

# industry research and technology

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- \*\* INDUSTRIAL RESEARCH UNDER CONTRACT currently accounts for less than 5% of R&D expenditure by industry in the Benelux countries, France and Germany and less than 3% in Italy. Present trends suggest that such research might ultimately run to 10% of industry's spending on research. This emerges from the studies which the Commission of the European Communities has had carried out in the various Member States to obtain a better understanding of R&D (subcontracting in industry, the scale of it, its advantages and disadvantages and the part it can play in the general organization of research. The Commission will shortly publish a report summarizing the results of these studies for the Six. Details are given in ANNEX 1.
- \*\* From 1958 to 1972, the aid granted by the European Coal and Steel Community (ECSC) to RESEARCH PROJECTS IN THE COAL SECTOR amounted to nearly 43 million units of account (one unit of account is equivalent to about one dollar). The aid granted annually to STEEL INDUSTRY RESEARCH currently runs to about 6 million u.a. annually and the volume of credit currently held by the ECSC for steel industry research is of the order of 60 million u.a. ANNEXES 2 and 3 give some details of coal and steel research carried out under ECSC auspices.

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Division for industrial and scientific information  
200, avenue de la Loi  
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*The information and articles published in this Bulletin concern European scientific cooperation and industrial development in Europe. Hence they are not simply confined to reports on the decisions or views of the Commission of the European Communities, but cover the whole field of questions discussed in the different circles concerned.*

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\*\* At the end of the summer of 1972, the economic situation in most of the Member States was marked by an INTENSIFICATION OF THE TREND TOWARDS GREATER ECONOMIC ACTIVITY and 1973 is expected to be a year of healthy growth for the Community.

Increased industrial production has raised the level of employment. The table below shows THE TREND OF INDUSTRIAL OUTPUT:

(Change as % of corrected index of seasonal fluctuations)

	I	1971				1972		II/72 compared with II/71
		II	III	IV	I	II		
Community	+2.6	-1.5	+1.5	-0.2	+3.4	+1	+4	
Belgium	+3.1	-4.1	+1.8	+1.9	+4.7	+3	+12	
France	+2.5	0	+4.2	+1.2	+2.3	+0.6	+7.9	
Germany	+3.8	-1.2	-1.3	-1.3	+5.1	-0.6	+2	
Italy	-1.4	-2.9	-2.0	+5.6	0	-0.9	+2.7	
Luxembourg	+1.5	+5.3	-0.1	-2.7	-0.5	+7	+2	
Netherlands	+2.6	+1.1	+0.9	+1.1	+4.2	+2.2	+8.6	

COSTS AND PRICES, however, continue to rise steeply, as the table below shows:

CONSUMER PRICES IN THE COMMUNITY COUNTRIES

(% change)

	I	1971				1972		II/72 compared with II/71
		II	III	IV	I	II		
Belgium	+1.8	+1.0	+1.7	+1.0	+1.1	+1.5	+5.0	
France	+1.3	+2.6	+1.3	+1.4	+1.3	+1.5	+5.5	
Germany	+2.5	+1.1	+0.8	+1.3	+2.1	+1.1	+5.2	
Italy	+1.1	+1.0	+1.2	+1.3	+1.2	+1.7	+5.1	
Luxembourg	+2.2	+1.1	+0.6	+1.5	+1.0	+1.7	+4.4	
Netherlands	+3.0	+1.9	+1.7	+1.5	+2.5	+1.9	+7.8	

\*\* The Commission of the European Communities is to step up its activities aimed at protecting CONSUMERS. Mr Borschette, the Commission member with special responsibility for consumer problems, has decided to maintain regular contacts with the European Organizations representing consumers' interests.

The Commission has made provision in its draft budget for 1973 for an appropriation of eight million Belgian francs in order to help EUROPEAN ORGANIZATIONS REPRESENTING CONSUMERS' INTERESTS to formulate certain opinions more effectively.

\*\* ENVIRONMENTAL POLLUTION BY EXHAUST GASES FROM DIESEL-ENGINED VEHICLES TO BE APPRECIABLY CUT DOWN IN THE COMMUNITY: In August the Council of Ministers adopted a directive on measures to be taken against polluting exhausts from the diesel engines of motor vehicles. A proposal for such a directive had previously been submitted by the Commission under the General Programme for the removal of technical barriers to trade (see IRT No. 127).

The object is to establish an acceptance procedure for motor vehicles which would be applicable throughout the Community. The present directive is an important step towards this aim, since it seeks to reduce pollution by diesel-engined vehicles to the lowest level which is attainable by current technology and at the same time economically viable.

Each type of vehicle submitted for acceptance must in future pass two tests, one fully laden on a test rig and another freely accelerating from standstill, during which limiting values for density of fumes emitted must not be exceeded. On every vehicle of the same type as the accepted prototype, the result of the free acceleration test must be marked in an easily visible place, to enable the competent authorities to ascertain what fumes are emitted by vehicles in circulation. Member States must introduce the necessary provisions for the implementation of the directive by 2 February 1974.

This new directive is of particular importance for pollution control; up till now, several Member States had no regulations on the matter and those of the other Member States were not very strict.

\*\* ENERGY AND STEEL CONSUMPTION PER HEAD in the Community in 1970 was 4.456 tce (tons of coal equivalent) for energy in all forms, and the equivalent of 470 kg of crude steel for steel. The consumption of electrical energy (for industrial and other uses) was 2,742 kWh per head. The average world consumption per head, still for 1970, was 1,300 kWh for electricity and 160 kg of steel.

The table below shows energy and steel consumption per head in 1970 for the various countries:

	Energy	Electrical energy		Steel
	Total tce	Industrial uses kWh	Other uses kWh	Crude steel equivalent kg
Belgium	6.023	1,972	892	470
France	4.231	1,581	985	443
Germany	5.477	2,071	1,479	659
Italy	2.935	1,267	665	352
Luxembourg	19.637	5,881	1,320	470
Netherlands	5.316	1,502	1,296	390
Community (Six)	4.456	1,672	1,070	485
Denmark	5.893	752	1,910	444
Ireland	2.514	(570)	(1,050)	128
Norway	8.430	8,370	4,908	432
UK	5.760	1,647	2,191	438
Community (Ten)	4.804	1,736	1,337	467
Canada	9.880	(5,817)	(3,000)	529
Japan	3.666	(1,860)	(1,228)	603
USSR	-	(1,896)	(698)	436
USA	10.957	(3,300)	(4,000)	682
World	-	1,300		160

- \*\* A LARGE DELEGATION from the European Parliament Committee on Research, Energy and Atomic Problems paid a STUDY AND FACT-FINDING VISIT to the Ispra Establishment of the Joint Research Centre on 11-12 September 1972. Led by its chairman, Mr Springorum, a German member of the European Parliament, the delegation held detailed talks not only with the Director-General of the establishment and his staff but also with personnel representatives. The Parliament delegation supported the Commission's decision to involve the Joint Research Centre in non-nuclear activities and emphasized the need for a long-term research programme.
  
- \*\* Research conducted at various centres, including the Community's Joint Research Centre (see IRT No. 140), suggests that HYDROGEN COULD BE PRODUCED UNDER ECONOMICALLY ACCEPTABLE CONDITIONS BY THE THERMAL DISSOCIATION OF WATER, by using suitable cycles involving, for example, heat of nuclear origin. The use of imported petroleum for the production of hydrogen would thus be avoided. The Commission of the European Communities has accordingly decided to have a study carried out on the various possibilities for producing hydrogen by the thermal dissociation of water.
  
- \*\* The Commission of the European Communities is to have a study carried out on the ECONOMIC CONSEQUENCES OF THE EXISTENCE OF DIFFERENT NATIONAL TELECOMMUNICATIONS SYSTEMS from the standpoints of research and development, industrial production and markets in the Community.
  
- \*\* An international symposium on THE ENVIRONMENTAL HEALTH ASPECTS OF LEAD, organized jointly by the Commission of the European Communities and the United States Environmental Protection Agency, will be held in Amsterdam on 2-6 October 1972. Over 450 people from 25 countries, from medical and public health services and from industrial and administrative circles will attend the symposium and about 100 reports and papers will be presented.

CONTRACT RESEARCH IN INDUSTRY

Research under contract currently accounts for less than 5% of the money spent on R&D by industry from its own funds in the Benelux countries, France and Germany and less than 3% in Italy. It may therefore be wondered why research and development under contract plays so small a part despite the undeniable advantages it can offer and what its place will be in the future as a method of organizing R&D.

In 1970, realizing that the concept of research under contract was inadequately understood, the Commission of the European Communities asked four Member State organizations to carry out a nation-wide study of the economic phenomenon of research under contract in industry (excluding research farmed out by the public authorities), to investigate the behaviour of parties to such contracts and to assess the development potential of this method of organizing R&D. The Centre for European and International Research at the University of Grenoble was then asked to draft a summary report, on the basis of the national findings, concerning research under contract in the Six. This document, shortly to be published by the Commission, should provide a large number of firms with information on the advantages and drawbacks of research under contract and on the prerequisites for its successful execution and should make it easier for the public authorities to assess its utility.

Advantages of research under contract

Contracting out enables execution of R&D programmes to be rationalized. Firms can run their research laboratories on an economic footing by using them to full capacity, since occasional overloads can be farmed out. Also, contracting out makes it possible to use outside experts or facilities without which the planned programmes could either not be carried out at all or only after too long a delay. Finally, contractors may be less restricted in their attitude than the firm's staff, who are accustomed to the routine of a certain type of research.

The problems

The main disadvantages of farming out research, in the view of the customer, appear to be fear of security of breaches and the potential loss of knowhow since the scientific personnel are in a less favourable position to exploit the results of research in which they have not been concerned. However, these arguments seem to stem rather from a short-term than a long-term view and the report published by the Commission discusses the extent to which they are justified.

In turn, contractors find it difficult to muster sufficient funds for survival, in view of the considerable fluctuations in the volume of work assigned to them.

The use of contracting out in R&D poses particularly thorny problems for small and medium-sized firms. It is extremely difficult for firms without their own research laboratories to draw up a research programme and then to adapt and exploit the results obtained. Those possessing a research department rarely have the financial means necessary for awarding long-term contracts and can not easily withstand the contingencies and setbacks inherent in research. Finally, besides the cost of contracting out, they are also unlikely to be able to bear the costs of adapting the results obtained and transforming them into a commercially marketable form.

The problems posed by research under contract when joint contractors are unevenly matched should also be underlined. Some laboratories belonging to large firms can cause customers of lesser economic and financial might to lose their independence. This problem is also experienced by contractors who are too dependent on a single customer.

The future of contract research

The advantages of farming out R&D to the rationalization of industry's research effort are undeniable. Nevertheless, because of (a) the present concentrations in European industry (which reduce the volume of research under contract), (b) the increase in agreements between firms in order to strengthen cooperation between R&D laboratories and (c) the almost insuperable difficulties which face customers who wish to farm out work



when they lack their own laboratories or the financial resources essential for the exploitation of results, it is likely that this method of organizing research will have only a limited development. Current trends suggest that research under contract is unlikely to exceed 10% of R&D expenditure in industry.

COAL RESEARCH CARRIED OUT UNDER ECSC AUSPICES

From 1958 to 1972, the aid granted by the European Coal and Steel Community (ECSC) to research projects in the coal sector amounted to nearly 43 million u.a. About one-third of the research contracts concluded with some 150 beneficiaries are still in hand. The period of these contracts varies from two to four years, depending on the scale of the project; Community aid represents about two-third of their total cost. The aid granted by the ECSC in the last 12 years amounts on average to 10-15% of the total expenditure on coal research by firms and research centres.

Until 1957, the ECSC's technical research activity on coal was concentrated on the establishment of bases for cooperation between research workers and collieries.

Financial aid was initially granted at the end of 1957. The first grants were to research on strata pressure, sudden outbreaks of firedamp, pockets of firedamp and their clearance, chemistry and physics of coal and coking techniques.

During the period 1964-67, owing to the situation in coal mining and on the coal market, greater emphasis was placed on the achievement of the following aims: greater productivity, higher yields and the opening-up of new outlets for coal.

During the period 1967-68 it was realized that the increasing number of pit closures was placing an additional strain on the ECSC budget and that, in other words, the volume of aid which could be used for research was smaller. This fact led the Commission's departments to specify still more precisely the direction which work was to take; thus, in 1969, a medium-term aid programme was adopted for 1970-74. This programme relates to three sectors: mining techniques, the coal industry and the valorization of coal.

The objectives proposed in this programme may be summarized as follows: the concentration of research in sectors where results can be achieved in reasonable times, the harmonization and coordination of research work undertaken in the Community on coal, the streamlining of the selection procedure for aid applications which are of considerable practical interest and, finally, determination of the main research projects to whose financing the Commission hopes to contribute.

The criteria used are normally the objectives of the energy policy and research policy in general and then, basically, the value of the research project, i.e., the gains in productivity and profitability and the repercussions it might have on working conditions and finally, of course, the Community's interest and the foreseeable date of completion of the work.

The Commission of the European Communities handles the dissemination of the results and knowhow. Since 1966 it has published in particular coal research bulletins ('Bulletins de recherche charbon<sup>10</sup>') which contain reports on the various research projects and, since 1970, an annual progress report on the work carried out, the results obtained, future prospects and any negative results. In the case of research projects divided among a number of Community research centres, summary reports are also published. Information is disseminated by the publication of specialized journals, and papers presented at scientific symposia and congresses. Finally, information sessions are organized on specific problems.

It may further be noted that a line of credit amounting to date to 200,000 u.a. has been opened to cover the translation and utilization of documents published in little known languages (Russian, Polish, Arabic, etc) and thus to render documents on the coal-mining techniques of those countries accessible to Community research personnel.

STEEL RESEARCH CARRIED OUT UNDER ECSC AUSPICES

The aid earmarked for steel research under the Treaty establishing the European Coal and Steel Community (ECSC) currently amounts to some six million u.a. annually. These credits have thus considerably increased since the early years of the ECSC'S existence, when they amounted on average to some 2.9 million u.a. annually, in order to cover the increasing requirements of competitiveness, productivity and, more particularly, quality which the Community steel industry has to meet.

The ECSC's activities in technical research on steel began in 1955. An initial programme of research was published in 1963 by the ECSC High Authority. The research projects are selected by a committee consisting of experts from all the Member States. The range of research is very wide and covers the various stages of steel production, namely, research on blast furnaces, steel mills and rolling mills. Basic research is also carried out on the most varied subjects, such as physical metallurgy and measuring methods. As most of the research extends over a number of years, the volume of credits currently held by the ECSC for steel research is of the order of 60 million u.a. In all, the ECSC is helping to finance about 100 projects.

The six million or so u.a. currently granted annually by the ECSC to steel research of Community interest represent barely 70% of the aid actually spent on such research, since the ECSC does not finance it in its entirety, but merely provides additional support. The aid to such research can thus be computed as more than eight million u.a. While such aid represents an undoubtedly effective instrument of action, it should nevertheless be borne in mind that those eight or nine million u.a. annually represent only 5% of the total aid spent on research by the Member States' steel industries. Better coordination of research, both under the ECSC Treaty and outside its scope, is necessary and the Commission of the European Communities is continuing its efforts to this end.

A draft medium-term research programme in the field of technical research on steel, which should serve as a basis for a debate on the general lines this research should take, was adopted by the Commission of the European Communities in July 1971 and is currently being examined in detail by the ECSC Consultative Committee. This document emphasizes in particular the repercussions brought about by the evolution of the world market on the concept of a competitive economy. Today, the Community industries as a whole have to face ever-increasing competition from the developing countries and in particular from Japan. This is why the concept of competition needs to be revised, with regard to cooperation in the field of technical research on steel. Cooperation in this field appears increasingly desirable between the Community industries in order to improve their competitiveness on the world market.

From 1973, the acceding countries, particularly Britain, will contribute to the financing of research through the medium of the ECSC levy and will receive the benefit of Community aid. Their research projects will thus be incorporated as far as possible in the medium-term research programme on steel, which may be finally adopted by the end of this year.

Information is disseminated through numerous publications; much of the information is also communicated at steel congresses organized under ECSC auspices. The next congress on steel is scheduled for 1974.