ	19,16 ME	4 P		43 ME		10 P		
— Safety of thermal water reactors	AI				6,3 ME		3 P			
— Decommissioning of nuclear power plants	AI				4,7 ME		3 P			
— Reactor development and advanced technologies					•					
1.1.3. Nuclear fusion										
— Controlled thermonuclear fusion	AI		124 M	Ⓡ	113 P					
					190,5 ME			113 P		
— JET	EC		102,4 ME		150 P					
					145 ME			150 P		
1.1.4. Radiation protection (cf. 2.2.)										
1.1.5. Coal										
— Mining technology	CECA	••								
— Upgrading of products	CECA	••								
1.2. Resources										
1.2.1. Raw materials										
— Primary raw materials	AI			18 ME	8 P					
— Uranium (extraction and exploitation)	AI		3 ME	3 P						
— Urban and industrial waste recycling	AI				9 ME	Ⓡ	5 P			
— Paper and board recycling	AI		2,9 ME	2 P						
1.2.2. Agriculture										
— Joint programmes and coordination programme					18,602 ME		•			
2. ENVIRONMENT, HEALTH AND QUALITY OF LIFE										
2.1. Environment										
— Environmental protection	AI		20,8 ME		10 P		51 ME		18 P	
— **Sewage sludge**	AC			0,14 M						
— Atmospheric pollutants	AC			0,5 ME	2 P					
— Organic micropollutants in water	AC			0,48 ME	1 P					
— Climatology	AI			8 ME	3 P					
— Town planning	AC		0,2 ME				1,5 ME		2 P	
— **Pollution in iron and steel industry**	CECA	10 M								
— Control of pollution in iron and steel industry	CECA						15 ME			
2.2. Radiation protection										
— Radiation protection	AI	39 M		68 P						
							59 ME		84 P	
2.3. Health and safety										
— Congenital abnormalities	AC			0,33 ME						
— Cellular ageing	AC			0,4 ME						
— Extracorporal oxygenation	AC			0,36 ME						
— Thrombosis	AC									
— Hearing	AC						2,32 ME	4 P		
— Perinatal monitoring	AC									
— Electrocardiography	AC									
— Chronic respiratory diseases	CECA		5 ME							
— Ergonomics and rehabilitation	CECA		9 M			13 ME				
— Industrial hygiene in mines	CECA		7 ME					10 ME		
— Safety in mines	CECA		7,5 M				10 ME			
3. ECONOMIC DEVELOPMENT										
3.1. Conventional technologies										
— Steel	CECA	•								
— Textiles		0,25 M			4,2 ME		2 P			
— Footwear			0,235 M							
— Ceramics						4,5 ME		2 P		
— Foodstuffs	AC		0,25 ME							
					0,287 ME		1 P			
3.2. New technologies										
3.2.1. Data processing										
— Data processing programmes		•								
				2,255 M						
					25 ME					
3.2.2. Bio-technology										
— Biomolecular engineering	AI					26 ME		8 P		
3.3. Support activities										
— Computer translation					3,3 ME		3,75 ME			
— EUROTRA								7,7 ME		
— Community Bureau of References	AI	2,7 M	7 P		10,3 ME		14 P			
4. SCIENTIFIC AND TECHNICAL INFORMATION AND DOCUMENTATION										
— STID		1,75 M		9,5 ME						
III. PROSPECTIVE STUDIES, PROGRAMMES FOR STIMULATING THE EFFECTIVENESS OF R & D										
— FAST							4,4 ME	10 P		
— Scientific and technical training			4,6 M		6 P		11,3 ME		8 P	
		1977	78	79	80	81	82	83	84	85

®: Date of revision of the programme
A.I.: Indirect action.
A D.: Direct action.
A.C.: Concerted action.
CECA. ECSC action.
□: Other action.

Programmes decided
Programmes approved by the Commission

• Annual budgetary appropriations
•• Not budgetizing programmes

P: Staff members
M: Million u.a.
ME: Million EUA

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European Communities — Commission

The European Community's research policy

Luxembourg: Office for Official Publications of the European Communities

1980 — 28 pp., 1 tab., 4 ill. — 16.2 × 22.9 cm

European Documentation Series — 5-1980

DA, DE, EN, FR, IT, NL

ISBN 92-825-2020-X

Catalogue number: CB-NC-80-005-EN-C

BFR 40	DKR 7	DM 2,50	FF 6	IRL 0.65
LIT 1 200	HFL 2,60	UKL 0.65	USD 1.30	

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It describes the research projects conducted by the Community in its own centres and carried out in cooperation with national research institutes.

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Science and research are foundation stones for long-term economic development. The pace of progress depends on them as much today as in the past.

It was therefore inevitable that from the outset the European Community would be involved in them. In the future much will depend on whether the European countries and the European Community show themselves capable of adopting a policy commensurate with the issues at stake.

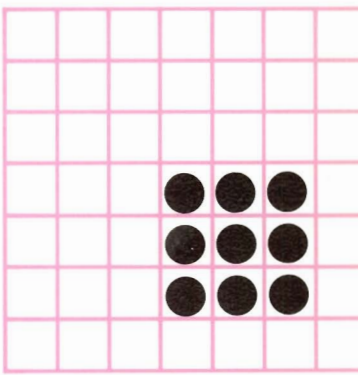
What can and must the Community do to encourage research within its territory?

The Community has no intention of taking over from the industrial and government research effort in the Member States. However, it is in a position to carry out in its own research centres and with its own funds various specific projects that serve the common interests of the Community.

It can also provide financial support of up to 50% of the cost for certain projects carried out by one or more Member States.

The Community also has a coordinating role. Its main aim is to facilitate discussion between those responsible for national research projects. These discussions can cover a wide variety of aims and achievements.

The Community is currently giving priority to the execution and promotion of research in several key areas. The first is the security of our supplies of raw materials (energy, food, other raw materials), followed by efforts to increase the competitiveness of industry, then the improvement of living and working conditions and finally the protection of our environment.



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ISBN 92-825-2020-X

Catalogue number: CB-NC-80-005-EN-C