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# COMMISSION OF THE EUROPEAN COMMUNITIES

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Brussels, 17 June 1981

MULTIANNUAL  
R & D PROGRAMME OF THE EUROPEAN COMMUNITIES  
IN THE SECTOR OF RAW MATERIALS  
(1982 - 1985)

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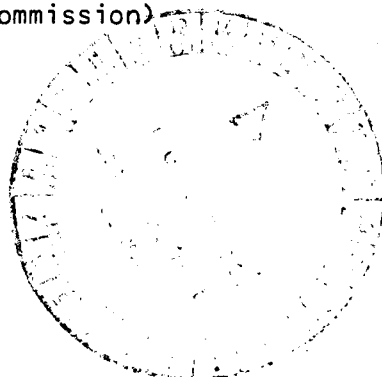
(Communication from the Commission to the Council)

Proposal for a  
COUNCIL DECISION  
adopting a research and development programme (1982 to 1985)  
in the raw materials sector

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(submitted to the Council by the Commission)

COM(81) 281 final



## CONTENTS

A. INTRODUCTION	1
B. PROGRAMME CONTENTS	7
Subprogramme I : Metals and Mineral Substances (formerly : Primary Raw Materials)	7
Subprogramme II : Uranium	13
Subprogramme III : Ceramics	14
Subprogramme IV : Wood as a renewable raw material	19
Subprogramme V : Recycling of urban and industrial waste	27
Subprogramme VI : Recycling of non-ferrous metals	28
Subprogramme VII : Substitution	34
C. IMPLEMENTATION AND MANAGEMENT OF THE SECTORAL PROGRAMME	42
D. WAYS AND MEANS	43
<hr/>	
PROPOSAL FOR COUNCIL DECISION	45

MULTIANNUAL  
R & D PROGRAMME OF THE EUROPEAN COMMUNITIES  
IN THE SECTOR OF RAW MATERIALS  
(1982-1985)

A. INTRODUCTION

The 1973-74 "energy crisis" made government authorities as well as the public acutely aware that, besides fossil fuels, the Community is also highly dependent on outside countries for its supply of most non-energetic raw materials.

For example, the Community imports approximately 69% of its copper requirements (as against 95% of its copper ores), 82% of its aluminium requirements (as against 75% of its bauxite), 80-85% of its tin and tin ore requirements and 98% of its titanium requirements (as against 100% of its titanium ores).

Numerous projects have studied this dependence on non-EC countries in respect of raw materials other than energy. For instance the OECD Interfutures project, a study of the problems which the member countries of that organisation will have to face by the year 2000, focuses on the very uneven distribution of raw material resources throughout the world. Generally speaking, 40% of mineral resources are located in the industrialized countries (United States, Canada, South Africa), 30% in the developing countries and the remainder in the State Trading Countries. More than three-quarters of the proven and estimated reserves of many materials (e.g. chromium, titanium, molybdenum, vanadium, platinum...) are concentrated in only three countries, all outside the Community.

The implications of this reliance on outside sources are well known:

- in the case of a number of minerals, there is a risk that conditions beyond the Community's control in producer countries may result in shortages of supply;

- the cost of these imports burdens the external trade balance and jeopardises the competitiveness of Community industry, especially in export markets;
- there is an adverse effect on internal economy and employment in the Community.

An awareness of this situation has promoted in most Member States action aimed at ensuring steady and dependable supplies of essential raw materials.

This has included: diversification of sources of supply, guaranteeing of mining investments abroad, stockpiling, increasing self-supply potential, greater use of secondary raw materials (recycling), development of renewable raw materials (e.g. wood), effecting raw material savings and the substitution of potentially scarce materials with those more readily available.

R & D actions will help to attain most of the objectives outlined above. More specifically, they are aimed at:

- the discovery of hitherto unknown native non-renewable resources entailing research into geology and into mineral prospection methods,
- improvements in the production of native renewable resources,
- the economic exploitation of native low-grade resources, both renewable and non-renewable,
- better utilisation of resources,
- the improvement of recycling, re-use and substitution.

R & D action in these fields will also help EC industry in its worldwide operations, produce exportable technologies and lead to significant energy savings.

There are a number of cogent reasons why a Community R & D programme in the sector of raw materials is needed in addition to the actions

carried out by individual Member States:

- The Member States of the EC have a number of problems in common. For example, certain materials are in short supply throughout the Community, indeed, as far as substitution is concerned, it is the same materials that are critical to all the Member States. In addition, low-grade resources of the same kind, such as mixed sulphide ores, slags and residues occur throughout the EC and the industry of the EC needs to improve its competitiveness on the world market.
- Certain natural conditions, such as climate (e.g. for wood growth) and basic geological structures are common to several countries.
- Additional benefits are gained by work done by teams of experts from several Member States pooling their efforts to solve a particular problem.
- Unnecessary duplication of research is avoided, gaps in research coverage are eliminated and equipment, funds and human expertise are used in the most efficient manner.
- A catalysing effect is obtained by promoting the coordination of national research activities and the cooperation of scientists, and by more efficient circulation of results.
- Collaboration with Third Countries and international organisations may be facilitated.
- Funds for projects which industry would be naturally reluctant to support can be provided, e.g. projects of a long-term nature.
- Smaller industries, universities and research laboratories which do not have capital readily available for R & D can be assisted.
- Such a programme would create the scientific and technical basis for the establishment of a Community policy on raw materials supply.
- It would also help in developing industrial initiatives in regions of the EC which have valuable mineral resources.

In fact, the Council of Ministers on 20 December 1979 identified raw materials as a sector of high priority for Community research.

In recent years, several separate R & D programmes have been prepared, based on the work of the CREST standing subcommittee on raw materials R & D, and have been initiated in the fields of primary and secondary raw materials: "primary raw materials" (1), "uranium exploration and extraction" (2), "recycling of urban and industrial waste" (3), "paper and board recycling" (4).

These programmes have already promised or yielded valuable results. They are finished or will be ending in the near future and the time has now come a) to extend them, taking into account the evolution of research needs and b) to initiate other R & D actions in new areas or in areas that were incompletely covered before, namely in such topics of great interest as materials substitution, recycling of non-ferrous metals, and wood production and utilisation.

These various actions will be integrated into a single, sectoral R & D programme on raw materials in accordance with the policy recommendation of the Council of Ministers of 20 December 1979 on the regrouping of Community research programmes into sectors of foremost priority. This regrouping will help make clear the objectives of Community R & D action for well-defined sectors and should contribute to a streamlining of the preparation, examination and implementation of the programmes.

The sectoral programme is subdivided as indicated in table I.

Depending on which research area is considered in table I, practical results for use by EC industry should become available in the short, medium and long term (respectively about 5, 10, 15-20 years).

Results for use in the short term are expected in the areas of prospecting methods, ore processing and mining technology (subprogrammes I and II), recycling of urban and industrial waste (subprogramme V), recycling of non-ferrous metals (subprogramme VI). Subprogramme VII on substitution and part of subprogramme IV on wood should give results in the

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(1) OJ L 72, 14/03/78

(2) OJ L 72, 14/03/78

(3) OJ L 293, 20/11/79

(4) OJ L 107, 21/04/78



medium term. Geological studies (subprogramme I and II) and wood production are mostly long term objectives.

In implementing this proposal the Commission intends to maintain very close cooperation between industry, universities and other research organisations and national authorities.

The various subprogrammes are presented hereafter. A more detailed description is found in other documents:

- Subprogramme I : Document XII/1269/80
- Subprogramme II : Document COM (80) 382 Final
- Subprogramme III : Document COM (79) 273 and III/1127/79
- Subprogramme IV : Document XII/1319/80 Rev. 2
- Subprogramme V : Document COM (78) 407 final
- Subprogramme VI : Document XII/291/81 Rev. 2
- Subprogramme VII : Document XII/1270/80

TABLE I

PRIMARY RAW MATERIALS

Metals and mineral substances  
(formerly: Primary raw materials)

Subprogramme I

1. Exploration
2. Ore processing
3. Mining Technology

Uranium

Subprogramme II

1. Exploration
2. Extraction

Ceramics

Subprogramme III

1. Clay based materials
2. Technical ceramics

Wood

Subprogramme IV

1. Production
2. Harvesting, storage and transport
3. Wood as a material
4. Processing without modification of basic structure
5. Processing into fibre products
6. Source of chemical feed-stock

SECONDARY RAW MATERIALS

Recycling of urban and industrial waste

Subprogramme V

1. Sorting of household waste
2. Thermal treatment of waste
3. Fermentation and hydrolysis
4. Rubber waste recovery

Recycling of non-ferrous metals

Subprogramme VI

1. Collection and characterization of scrap and residues
2. Physical processes for the treatment of non-ferrous metals scrap and residues
3. Metallurgical processes for the treatment of non-ferrous metals scrap and residues

SUBSTITUTION

Subprogramme VII

1. Electrical and electronics industry
2. Surface treatments and coating
3. Technology of cutting and machining
4. Stainless steels and alloys
5. Others: Brazing and soldering technologies, Leather tanning

## B. PROGRAMME CONTENTS

### SUBPROGRAMME I : METALS AND MINERAL SUBSTANCES

(Formerly : Primary Raw Materials)

Recent discoveries in E.C. countries should act as a strong incentive to continued exploration. They tend to confirm the general feeling among geologists that new deposits remain to be found even if they are deep or concealed. Similarly, research on ore processing is a necessity because the high-grade deposits and "easy" ores of the E.C. territory are practically depleted, which results in a need to develop processing routes for indigenous resources. Mining technology should also be promoted for a number of reasons, in particular because progress in this field can be the decisive factor that will enable a previously marginally economic mine to be developed.

The first programme on primary raw materials (18 MEUA), initiated in 1978, has already yielded a number of valuable results. Foremost among these, in the research area of exploration, are the discovery of new tungsten occurrences in Greenland, the use of fluid inclusions in ascertaining the potential of veins for concealed ore in the UK, the obtention of characteristic spectral signatures of some molybdenum, copper, lead and zinc mineralisations by processing remote sensing data, and an aeromagnetic survey of Ireland which opens up interesting perspectives for future prospecting. Also important are various improvements of geochemical, geophysical and drilling techniques, particularly on : hydrogeochemistry, soil gas geochemistry, the in-situ determination of elements by X-Ray fluorescence and a generalized interpretation scheme of multi-method geophysical data.

In the area of ore processing techniques, important improvements in the general economy and mineral recovery have been obtained on complex lead-zinc ores from the Meggen mine (Federal Republic of Germany). Good results at laboratory scale have been achieved in the extraction of alumina from non-bauxitic sources as well as in the preparation of Al/Si alloys from leucitic rocks.

On mining technology, the management of the Masua mine (Sardinia) has adopted the recommendations of a multinational team working on predictive models for mining, stockpiling and ore treatment. Several patents have been applied for in the areas of ore processing and mining technology.

The present proposal deals with a large range of primary raw materials, excluding however iron, fossil fuels and building materials. In common with the first programme, it defines three main areas for R & D activities: exploration, ore processing and mining technology.

#### CONTENTS OF THE SUBPROGRAMME

##### RESEARCH AREA 1 : EXPLORATION

##### Objectives

Recent discoveries of deposits, some of them extensive, clearly show that mineral wealth still exists in the Community, which can help to reduce our external dependence for our supplies of primary raw materials and to improve our balance of payments. In this field, a role of primary importance must be accorded to improving geological knowledge and prospecting methods in order to provide Community industry with new means for mineral exploration, both within the European Community and outside it.

Although the first programme, where exploration was concerned, emphasized non-ferrous metals and was confined to dry land within the Community, it appears advisable to adopt a much wider field of application for this programme :

- it will cover a range of primary raw materials necessary to Community industry (with the exception of iron, energy minerals and building materials): for example copper, lead, zinc, aluminium, chromium, cobalt, nickel, molybdenum, titanium, manganese, vanadium, antimony, tin, tungsten, magnesium and a series of rarer metals that can be found in association with some of those listed above : platinum-group metals, lithium, niobium,

tantalum, zirconium, rare earths; finally, mineral substances such as phosphate, magnesite, asbestos, mica ...

- it will include the immediate near-shore areas of the continental shelf.
- research on prospecting methods can be extended to third countries, insofar as the resulting activities can lead to the discovery of minerals within the E.C. or provide the E.C. with techniques permitting the discovery of new and well diversified supplies.

#### Types of deposits to be considered

- Volcanogenic deposits : essentially for copper-lead-zinc-sulphides
- Stratabound deposits in a sedimentary environment : mainly for lead and zinc ores and for minerals such as sedimentary phosphates.
- Deposits associated with igneous rocks, namely :
  - . Granitic rocks (including quartz veins in general) : for minerals of copper, lead, zinc, molybdenum, tungsten, tin, lithium, antimony, rare earths.
  - . Basic and ultrabasic rocks : for minerals of chromium, platinum, nickel and copper.
  - . Alkaline rocks : for rare earths, phosphates, niobium-tantalum.
- Residual concentrations : for nickel, chromium, manganese ores and bauxites.
- Mineralisation on the continental shelf : heavy minerals sands (for tin, titanium, rare earths ...), extensions of on-land mining districts onto the shelf.

#### Research topics

##### 1.1 Geology of ore deposits and of their host rocks

Since exploration nowadays must be directed towards the discovery of concealed or even deep seated deposits, the sites suitable for in-depth research - which, of necessity, is costly - will have to

be selected with particular care. It is therefore necessary to obtain the most accurate information possible on the geological controls of ore genesis and of deposit distribution.

1.2 Geochemical methods

- 1.2.1 Problems of sampling, analyses, data processing and interpretation of results (including applications to geochemical mapping)
- 1.2.2 Soil and stream-sediment prospecting
- 1.2.3 Rock geochemistry
- 1.2.4 Hydrogeochemistry
- 1.2.5 Soil gas geochemistry
- 1.2.6 Biogeochemistry (botanic geochemistry)

1.3 Geophysical methods

- 1.3.1 Airborne methods
- 1.3.2 Ground methods
- 1.3.3 Geophysical borehole logging

1.4 Remote sensing

1.5 Drilling techniques

1.6 Statistics and geostatistics applied to exploration data

RESEARCH AREA 2 : ORE PROCESSING

Objectives

The reasons for supporting R & D in the field of ore processing are essentially the same as when the first R & D Programme was prepared, with the difference that a rather more unstable world political situation makes the exploitation of indigenous E.C. resources even more a priority than before. Those indigenous resources for which processing routes should be developed, include low grade ore deposits,

complex ores, oxidized ores, some aluminous minerals, and also large amounts of slags and residues from metallurgical plants.

### Research topics

- 2.1 Complex lead, zinc and copper ores
  - 2.1.1 Crushing and grinding\*
  - 2.1.2 Flotation and other physical treatment methods
  - 2.1.2 In-situ leaching
  - 2.1.4 Improvements in metal winning processes
- 2.2 Other complex and oxidized ores, particularly those containing tin, tungsten and titanium
- 2.3 Aluminium from low-grade sources, such as leucitic lavas and tuffs, clays, coal wastes, micaceous kaolin residues, alunites and low-grade bauxites
- 2.4 Chromium from low-grade sources
- 2.5 Phosphates : beneficiation and treatment of low-grade E.C. phosphate-bearing materials, as well as phosphates from outside sources other than the two main suppliers (Morocco, Florida)
- 2.6 Slags and residues from metallurgical processing, regarded as complex low-grade sources of metals such as copper, lead, zinc, silver, titanium.  
(Even though this topic is closely related to the recycling of non-ferrous metals it is included here because of similarities in processing technology)
- 2.7 Modelling and control in mineral processing
- 2.8 Improved mineralogical analysis (in order to predict the behaviour of rocks and minerals in physical and physico-chemical processing and to analyse the performance of plants and unit processes).

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\* This is also applicable to topics 2.2 to 2.6 inclusive

RESEARCH AREA 3 : MINING TECHNOLOGY

Objectives

Beside the strong political and strategic reasons that push the Community to promote a more exhaustive exploitation of known mines in the EC, there is a general need to help the economics of exploiting deeper mines and marginally economic deposits through improvements in the various mining techniques used, as well as through reduction of investments and operating costs.

Research topics

3.1 Problems associated with depth

3.2 Marginally economic deposits

- . Inventory of high grade - low tonnage deposits
- . Production of integrated mobile plants
- . Rock mechanics and stability
- . Improved mining tools and methods

3.3 Geostatistics and modelling in mineral exploitation

INDICATIVE DISTRIBUTION OF FUNDS WITHIN THE SUBPROGRAMME ON METALS AND MINERAL SUBSTANCES

Research area 1 : 35-40%

Research area 2 : 50-55% \*

Research area 3 : 10%

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\* This percentage takes into account the possibility of financing construction and exploitation of some pilot plants.



SUBPROGRAMME II

URANIUM EXPLORATION AND EXTRACTION

This subprogramme provides for a follow-up to the first research and development programme in the field of uranium exploration and extraction which was adopted by the Council on 6 March 1978.<sup>1)</sup>

This decision (78/246/EURATOM) was modified by the Council on 28 April 1981<sup>2)</sup>, the new decision extending the period of the first programme to five years ending on 31 December 1982. The extension is based on the content of the proposed subprogramme.

The programme comprises two research areas:

Research Area I : uranium exploration

Research Area II : uranium extraction and recovery

A detailed description of subprogramme II is given in document COM(80)382 fin.

Additional funding may be required to extend the subprogramme beyond 1982.

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1) O.J.L72, 14.3.1978

2) O.J.

SUBPROGRAMME III

CERAMICS

Based essentially upon clay as the raw material, ceramics are characterized by various properties (such as high resistance to heat and wear, chemical inertness, electrical behaviour, mechanical strength) which have led to their use in a whole range of industrial products from domestic ceramics to areas of advanced technology.

The ceramics industry plays an increasingly important role and many other industrial sectors depend on ceramic components for their further development and growth. Yet the ceramics industry is beset by problems of technological development and innovation which require for their solution a well-planned and coordinated research effort. Such research carried out at Community level would not only benefit the ceramics industry itself, but strengthen the technological base of Community industry in general.

It is proposed to promote research in two main areas .

- 1) - Clay based materials
- 2) - Technical ceramics.

CONTENTS OF THE SUBPROGRAMME

RESEARCH AREA 1 : CLAY BASED MATERIALS

Motivation and objectives

The ceramics industry still finds itself confronted in practice to a variety of technical problems, such as abnormal reactions of its bodies, technically unexplainable losses in drying and firing, variations of properties in the end products. At present, those problems are to a large extent dealt with empirically. Among other consequences, this has prevented the development of applications for lower-grade clays and resulted in the unnecessary use of high-grade clays for common products. It has also brought about the closing down of plants in regions where higher quality material was exhausted, thereby causing employment problems.

Thus a more thorough understanding of the raw material and of its behaviour during processing is required in order to improve fabrication control and facilitate the development of new products and processes.

Research in this area should therefore promote a better utilization of clay raw materials, including the use of a variety of clays. It should also lead to reduction of losses due to fabrication faults, and result in energy saving.

Research topics

1.1. Characterisation of raw materials and of their intrinsic properties.

This topic includes research on the chemical and mineralogical composition of selected clays, their texture and sorption properties. Apart from the various clay minerals, it will be necessary to study other constituents of ceramic materials such as feldspars and quartz.

Results obtained elsewhere in basic research on clays should be taken into account here when promoting new research. Quantitative assessments of suitable raw materials could be considered under this heading.

## 1.2. Study of the manufacturing sequence

This topic covers the following processes :

### 1.2.1 Rheology and shaping

The following shaping processes will be studied : Plastic shaping (extrusion, turning), casting, pressing , and research will be done on rheological properties :

- clay - water systems,
- ceramic - water systems,
- the shaping behaviour of ceramic bodies.

### 1.2.2 Drying. Studies on :

- the behaviour of clay minerals,
- the drying mechanism of bodies,
- the drying behaviour of products.

### 1.2.3 Firing. Studies on :

- the behaviour of clays during firing,
- the behaviour of bodies during firing,
- the firing behaviour of products.

### 1.2.4 Characterization of the finished products

Generally speaking, projects under this research area 1 should be aimed at :

- identifying, analyzing and possibly curing ceramic fabrication faults which lead to losses in the industry. This would involve studies of the relationship between original body composition, preparation and firing conditions

- understanding the relationship of composition to fired properties.  
With the increase in "dust-pressing" processes and the use of organic plasticizers, the "plasticity" of a clay is becoming less important; lower-grade clays consisting of mixed-assemblage clays (i.e. multiminer-  
al species), will become increasingly important
- ascertaining the response of clays of different compositions to fast-firing trials.

Refractory materials and feldspathic clays will also be considered.

## RESEARCH AREA 2 : TECHNICAL CERAMICS

### Motivation and objectives

Industrial ceramics are increasingly used as structural elements under extreme operating conditions, as electrical insulators, as semi-conductors in electronic circuits and in more massive form in a variety of process equipment components. Since this field is developing rapidly, technical research is needed to keep EC industry competitive. Its main objective will be to obtain a better quality of ceramics for specific uses through the improvement of generic technologies.

### Research topics

#### 2.1. Powder processing technology

Research under this heading will be aimed at optimising technology for particular products or purposes and at developing and characterising the optimised powders.

It will cover, as the most important points, the technology of powders of zirconium oxide, tin oxide, alumina, beta-alumina, zinc oxide, magnesium oxide and the powders of mixed oxides (zirconium oxide, silicon oxide, alumina, titanium oxide), and can be extended later to other powders such as those of silicon nitride, silicon carbide, carbon, titanate, zirconate, niobates and ferrites.

For each powder, research will cover the technology of producing the powders, of using the powders and of producing materials manufactured from these powders.

2.2. Improvement of the fabrication cycle for various ceramic materials

Research here will be aimed at improving such characteristics as mechanical strength, electrical properties, insulating properties and life-time. Materials to be studied include oxides of aluminium, tin and zirconium, as well as refractories.

Subtopics to be studied initially are :

- 2.2.1 Improvement of the surface state of semi-finished and finished ceramics in alumina in order to increase their mechanical strength;
- 2.2.2 Development of the technology of using zirconium oxide ceramic products by increasing their mechanical strength;
- 2.2.3 Development of the technology of using ceramic materials containing zirconium oxide as a conductor of electricity;
- 2.2.4 Development of the possibilities of using the electrical properties of tin oxide;
- 2.2.5 Development of the technology of further processing and utilisation of ceramic fibres and other insulating materials, and perfecting of technological bases for new production procedures.

INDICATIVE DISTRIBUTION OF FUNDS WITHIN THE SUBPROGRAMME ON CERAMICS

RESEARCH AREA 1 : 30 - 40 %

RESEARCH AREA 2 : 60 - 70 % (50 % of this figure for topic 2.1,  
50 % for topic 2.2.)

SUBPROGRAMME IV

WOOD AS A RENEWABLE RAW MATERIAL

Objectives

The sub-programme on "Wood as a Renewable Raw Material" is in support of three main policy objectives:

1. To prevent, by the development of its own resources, an undue increase in the Community's already very heavy dependence on imports of wood and wood products; (annual net imports in this sector amount to over 11.300 Million ECU and continue to rise).
2. To improve efficiency and economic viability of woodland property and wood processing industries in a period of rapid technological change.
3. To make a modest but rising contribution to the economic production and conservation of energy in the Community.

In the pursuit of these objectives regard should be paid to:

- Conservation and improvement of the environment;
- Safety and health of the work force;
- Regional development implications;
- Reduction of energy consumption in processing.

In this context the aim of the proposed research programme is:

1. To increase the physical and economic availability of wood and wood products;
2. To reduce the costs of growing, harvesting, processing and transformation of wood by the development of new technology;
3. To upgrade the quality of wood and wood products;

4. To promote a more complete utilisation of wood and wood residues, (also organic fibres other than wood in so far as they are relevant) so as to reduce the amount of waste incurred at the production and processing stages, and to minimise losses due to deterioration and fire.

#### Motivations

The situation of wood industries (including pulp and paper industries) can be summarised as follows:

- a. All Member States are net importers of wood and wood products; the negative trade balance in this sector is approximately 11,300 million ECU per year and is exceeded only by the oil sector; demand for wood products is rising by some 2% per year in volume, and the demand for wood as a source of energy has suddenly begun to rise much faster; supplies under existing national forestry policies are rising by only 1% per year.
- b. The supply position on the world market is likely to get more difficult as demand rises especially in the developing countries, while the traditional sources of supply in North America, Scandinavia, the Soviet Union and some tropical countries become less accessible and, in some instances, exhausted.
- c. The potential for increasing wood production in the Community is great. Preliminary estimates suggest that the availability of wood and wood residues to industry from indigenous sources could be increased by 25% within the next 10-15 years and more than doubled in the long term, given appropriate policy initiatives and well directed research and development support.
- d. Forestry and forest industries make a significant contribution to several important Community policies. They provide employment and useful sources of income in some of the poorest rural areas of the Community; they can help in the solution of the problem of surplus agricultural production if land that has become submarginal for



farming, but is suitable for forestry, is used to grow trees. Even where wood production is the main objective forests can be managed so as to contribute to the conservation and improvement of the environment and to provide recreational opportunities.

- e. The forest industries in the Community operate under conditions significantly different from those in North America, Scandinavia and the Soviet Union against whose products they have to compete. The forest resources in the Community are limited and widely scattered geographically and fragmented in ownership; it is therefore only exceptionally possible to achieve economies of scale in wood processing without unduly increasing the distance from the forest to the plant, and hence the cost.

#### CONTENTS OF THE SUB-PROGRAMME

#### RESEARCH AREA I : WOOD PRODUCTION

The research includes the following items:

##### 1.1 Selection and improvement of forest reproductive material

The main objectives are:

- increased timber and/or biomass production
- improved quality of timber (or fibre)
- increased resistance against disease and abiotic causes of damage
- improved tolerance of difficult site conditions

The research topics are :

- 1.1.1 Species and origin: exploration and testing
- 1.1.2 Tree breeding and propagation
- 1.1.3 Gene resource conservation

##### 1.2 Improvement of growth (silviculture)

- 1.2.1 Treatment of site and stands

- The silviculture of species or provenances newly introduced into more than one Member State;
- The improvement or replacement of forest stands which are unproductive but with a good growth potential;
- Simplification of silviculture in order to reduce costs;
- Methods of accelerating growth such as fertilisation.

1.2.2 Establishment and management of fibre plantations

1.2.3 Cultivation and management of trees outside the forest

### 1.3 Prevention of losses

1.3.1 Protection against damage from biotic agents (such as insects and fungi) with emphasis on the use of environmentally safe methods (i.e. avoidance of chemicals toxic to man and wild life)

1.3.2 The prevention of forest fires

1.3.3 Protection against damage from other abiotic causes (such as storms, frost and air pollution)

### 1.4 Forest inventory

The research will concentrate on methods of assessing biomass and surplus growing stock as well as on the development of agreed definitions and criteria to be used.

## RESEARCH AREA 2 : WOOD HARVEST, STORAGE AND TRANSPORT

This research area is composed of the following items :

### 2.1 Harvesting of Biomass

The logging systems and machinery to be investigated will be

concerned mainly with small scale operations in environmentally sensitive surroundings and will include:

- Whole tree chipping in the forest;
- Whole tree chipping at a central collecting point near the forest;
- Transport of whole tree sections with branches to wood processing industry.

2.2 Processing and storage of chips for industrial use

2.3 Harvesting systems for on-ground extraction

2.4 Harvesting systems for off-ground extraction

2.5 Safety and health aspects

RESEARCH AREA 3 : WOOD AS A MATERIAL

This research area is sub-divided as follows:

3.1 Study of wood properties

This includes:

- Basic orientated research on the properties of wood;
- Relationship between timber properties and the living trees (physiological, biochemical and silvicultural aspects, etc...)

3.2 Improvement of performance and protection against deterioration

The main lines of research envisaged are:

- methods to improve wood stability;
- basic studies on the mechanism of action of wood preservatives;
- development of environmentally safe preservatives;
- improved methods for preservation of so-called "refractory" species (which are resistant to the penetration of liquid preservatives in common use);

- the development of improved fire retardants.

### 3.3 Development of objective testing methodology

- 3.3.1 Improvements to machine stress grading methods for sawn timber
- 3.3.2 Methods for evaluating new adhesives
- 3.3.3 Non-destructive, comparable test procedures for wood-based panels
- 3.3.4 Criteria for acceptance of wood preservatives

## RESEARCH AREA 4 : WOOD PROCESSING WITHOUT MODIFICATION OF ITS BASIC STRUCTURE

This research area covers sawmilling, the production of wood-based panels (including fibre board) and constructional uses of wood as well as adhesives used in the wood industries.

### 4.1 Development of manufacturing processes and products

This is concerned mainly with sawmilling and the manufacture of wood based panels. The main aims are:

- better use of Community raw materials and especially the improvement of the yield and efficiency of sawmills;
- improved product quality;
- reduction of waste and increased use of residues;
- reduction in energy consumption;
- development of new panel products.

### 4.2 Adhesives and joints

The aims are:

- to promote safety of structures;
- to reduce health hazards (associated with toxic substances in certain glues);

- improved technology in jointing.

#### 4.3 Constructional use of wood

- 4.3.1 More efficient use and re-use of wood in temporary works
- 4.3.2 Greater economy in use through improved design
- 4.3.3 Load duration effects

### RESEARCH AREA 5 : PROCESSING OF WOOD AND RELATED ORGANIC MATERIALS INTO FIBRE PRODUCTS

The main objective in this part of the programme is the development of technology which will permit economic and environmentally acceptable working under Community conditions by:

- reduction in energy consumption, pollution and raw material specifications
- better use of recycled waste paper and non-wood fibres such as straw as well as of the residues of fibre processing
- improvement of fibre yield

#### 5.1 Process and Product development in the pulp industry

The research will be concerned with chemical and mechanical pulping as well as with various combinations of chemical, mechanical and thermal treatments and the possible integration of pulp producing units into paper machines.

#### 5.2 Better use of recycled waste paper, cereal straw and other fibres

#### 5.3 Improvement of paper and board manufacturing processes

The objects of this research are:

- improvement of process control;
- increased use of mineral fillers;
- reduction of fibre losses;
- reduction of weight and thickness of paper without loss of quality;
- reduction in material specifications.

RESEARCH AREA 6 : WOOD AS A SOURCE OF CHEMICALS

This part of the programme concerns the production of commercially valuable chemicals from wood, straw and other materials containing ligno-cellulose substances. The recovery of by-products from residues of fibre processing is also included in this research area.

The production of fuels such as methanol will only be considered in so far as it is not included in the Community research programme "Energy from biomass".

The main objectives are:

- 6.1 Development of processes to separate chemically the main components of materials containing ligno-cellulose substances
- 6.2 Utilisation of lignin, hemicelluloses and cellulose
- 6.3 Recovery of by-products from chemical fibre processing

INDICATIVE DISTRIBUTION OF FUNDS WITHIN THE SUB-PROGRAMME ON WOOD :

Research area 1	}	30-40%
Research area 2		
Research area 3	}	30-40%
Research area 4		
Research area 5	}	25-35%
Research area 6		

SUBPROGRAMME V

RECYCLING OF URBAN AND INDUSTRIAL WASTE

(Secondary Raw Materials)

This subprogramme covers 4 research areas:

1. Sorting of household waste
2. Thermal treatment of waste
3. Fermentation and hydrolysis of organic waste
4. Recovery of rubber waste

The first research and development programme in the field of secondary raw materials was adopted by the Council on 12 November 1979 (1), and ends on 31 October 1983.

It is described in detail in document COM (78) 407 fin.

Additional funding may be required to extend the subprogramme beyond October 1983, following a review of the results obtained so far and an updating of research priorities.

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(1) O.J. No L293/19 of 20.11.1979

SUBPROGRAMME VI

RECYCLING OF NON-FERROUS METALS

By supporting systematic research in recycling technology the EC could play an important role in encouraging industrial innovation and competitiveness and give a more important economic impact to scrap and residue recycling.

As far as energy consumption is concerned, the production of metals from scrap and residues generally allows a substantial saving compared with that of metals coming from primary ores.

The proposed R & D subprogramme on the recycling of non-ferrous metals is based on the data given in the following table:

Estimated secondary production of the commoner non-ferrous metals in the EC for 1977  
(expressed as percentage of consumption)

Metal	EUR (9)	D	F	I	NL	B-L	UK	IRL	DK	GR
Aluminium	22	20	16	18	39	42	28	-	22	17
Copper	35	26	45	30	34	17	42	45	64	2
Lead	48	51	47	26	46	46	71	-	14	10
Tin	22	31	9	41	2	12	14	-	100	-
Zinc	36	51	40	27	-	57	22	-	28	-

In addition to these metals, other metals such as chromium, nickel, manganese, tungsten, molybdenum, cobalt, vanadium, tantalum, titanium, zirconium, niobium, silver and platinum, should be taken into consideration for strategic reasons (e.g. in the electronics, chemical, aerospace and nuclear industries). In fact, a short-fall in supplies of these metals could jeopardize the development of these leading industrial sectors.



CONTENTS OF THE SUBPROGRAMME

The proposed programme has been selected on the basis of promoting technological development and industrial innovation. It considers three main areas of research, based on technological processes:

1. collection and physical and chemical characterization
2. physical processes
3. metallurgical processes

In addition studies of technico-economical nature for the evaluation of the future potential for recycling of non-ferrous metals of strategic interest in the EC will be supported.

RESEARCH AREA 1 : COLLECTION AND PHYSICAL AND CHEMICAL CHARACTERISTICS OF NON-FERROUS METAL SCRAP AND RESIDUES (SAMPLING AND ANALYSIS)

Objectives

To improve the marketability of recovered metals  
To decrease the overall cost of recycling

Research topics

Development of improved methods for sampling and analysis (especially for scrap of aluminium, titanium, precious metals, superalloys etc.)

RESEARCH AREA 2 : PHYSICAL PROCESSES FOR THE TREATMENT OF NON-FERROUS METALS SCRAP AND RESIDUES

2.1 Liberation processes by mechanical means

Objective

To improve and adapt currently used techniques to liberate the various components of non-ferrous metals scrap.

Research topics

- Development of selective **grinding** and shredding techniques
- Optimisation of these techniques with respect to energy consumption

2.2 Physical separation processes

objectives

- To improve physical separation processes
- To reduce overall cost of the whole recycling process

Research topics

- Advanced gravimetric processes using magnetic fluids
- Advanced electronic sorting methods
- Advanced eddy current separation
- Advanced dry gravimetric processes using fluidised beds
- New flotation techniques
- Particle size separation by hydrocyclones
- Optimization of magnetic separation techniques

RESEARCH AREA 3 : METALLURGICAL PROCESSES FOR THE TREATMENT OF NON-FERROUS METALS SCRAP AND RESIDUES

3.1 Physical preparation of charges for pyro- and hydrometallurgical treatment

Objectives

To reduce handling and environmental problems in retreatment due to the heterogeneous character of many scraps and residues (extreme fineness of dusts, fumes, fly ash... and high water content of slurries). To prevent high losses in non-ferrous metals by recycling the existing amounts of fine materials.

Research topics

- Comminution processes leading to a more homogeneous size distribution of materials
- Agglomeration processes (cold or warm) leading to improved handling and avoidance of contamination

### 3.2 Hydrometallurgical processes

#### 3.2.1 Leaching processes

##### Objective

To effect a more selective chemical attack, leaving the residues in a more suitable form for disposal or recycling.

##### Research topics

- Studies on adequate leaching conditions
- Development of new leaching methods

#### 3.2.2 Purification of solutions and extraction from solutions

##### Objective

To reach, for metals extracted from leach solutions, the purity requirements of the market.

##### Research topic

Development of new processes using selective membranes.

#### 3.2.3 Direct hydrometallurgical treatment

##### Objectives

To decrease capital costs by combining selective leaching and extraction in one operation.

To avoid problems and high costs incurred in solid-liquid separation and clarification steps.

##### Research topic

Development of new electro-chemical processes.

### 3.3 Pyrometallurgical (high temperature) processes

#### 3.3.1 High temperature pretreatments

Objective

To minimise environmental problems and to obtain higher metal yields by improving furnace technology.

Research topic

Development of advanced non-polluting combustion furnace technology.

(new types of furnaces, study of modification of existing furnaces)

3.3.2 Smelting processes

Objective

To obtain higher metal yields, minimised environmental problems and lower energy consumption by improved smelting technology.

Research topics

- Advanced smelting furnace technology
- Advanced studies on metallurgy, chemical dynamics, thermodynamics, mass transfer, and refractories.

3.3.3 High temperature processes based on gas phase formation

Objective

To use gas phase formation as a selective way of separating some valuable non-ferrous metals.

Research topic

Development of high temperature processes making use of selective extraction through formation of a gas phase.

3.4 Refining of secondary metals

Objective

To develop methods for refining secondary metals from alloying elements or impurities.

Research topic

Development of advanced technology such as electrolytic refining in molten salts and vacuum distillation.

TECHNICO-ECONOMICAL STUDIES FOR THE FUTURE EVALUATION OF THE RECYCLING POTENTIAL OF NON-FERROUS METALS OF STRATEGIC INTEREST IN THE EC

To be able to have a better insight into the non-ferrous metal recycling potential of the Community as a whole and to establish long term priorities for R & D it is necessary to have reliable quantitative data from each Member State. In some European countries, the Authorities feel that this type of information is sufficiently available, while in several others complementary studies are still to be done.

INDICATIVE DISTRIBUTION OF FUNDS WITHIN THE SUBPROGRAMME ON RECYCLING OF NON-FERROUS METALS

Research area 1 : 15-20%  
Research area 2 : 20-40%  
Research area 3 : 45-60%

Technico-economic studies: a small proportion of the funds

SUBPROGRAMME VII - SUBSTITUTION

Since the EC countries are highly dependent on a number of materials which come from politically sensitive areas of the world, it is intended to launch research on substitution of these materials in order to develop the use of more readily available indigenous or less costly materials and promote a more judicious use of imported commodities. This could reduce substantially the vulnerability of the EC.

Systematic research into substitution possibilities is essential; even if it cannot make the Community independent it can, in addition to its purely economic effect, play an important part in encouraging action and have a useful deterrent effect on the producing countries. Active research is required to identify changes in product design that will allow technically acceptable materials chosen from the criterion of Community self-sufficiency to be used in their manufacture. The acquisition of new scientific and technical know-how is of vital importance in this context.

Research into substitution is of course only one of the aspects of the policy designed to make industry less vulnerable in respect of its raw materials supplies.

Several types of spin-off are to be expected : the primary aim is still to reduce the Community's dependence on outside sources of supply but there are also sure to be favourable secondary effects of the following kinds :

- saving of energy;
- improvement of environmental protection by better matching of resources to uses (reducing of waste containing heavy metals)
- improved competitiveness of firms -in the long run this will create jobs, especially in small and medium-sized firms.

This point calls for explanation: the proposed programme will have the advantage of providing information on substitution which, because it forms part of an inevitable development in technology will reduce the vulnerability of EC industries. Moreover it may have an impact on imports and on balance of payments.

Under these conditions it might appear that those primarily involved will be the large groups or organisations having extensive production facilities or research centres. However, the spin-off from the Community activities will also benefit small and medium-sized firms, in particular by providing information or know-how that they would find difficult to acquire for themselves; this is a particularly marked advantage in several of the industrial sectors selected in which sub-contracting operations are extensive and consequently there is a large number of small and medium-sized firms.

R & D on substitution can have two separate effects, both favourable to Community industry, whatever the size of the firms concerned:

1. It would prepare for supply crises, the likelihood of which cannot be ruled out. The expected results should mainly serve to:
  - a. bring home to manufacturers using a sensitive substance in the Community the risks of a crisis or of pressure on the international market for that substance (supply difficulties, physical shortage, abrupt rise in prices);
  - b. collect and make available to manufacturers information that can be used in the event of crisis so that they can cope with the situation by diversifying their supplies.
  
2. It would contribute to increasing the competitiveness of firms in several forms:
  - a. the effort to economize will help to make industry more competitive by forcing it to innovate (new processes, new and more economic products);
  - b. and it will favour the possibility of exporting advanced technology.

The analysis by industrial sector of the implications of substitution of the six materials treated in the preparatory studies (silver, tin, chromium, tungsten, cobalt and platinum), helped to reveal the industrial sectors mainly involved and in which the manufacturing industry of the EC would obtain some direct benefits from an R & D programme on materials substitution.

This examination has been summarized in Table I, and as a consequence the following five priority sectors were selected :

1. Electrical and electronics industry;
2. Surface treatments and coatings;
3. Technology of cutting and machining;
4. Stainless steels and alloys;
5. Other uses (brazing and soldering technologies, leather tanning)

TABLE 1

MAIN SECTORS OF INDUSTRIAL ACTIVITY  
AND THEIR USE OF METALS

	Co	Cr	Ag	Sn	W	Other Metals Involved
1 Refined steels (stainless steels)	x	x			x	Mn, Mo, V, Ni, Fe
2 Machining tools, tools	x	x	x		x	Mo, V, Ti, Ta
3 Cars		x	x			Zn, Pb, Al, Cu
4 Consumer electrical goods		x				Al, Cu, Ni
5 Aircraft construction	x	x			x	Ti, Mo
6 Surface treatments and coatings	x	x	x	x	x	Pb, Cd, Cu, Al, Pt
7 Electrical and electro- nics	x		x	x	x	Pb, Cd, Cu, Al, Pt
8 Containers				x		Al, Fe

In addition, the conclusions and recommendations of the six preparatory studies lead to an interest in a small number of rather sensitive industrial sectors and in encouraging them to modify the design of products by substitution.

The chosen sectors are confirmed by the following example (1977 - France). The percentage of three of the four industrial sectors consuming the five metals (Ag, Sn, W, Cr, Co) is as follows :



TABLE II

Sectors or Industrial Activities	Percentage of Use of				
	Cr	Ag	Sn	W	Co
Electrical and electronics industries	=	20	10	16	13,5
Surface treatments and coatings	6	36	48,5	=	6,5
Cutting and machining tools	10	=	=	75	28

It is worth underlining, moreover, that in the Community, there are many industries of all sizes affected and the problem of materials supply is deeply felt by them.

R & D activities in each of these areas could also lead to other substitution of sensitive raw materials in the Community.

CONTENTS OF THE SUB-PROGRAMME

RESEARCH AREA 1 : RESEARCH ON THE SUBSTITUTION OF MATERIALS USED IN THE ELECTRIC AND ELECTRONICS INDUSTRY.

Objective

To coordinate research already in progress based on public financing and initiate new research projects on products suitable to replace the following raw materials, in particular : silver, tungsten, tin, copper and possibly cobalt - considering the industrial interest.

For silver and tungsten, priority will be given to their use in electrical contacts (20% of silver uses)

For cobalt, magnetic alloys will be studied (20 - 25% of the total uses of this metal).

For copper, electric wires and cables will be studied (about 40 - 50% of the industrial uses of copper).

### Research Topics

- 1.1 Electrical contact function
- 1.2 Electrical conductivity function
- 1.3 The magnetic function

## RESEARCH AREA 2 : RESEARCH INTO THE SUBSTITUTION OF MATERIALS USED IN SURFACE TREATMENT AND COATINGS

### Objective

Surfaces have to be given specific physical or chemical properties in many industrial fields such as mechanical engineering (anti-friction coatings, for example), photography (silver deposit to form a sensitive surface).

The need to treat or coat a surface often involves the use of rare and expensive raw materials (chromium, tin, cadmium or silver for example). Priority should be given to research into the possibility of using different raw materials (less costly and if possible more readily available).

### Research Topics

- 2.1 Packaging (tinplate)
  - 2.1.1 Tin-free steel, chromium type
  - 2.1.2 Tin-free steel, non-chromium type
  - 2.1.3 Tinplate with reduced tin coating weight
- 2.2 Wear-resistant and corrosion-resistant coatings
- 2.3 Sensitive surfaces for photography

## RESEARCH AREA 3 : RESEARCH ON SUBSTITUTION IN CUTTING AND MACHINING TOOLS

### Objective

For the last 50 years the most widely used materials for machining have been high-speed steels, and hard metals with cobalt as a binder (crude metal); the continuing use of these materials is probably due to economic

considerations and partly to technical successes that have proved difficult to equal with other materials.

The main aim of research is to obtain a greater variety of cutting materials offering the toolmaker a wider choice, with some options containing little or no tungsten and possibly cobalt.

### Research topics

#### Hard metals (tungsten and cobalt based)

3.1 Materials for cutting applications

3.2 Materials for non-cutting applications

3.3 Materials for wear resistance, facing and surface protection purposes.  
Materials used are stellites containing Co, Cr, W and C.

#### RESEARCH AREA 4 : STAINLESS STEELS AND ALLOYS

#### Objective

It is deemed useful to introduce a special sector in which the problem of substitution of critical materials such as chromium, tungsten, cobalt and tin linked to the special steel industry is a priority. In fact chromium consumption in the EC stainless steel industry is 52% of total use (500,000 tonnes for 1977). Tungsten consumption in the EC high speed steel industry is 50% of total use (7,870 tons for 1977) and for cobalt, in the case of France, total consumption in the high speed steel industry is 10% of a total of 1,100 tons used in 1978.

Complete replacement of chromium in its alloys is not generally possible without unacceptable loss of performance, but there is now scope for reducing the amount required and respecting desired specifications.

#### Research Topics

4.1 Stainless steels and alloys

4.2. Improvement of high speed steels

## RESEARCH AREA 5 : OTHER USES

### 5.1 Leather tanning

### 5.2 Soldering and brazing technologies

## TECHNICAL AND ECONOMIC STUDIES

The six case studies carried out in 1979-1980 were particularly illuminating and supplied invaluable data for the preparation of this programme. However, they have nowhere near exhausted the subject and should be complemented by a number of similar studies so as to enable the research topics to be up-dated while the programme is under way, taking into account studies already carried out under the activities of the ECSC (European Coal and Steel Community).

These will be mainly case studies of a technical and economic nature relating to :

- Substances that are particularly critical for the Community

- Manganese
- Molybdenum
- Vanadium
- Platinum (\*)

- Technologies in which progress could speed up substitution :

- assembly technologies (new bonding techniques);
- powder technologies (metals, ceramics, etc...);
- use of composite materials and mineral fibres;
- non-conventional machining methods.

- Special steels : This industrial branch is the main outlet for metals such as nickel, chromium, molybdenum, tungsten, cobalt and vanadium.

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(\*) Only for chemical applications.

INDICATIVE DISTRIBUTION OF FUNDS WITHIN THE SUBPROGRAMME ON SUBSTITUTION

Research area 1 : 20 - 25 %

Research area 2 : 30 - 35 %

Research area 3 : 11 - 18 %

Research area 4 : 18 - 23 %

Research area 5 : 7 - 9 %

Case studies : 2 - 3 %

### C. IMPLEMENTATION AND MANAGEMENT OF THE SECTORAL PROGRAMME

The rationalization and simplification of procedures which is the main aim of the present attempt at grouping R & D actions in the raw materials sector should also allow greater flexibility in implementation and management of the programme.

Thus it is foreseen that the Commission will decide on the detailed implementation of the programme, with the help and active participation of Advisory Committees on Programme Management (ACPM) for the various subprogrammes.

It is intended to have the following ACPM's :

- a. Metals and mineral substances, recycling of non-ferrous metals, clay based materials
- b. Uranium exploration and extraction
- c. Wood as a renewable raw material
- d. Recycling of urban and industrial waste
- e. Substitution, research on technical ceramics

(Note: ACPM's a (for metals and mineral substances), b and d already exist).

The programme will be implemented as an indirect action (cost-sharing contracts) which will be supplemented, wherever feasible, by a coordination of research carried out on public funds in the Member States.

In order to avoid dispersion over what is a very broad subject-matter, the research proposals submitted for funding will be selected (in addition to their merits on the basis of scientific quality, prospects of success, cost, etc.), in order to ensure also a concentration of effort on high priority topics so as to enable coordination, avoid unnecessary duplication as well as any gaps.

It is proposed that the sliding programme concept be applied to the present programme. Thus the programme will be reviewed during the third year. The review may lead to a new programme proposal based on research needs. The new programme would then supersede the on-going programme at the end of its third year, in order to ensure greater continuity in the research effort and prevent any gap in funding the contractors.

Scientific cooperation and coordination among the participants in the programme will be encouraged and facilitated by the proven techniques of steering committees, contact groups and research seminars, the latter to be sponsored jointly by the Commission and the relevant authorities in a Member State.

Provisions are made in the draft programme decision to extend the cooperation with non-Member States.

#### D. WAYS AND MEANS

##### 1. Funding

Total funding required for the 1982-1985 period is estimated at 71 Mio ECU, tentatively distributed as follows:

Subprogrammes I	(Metals and Mineral Substances)		30
Subprogramme II	(Uranium)	(2.4) <sup>(1)</sup>	p.m.
Subprogramme III	(Ceramics)		5
Subprogramme IV	(Wood as renewable raw material)		15
Subprogramme V	(Recycling of urban and industrial waste)	(9) <sup>(2)</sup>	p.m.
Subprogramme VI	(Recycling of non-ferrous metals)		11
Subprogramme VII	(Substitution)		10

(1) 1981-1982

(2) Nov. 1979 - Oct. 1983

## 2. Staff

Staff requested for managing the programme is estimated at 23, i.e. 5 additional staff.

At present, staff distribution is as follows :

- primary raw materials	8
- uranium exploration and extraction	3
- recycling of urban and industrial waste	5
- recycling of paper and board	2

The additional staff are requested in view of the competences necessary to cope with the new research topics proposed.

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Proposal for a Council Decision

adopting a research and development programme (1982 to 1985)  
in the raw materials sector

THE COUNCIL OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Economic Community and in particular Article 235 thereof,

Having regard to the Treaty establishing the European Atomic Energy Community, and in particular Article 7 thereof,

Having regard to the proposal from the Commission,

Having regard to the opinion of the European Parliament,

Having regard to the opinion of the Economic and Social Committee,

Whereas Article 2 of the EEC Treaty assigns to the Community the task inter alia of promoting throughout the Community a harmonious development of economic activities, a continuous and balanced expansion and an accelerated raising of the standard of living;

Whereas the Council Resolution of 14 January 1974 on an initial outline programme of the European Communities in the field of science and technology (1) stressed that the whole range of available means of action should be used as appropriate, including indirect action;

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(1) OJ No C7, 29.1.74, p. 6

Whereas the Community depends to a great extent on non-member countries for its supply of raw materials, and thus it is in the Community's interest to increase its self-supply potential and in particular to develop new technologies for its indigenous resources;

Whereas a Community research action in the field of raw materials will contribute effectively to the achievement of the above-mentioned objectives, particularly through the discovery and economic exploitation of internal resources, the improvement of waste recovery, recycling and re-use and the development of material substitution for a more efficient use of materials, as well as through the development of exportable techniques and technologies;

Whereas by Decision 79/968/EEC (1) the Council adopted a multiannual research and development programme for the European Economic Community in the field of the recycling of urban and industrial waste;

Whereas by Decision 78/264/Euratom (2), as amended by Decision 81/364/Euratom (3), the Council adopted, for a period of five years with effect from 1 January 1978, a programme of research and development for the European Atomic Energy Community on uranium exploration and extraction;

Whereas on 19 April 1977 the European Parliament adopted a Resolution (4) on the Community's raw materials supply;

Whereas in its deliberations of 20 December 1979 the Council invited the Commission to concentrate Community research programmes on sectors of priority interest, including energy and raw materials, and to rationalize the structures for the preparation, adoption and implementation of these programmes; whereas a grouping of indirect actions in the field of raw materials would constitute a contribution towards meeting these objectives;

Whereas the Treaty establishing the European Economic Community does not provide the specific powers necessary for this purpose;

Whereas the Scientific and Technical Research Committee (CREST) has given its opinion on the Commission proposal,

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(1) OJ No L293, 20.11.1979, p. 19

(2) OJ No L72, 14.3.1978, p. 12

(3) OJ No L137, 23.5.1981, p. 44

(4) OJ No C

HAS DECIDED AS FOLLOWS:

Article 1

1. A programme of research and development for the European Economic Community and the European Atomic Energy Community in the sector of raw materials is hereby adopted in the form set out in the Annex, for a four-year period starting on 1 January 1982.
2. The programme will be implemented by means of indirect actions and coordination actions.

Article 2

1. The total amount of resources necessary for the duration of the programme is estimated at 71 Mio ECU and the number of staff required is evaluated at 23. The European Currency Unit is defined by the financial regulations in force.

These figures are given merely by way of indication. The indicative internal distribution of funds is shown in the Annex.

2. In the light of experience gained in the course of the execution of this programme and after having consulted the Scientific and Technical Research Committee (CREST) and the competent Advisory Committees on Programme Management, the Commission shall be authorized to transfer funds from one subprogramme to another provided that such fund transfers do not result in an increase or a reduction of more than 10% in the original allocation to each subprogramme as defined in the Annex.

Article 3

The Commission shall be responsible for the implementation of the programme and shall be assisted by Advisory Committees on Programme Management in the following fields, such Committees being set up for this purpose and governed by the rules laid down in the Council resolution of 18 July 1977 on advisory committees on research programme management (1):

(1) OJ No C192, 11.8.1977, p. 1

- a. Metals and mineral substances, recycling of non-ferrous metals, clay based materials;
- b. Uranium exploration and extraction;
- c. Wood as a renewable raw material;
- d. Recycling of urban and industrial waste;
- e. Substitution, technical ceramics.

#### Article 4

The programme shall be reviewed during the third year. This review, in accordance with the appropriate procedures, may lead to a Council decision for a new four year programme which would supersede the current programme at the end of the third year. A report on this review and on the possible revision shall be drawn up for the European Parliament and the Council.

#### Article 5

The information resulting from the implementation of the indirect action programme defined in the Annex, in so far as it concerns raw materials covered by the EEC treaty, shall be disseminated in accordance with Council Regulation (EEC) N° 2380/74 of 17 September 1974 adopting provisions for the dissemination of information relating to research programmes for the the European Economic Community (1).

#### Article 6

1. In accordance with a procedure to be laid down by the Commission after having consulted the committees referred to in Article 3, the Member States taking part in coordination activities and the Commission shall regularly exchange all useful information concerning the execution of the research covered by such activities. The Member States shall provide the Commission with all information relevant for coordination purposes.
2. The Commission shall prepare annual progress reports on the basis of the information supplied, and shall forward them to the Member States and the European Parliament.

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(1) OJ No L255, 20.9.1974, p. 1

3. At the end of the coordination period the Commission, after having consulted the Committees referred to in Article 3 shall forward to the Member States and the European Parliament a comprehensive report on the execution and results of the coordination activities. The Commission shall publish this report six months after it has been sent to the Member States, except where a Member State objects.

In that case the report shall be forwarded, after consultation with the said committees, solely to the institutions and undertakings which so request and whose research or production activities justify access to the results of the research covered by the coordinated activities.

#### Article 7

1. In accordance with Article 228 of the EEC Treaty, the Community may conclude agreements with non-member countries, in particular those involved in European collaboration in the field of Scientific and Technical Research (COST) with a view to associating them wholly or partly with this programme.
2. The Commission is hereby authorised to negotiate the agreements referred to in paragraph 1.

Done at Brussels,

For the Council

The President

A N N E X

RAW MATERIALS RESEARCH AND DEVELOPMENT PROGRAMME

The programme comprises the following subprogrammes:

I . METALS AND MINERAL SUBSTANCES

An expenditure of 30 million European Currency Units is allocated to this programme.

It covers the following research areas:

1. Exploration

- 1.1. Geology of ore deposits and of their host rocks
- 1.2. Geochemical methods
- 1.3. Geophysical methods
- 1.4. Remote sensing
- 1.5. Drilling techniques
- 1.6. Statistics and geostatistics applied to exploration data

2. Ore processing

- 2.1. Complex lead, zinc and copper ores
- 2.2. Other complex and oxidized ores
- 2.3. Aluminium from low-grade sources
- 2.4. Chromium from low-grade sources
- 2.5. Phosphates
- 2.6. Slags and residues
- 2.7. Modelling and control in mineral processing
- 2.8. Improved mineralogical analysis

3. Mining technology

- 3.1. Problems associated with depth
- 3.2. Marginally economic deposits
- 3.3. Geostatistics and modelling in mineral exploitation

II. URANIUM EXPLORATION AND EXTRACTION

An expenditure of 2,4 million European Currency Units was allocated to this subprogramme for the period 1981-1982. Additional funding, if required, to be transferred from Subprogramme I.

It covers the following research areas:

1. Exploration

- 1.1. Discovery of uranium provinces - uranium geology and metallogeny
- 1.2. Exploration techniques
- 1.3. Transportation and deposition of uranium
- 1.4. Bore-hole logging

2. Research and development in uranium extraction and recovery

- 2.1. Recovery of uranium from phosphoric acid liquors
- 2.2. Recovery of uranium from phosphatic rocks
- 2.3. Extraction of uranium from the waste of phosphate rock treatment
- 2.4. Recovery of uranium by dump, heap, bacterial or in-situ leaching
- 2.5. High temperature, high pressure leaching
- 2.6. Extraction of uranium and other values from calcines and low-grade sources
- 2.7. Other technical aspects related to the uranium mining industry

III. CERAMICS

An expenditure of 5 million European Currency Units is allocated to this subprogramme.

It covers the following research areas :

1. Clay based materials

- 1.1 Characterization of raw materials and of their intrinsic properties.
- 1.2 Study of the manufacturing sequence.

2. Technical ceramics

- 2.1 Powder processing technology
- 2.2 Improvement of the fabrication cycle for various ceramic materials.

IV. WOOD AS A RENEWABLE RAW MATERIAL

An expenditure of 15 million European Currency Units is allocated to this subprogramme.

It covers the following research areas:

1. Wood Production

- 1.1. Selection and improvement of forest reproductive material
- 1.2. Improvement of growth (silviculture)
- 1.3. Prevention of losses
- 1.4. Forest inventory

2. Wood harvesting, storage and transport

- 2.1. Harvesting of biomass
- 2.2. Processing and storage of chips for industrial use
- 2.3. Harvesting systems for on-ground extraction
- 2.4. Harvesting systems for off-ground extraction
- 2.5. Safety and health aspects

3. Wood as material

- 3.1. Study of wood properties
- 3.2. Improvement of performance and protection against deterioration
- 3.3. Development of objective testing methodology

4. Wood processing without modification of its basic structure

- 4.1. Development of manufacturing processes and products
- 4.2. Adhesives and joints
- 4.3. Constructional use of wood

5. Processing of wood and related organic materials into fibre products

- 5.1. Process and Product development in the pulp industry
- 5.2. Better use of recycled waste paper, cereal straw and other fibres
- 5.3. Improvement of paper and board manufacturing processes



6. Wood as a source of chemicals

- 6.1. Development of processes to separate chemically the main components of materials containing ligno-cellulose substances
- 6.2. Utilisation of lignin, hemicelluloses and cellulose
- 6.3. Recovery of by-products from chemical fibre processing

V. RECYCLING OF URBAN AND INDUSTRIAL WASTE

An expenditure of 9 million European Currency Units was allocated to this subprogramme for the period November 1979 - October 1983. Additional funding, if required, to be transferred from Subprogramme V.

It covers the following research areas:

1. Sorting of household waste

- 1.1. Assessment of waste sorting projects
- 1.2. Methods for sampling and analysis of household waste
- 1.3. Evaluation of health hazards
- 1.4. Technology for the sorting of bulk waste
- 1.5. Materials recovery
- 1.6. Energy recovery
- 1.7. New collection and transport systems

2. Thermal treatment of waste

- 2.1. Firing of waste derived fuel
- 2.2. Pyrolysis and gaseification
- 2.3. Recovery of metal and glass from residue

3. Fermentation and hydrolysis

- 3.1. Anaerobic digestion
- 3.2. Carbohydrate hydrolysis
- 3.3. Composting

4. Recovery of rubber waste

- 4.1. Retreading
- 4.2. Size reduction
- 4.3. Reclaiming and recycling of rubber powder
- 4.4. Pyrolysis

## VI. RECYCLING OF NON-FERROUS METALS

An expenditure of 11 million European Currency Units is allocated to this subprogramme.

It covers the following research areas:

1. Collection and physical and chemical characterisation of non-ferrous metals scrap and residues
2. Physical processes for the treatment of non-ferrous scrap and residues
  - 2.1. Liberation processes by mechanical means
  - 2.2. Physical separation processes
3. Metallurgical processes for the treatment of non-ferrous metals scrap and residues
  - 3.1. Physical separation of charges for pyro- and hydrometallurgical treatments
  - 3.2. Hydrometallurgical processes
  - 3.3. Pyrometallurgical (high temperature) processes
  - 3.4. Refining of secondary metals

Technico-economical studies for future evaluation of the recycling potential of non-ferrous metals of strategic interest in the E.C.

## VII. SUBSTITUTION

An expenditure of 10 million European Currency Units is allocated to this subprogramme.

It covers the following research areas:

1. Research on the substitution of materials used in the electric and electronics industry
  - 1.1. Electrical contact function
  - 1.2. Electrical conductivity function
  - 1.3. The magnetic function

- 2. Research into the substitution of materials used in surface treatment and coatings
  - 2.1. Packaging (tinplate)
  - 2.2. Wear-resistant and corrosion-resistant coatings
  - 2.3. Sensitive surfaces for photography
  
- 3. Research on substitution in cutting and machining tools
  - 3.1. Materials for cutting applications
  - 3.2. Materials for non-cutting applications
  - 3.3. Materials for wear resistance, facing and surface protection
  
- 4. Stainless steel and alloys
  - 4.1. Stainless steels and alloys
  - 4.2. Improvement of high speed steels
  
- 5. Other uses (soldering and brazing technologies, leather tanning)

Technical and Economical Studies

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INDICATIVE DISTRIBUTION OF FUNDS WITHIN THE SUBPROGRAMMES

Subprogramme I : Metals and mineral substances

Research area 1 : 35-40 %

Research area 2 : 50-55 %

Research area 3 : 10 %

Subprogramme III : Ceramics

Research area 1 : 30-40 %

Research area 2 : 60-70 %

Subprogramme IV : Wood as a renewable raw material

Research area 1 : )  
Research area 2 : ) 30-40%

Research area 3 : )  
Research area 4 : ) 30-40%

Research area 5 : )  
Research area 6 : ) 25-35%

Subprogramme VI : Recycling of non-ferrous metals

Research area 1 : 15-20 %

Research area 2 : 20-40 %

Research area 3 : 45-60 %

Technico-economic studies : a small proportion of  
the funds

Subprogramme VII : Substitution

Research area 1 : 20-25 %

Research area 2 : 30-35 %

Research area 3 : 11-18 %

Research area 4 : 18-23 %

Research area 5 : 7-9 %

Case studies : 2-3 %

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FINANCIAL DATA  
CONCERNING THE R & D PROGRAMME  
IN THE SECTOR OF RAW MATERIALS

(Indirect Actions)  
 1982 - 1985

BUDGET HEADING : Raw Materials

Article : 735

Item : 7359

Titles :	<u>Heading</u>	<u>MioECU</u>	<u>Staff</u>
- Metals and mineral substances	359-0	30	8
- Uranium (1)	359-1	(2,4) p.m.	3
- Ceramics	359-2	5	-
- Wood	359-3	15	3
- Recycling of urban and (2) industrial waste	359-4	(9) p.m.	5
- Recycling of non-ferrous metals	359-5	11	2
- Substitution	359-6	10	2
	TOTAL	71	23

(1) 1981-1982

(2) Nov.1979-Oct. 1983

(1) p.m. 1983-1985 Additional funds to be transferred from heading 359.0

(2) p.m. 1984-1985 " " " " 359.5

FINANCIAL DATA

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1. BUDGET CHAPTER : 7359.0
2. TITLE OF THE BUDGET HEADING : Sub-programme I : Metals and minerals substances
3. LEGAL BASIS :
  - Implementation of Article 235 of the Treaty establishing the European Economic Communities
  - Decision of
4. DESCRIPTION, OBJECTIVES AND JUSTIFICATION OF ACTION
  - 4.1 Description

Continuation of a coordinated research programme on metals and mineral substances (formerly called "primary raw materials") carried out essentially by means of shared-cost contracts concluded with research bodies in the Member States and relating to :

    - a) exploration
    - b) ore processing
    - c) mining technology
  - 4.2 Objectives

R & D aimed at :

    - increasing the self-supply potential of the EC in metals and mineral substances
    - ensuring a scientific and technical basis for a Community policy on raw materials
  - 4.3 Justification

Preliminary results obtained from research carried out under the first programme proved the usefulness and necessity of a second programme. Actions carried out at Community level optimize the productivity of research undertaken in the Member States, by avoiding useless duplication and filling gaps. They also make it possible to concentrate the potential of research organizations in the Member States on problems of common interest and facilitate the development of advanced technologies.

5. Total financial incidence of Action in ECU

5.0 Incidence on expenditure

5.0.0 Total cost during the term envisaged

- on Community budget :	30.000.000
- by national administrations :	} 27.048.000
- by other sectors at national level :	
<b>Total :</b>	<b>57.048.000</b>

5.0.1 Multiannual schedule

Commitment

	1982	1983	1984	1985		Total
Staff	462.000	498.000	534.000	573.000	/	2.067.000
Manag.	180.000	202.000	236.000	267.000		885.000
Contracts	4.000.000	14.000.000	9.048.000	-		27.048.000
<b>TOTAL</b>	<b>4.642.000</b>	<b>14.700.000</b>	<b>9.818.000</b>	<b>840.000</b>		<b>30.000.000</b>

Payment

	1982	1983	1984	1985	1986		Total
Staff	462.000	498.000	534.000	573.000	-	/	2.067.000
Manag.	180.000	202.000	236.000	267.000	-		885.000
Contracts	800.000	4.300.000	8.600.000	9.600.000	3.748.000		27.048.000
<b>TOTAL</b>	<b>1.442.000</b>	<b>5.000.000</b>	<b>9.370.000</b>	<b>10.440.000</b>	<b>3.748.000</b>		<b>30.000.000</b>

### 5.0.2 Evaluation method

(included multiannual provisions)

#### a) Staff expenditure

The needs are estimated to be 8 staff for this programme.

5 Category A staff  
1 Category B staff  
2 Category C staff

In addition to staff number estimates, the calculations also take account of the rates of salary increases of Commission staff used to estimate the appropriations entered in the 1982 budget; the estimated overall increases in the general Community price index used in drawing up the triennial estimates, i.e. 7,7 % per annum.

#### b) Administrative and/or technical expenditure

This expenditure specifically covers the cost of missions and the organization of meetings. It has been estimated on the basis of average requirements.

#### c) Expenditure on contracts

This expenditure covers the financial participation of the Community in research carried out under cost-shared contracts (studies, research etc.) to be concluded with research institutions in the Member States specialized in the field. Since the specific nature of the various topics and the qualifications of the contracting parties are likely to vary, it has not been possible to devise a uniform method of calculation. Consequently, the estimate of requirements is a hypothetical one based on the number of contracts to be negotiated and on average financial participation by the Community approximating to 50 % of total costs. At all events, the Advisory Committee on Programme Management will be consulted over the allocation of the appropriations.

### 6. FINANCIAL IMPLICATION IN RESPECT OF APPROPRIATIONS FOR STAFF AND CURRENT ADMINISTRATIVE EXPENDITURE :

(see point 5 above)



7. FINANCING OF EXPENDITURE :

7.4 The requisite appropriations to cover the Community's participation in this project are to be entered under future budgets.

8. IMPLICATIONS IN RESPECT OF REVENUE :

- Community taxes on officials' salaries
- Officials' contributions to the pension scheme

9. TYPE OF MONITORING TO BE APPLIED :

- Administrative checks by the DG for Financial Control with regard to the implementation of the budget and to ensure that the expenditure has been incurred in a regular and proper manner plus checks carried out by the Contracts Service of DG XII.

- Scientific checks : ACPM ;

Scientific officers from DG XII

FINANCIAL DATA

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1. BUDGET CHAPTER : 7359.1
2. TITLE OF THE BUDGET HEADING : Sub-programme II : Uranium
3. LEGAL BASIS :
  - Implementation of Article 7 of EAEC Treaty
  - Decisions of the Council on 6 March 1978 and 28 April 1981
4. DESCRIPTION, OBJECTIVES AND JUSTIFICATION OF ACTION
  - 4.1 Description

Programme on uranium exploration and extraction.  
Research programme carried out essentially by means of shared-cost contracts concluded with research bodies in the Member States and relating to :

    - a) research and development in uranium exploration
    - b) research and development in uranium extraction and recovery.
  - 4.2 Objectives

R & D aimed at :

    - increasing the self-supply potential of the EC in uranium
    - developing new techniques for exploration and exploitation of uranium deposits
    - developing advanced extraction technology and reducing ore processing costs.
  - 4.3 Justification

Preliminary results obtained from research realized under the first phase of the first programme proved the usefulness and necessity of extending the programme. Actions carried out at Community level optimize the productivity of research undertaken in the Member States, by avoiding useless duplication and filling gaps. They also make it possible to concentrate the potential of research organizations in the Member States on problems of common interest and facilitate the development of advanced technologies.

5. Total financial incidence of Action in ECU

5.0 Incidence on expenditure

5.0.0 Total cost during the term envisaged	1981-1982	1983- 1985 (*)
- on Community budget :	2,400,000	p.m.a.
- by national administrations :	1,943,000	p.m.a.
- by other sectors at national level :		
Total :	4,343,000	p.m.a.

5.0.1 Multiannual schedule

Commitment

	1981	1982	1983	1984	1985	Total
Staff	158,000	172,000	p.m.a.	p.m.a.	p.m.a.	330,400
Manag.	58,600	68,000	p.m.a.	p.m.a.	p.m.a.	126,000
Contracts	1,324,000	619,000	p.m.a.	p.m.a.	-	1,943,000
TOTAL	1,541,000	859,000	p.m.a.	p.m.a.	p.m.a.	2,400,000

Payment

	1981	1982	1983	1984	1985	1986	Total
Staff	158,000	172,000	p.m.a.	p.m.a.	p.m.a.	-	330,000
Manag.	58,600	68,000	p.m.a.	p.m.a.	p.m.a.	-	126,000
Contracts	150,000	660,000	1,000,000	133,000	p.m.a.	p.m.a.	1,943,000
TOTAL	367,000	900,000	1,000,000	133,000	p.m.a.	p.m.a.	2,400,000

(\*)- Additional funding, if needed, to be transferred from heading 359.0

## 5.0.2 Evaluation method

(included multiannual provisions)

### a) Staff expenditure

The needs are estimated to be 3 staff for this programme.

2 Category A staff

1 Category C staff

In addition to staff number estimates, the calculations also take account of the rates of salary increases of Commission staff used to estimate the appropriations entered in the 1982 budget; the estimated overall increases in the general Community price index used in drawing up the triennial estimates, i.e. 7,7 % per annum.

### b) Administrative and/or technical expenditure

This expenditure specifically covers the cost of missions and the organization of meetings. It has been estimated on the basis of average requirements.

### c) Expenditure on contracts

This expenditure covers the financial participation of the Community in research carried out under cost-shared contracts (studies, research etc.) to be concluded with research institutions in the Member States specialized in the field. Since the specific nature of the various topics and the qualifications of the contracting parties are likely to vary, it has not been possible to devise a uniform method of calculation. Consequently, the estimate of requirements is a hypothetical one based on the number of contracts to be negotiated and on average financial participation by the Community approximating to 50 % of total costs. At all events, the Advisory Committee on Programme Management will be consulted over the allocation of the appropriations.

## 6. FINANCIAL IMPLICATION IN RESPECT OF APPROPRIATIONS FOR STAFF AND

### CURRENT ADMINISTRATIVE EXPENDITURE :

(see point 5 above)

7. FINANCING OF EXPENDITURE :

7.4 The requisite appropriations to cover the Community's participation in this project are to be entered under future budgets.

8. IMPLICATIONS IN RESPECT OF REVENUE :

- Community taxes on officials' salaries
- Officials' contributions to the pension scheme

9. TYPE OF MONITORING TO BE APPLIED :

- Administrative checks by the DG for Financial Control with regard to the implementation of the budget and to ensure that the expenditure has been incurred in a regular and proper manner plus checks carried out by the Contracts Service of DG XII.

- Scientific checks : ACPM ;

Scientific officers from DG XII

-Checks by the Courts of Auditors in accordance with the Treaties

FINANCIAL DATA

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1. BUDGET CHAPTER : 7359.2

2. TITLE OF THE BUDGET HEADING : Sub-programme III : Ceramics

3. LEGAL BASIS :

- Implementation of Article 235 of the Treaty establishing the European Economic Communities
- Council decision of

4. DESCRIPTION, OBJECTIVES AND JUSTIFICATION OF ACTION

4.1 Description

First programme on ceramics.

Research programme carried out by means of cost-sharing contracts (indirect action) with research bodies and industry in the Member States and relating to :

- a) clay based materials
- b) technical ceramics

4.2 Objectives

R & D aimed at :

- identifying, analyzing and curing the causes of ceramic fabrication faults which lead to losses in the industry. This involves studies of the relationship between original body composition, preparation and firing conditions.
- understanding the relationship of composition to properties after firing
- ascertaining the response of clays of different compositions to fast-firing trials
- obtaining a better quality of ceramics for specific uses through the improvement of generic technologies.

4.3 Justification

By concentrating the potential of research organizations in the Member States on a programme of great common interest such as ceramics, it is possible to help keep E.C. industry competitive in the field.

By optimizing the productivity, the dependency of the E.C. on third countries with regard to advanced ceramics technologies could be reduced.

Coordination at Community's level will increase the efficiency of the research effort in this field.

5. Total financial incidence of Action in ECU

5.0 Incidence on expenditure

5.0.0 Total cost during the term envisaged

- on Community budget :	5.000.000
- by national administrations :	} 4.864.000
- by other sectors at national level :	
<b>Total :</b>	<b>9.864.000</b>

5.0.1 Multiannual schedule

Commitment

	1982	1983	1984	1985		Total
Staff	-	-	-	-	/	-
Manag.	30.000	32.000	36.000	38.000		136.000
Contracts	1.101.000	3.018.000	745.000	-		4.864.000
<b>TOTAL</b>	<b>1.131.000</b>	<b>3.050.000</b>	<b>781.000</b>	<b>38.000</b>		<b>5.000.000</b>

Payment

	1982	1983	1984	1985	1986		Total
Staff	-	-	-	-	-	/	-
Manag.	30.000	32.000	36.000	38.000	-		136.000
Contracts	200.000	878.000	1.614.000	1.632.000	540.000		4.864.000
<b>TOTAL</b>	<b>230.000</b>	<b>910.000</b>	<b>1.650.000</b>	<b>1.670.000</b>	<b>540.000</b>		<b>5.000.000</b>

## 5.0.2 Evaluation method

(included multiannual previsions)

### a) Staff expenditure

No research staff is required for this programme.

The estimated overall increases in the general Community price index used in drawing up the triennial estimates, i.e. 7,7 % per annum.

### b) Administrative and/or technical expenditure

This expenditure specifically covers the cost of missions and the organization of meetings. It has been estimated on the basis of average requirements.

### c) Expenditure on contracts

This expenditure covers the financial participation of the Community in research carried out under cost-shared contracts (studies, research etc.) to be concluded with research institutions in the Member States specialized in the field. Since the specific nature of the various topics and the qualifications of the contracting parties are likely to vary, it has not been possible to devise a uniform method of calculation. Consequently, the estimate of requirements is a hypothetical one based on the number of contracts to be negotiated and on average financial participation by the Community approximating to 50 % of total costs. At all events, the Advisory Committee on Programme Management will be consulted over the allocation of the appropriations.

## 6. FINANCIAL IMPLICATION IN RESPECT OF APPROPRIATIONS FOR STAFF AND

### CURRENT ADMINISTRATIVE EXPENDITURE :

(see point 5 above)



7. FINANCING OF EXPENDITURE :

7.4 The requisite appropriations to cover the Community's participation in this project are to be entered under future budgets.

8. IMPLICATIONS IN RESPECT OF REVENUE :

- Community taxes on officials' salaries
- Officials' contributions to the pension scheme

9. TYPE OF MONITORING TO BE APPLIED :

- Administrative checks by the DG for Financial Control with regard to the implementation of the budget and to ensure that the expenditure has been incurred in a regular and proper manner plus checks carried out by the Contracts Service of DG XII.

- Scientific checks : ACPM ;

Scientific officers from DG XII

- Checks by the Court of Auditors in accordance with the Treaties

FINANCIAL DATA

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1. BUDGET CHAPTER : 7359.3

2. TITLE OF THE BUDGET HEADING : Sub-programme IV : Wood

3. LEGAL BASIS :

- Implementation of Article 235 of the Treaty establishing the European Economic Communities
- Decision of

4. DESCRIPTION, OBJECTIVES AND JUSTIFICATION OF ACTION

4.1 Description

Research programme carried out essentially by means of shared-cost contracts concluded with research bodies in the Member States and relating to :

- a) wood production
- b) wood harvest, storage and transport
- c) study of wood as a material
- d) wood processing without modification of its basic structure
- e) processing of wood and related organic materials into fibre products
- f) wood as a source of chemicals.

4.2 Objectives

R & D aimed at :

- increasing the physical and economic availability of wood and wood products
- reducing the costs of growing, harvesting, processing and transformation of wood by the development of new technology
- upgrading the quality of wood and wood products
- ensuring a more complete utilisation of wood and wood residues (also organic fibres other than wood insofar as they are relevant), so as to reduce the amount of waste incurred at the production and processing stages, and to minimise losses due to deterioration and fire.

4.3 Justification

The Community depends on external sources to provide more than half its needs of wood and wood products, and consumption continues to rise faster than supplies from indigenous resources.

A coherent Community research programme on wood as a raw material is necessary to complement the existing national and Community research activities.

- The solution of some of these common research problems requires equipment or expertise beyond the resources of any one Member State.
- A Community approach to certain research problems will facilitate collaboration with third countries and international organisations. For example, the development of economically viable small scale wood processing technology would be of very great benefit to many countries all over the world; few, if any, of these could muster the combined scientific resources of the Community which is therefore in a good position to take a lead.

5. Total financial incidence of Action in ECU

5.0 Incidence on expenditure

5.0.0 Total cost during the term envisaged

- on Community budget :	15.000.000
- by national administrations :	} 13.959.000
- by other sectors at national level :	
<b>Total :</b>	<b>28.959.000</b>

5.0.1 Multiannual schedule

Commitment

	1982	1983	1984	1985		Total
Staff	172.000	186.000	200.000	214.000	/	772.000
Manag.	60.000	64.000	70.000	75.000		269.000
Contracts	2.500.000	8.179.000	3.280.000	-		13.959.000
<b>TOTAL</b>	<b>2.732.000</b>	<b>8.429.000</b>	<b>3.550.000</b>	<b>289.000</b>		<b>15.000.000</b>

Payment

	1982	1983	1984	1985	1986		Total
Staff	172.000	186.000	200.000	214.000	-	/	772.000
Manag.	60.000	64.000	70.000	75.000	-		269.000
Contracts	468.000	2.200.000	5.400.000	4.231.000	1.660.000		13.959.000
<b>TOTAL</b>	<b>700.000</b>	<b>2.450.000</b>	<b>5.670.000</b>	<b>4.520.000</b>	<b>1.660.000</b>		<b>15.000.000</b>

## 5.0.2 Evaluation method

(included multiannual provisions)

### a) Staff expenditure

The needs are estimated to be 3 staff for this programme.

2 Category A staff

1 Category C staff

In addition to staff number estimates, the calculations also take account of the rates of salary increases of Commission staff used to estimate the appropriations entered in the 1982 budget; the estimated overall increases in the general Community price index used in drawing up the triennial estimates, i.e. 7,7 % per annum.

### b) Administrative and/or technical expenditure

This expenditure specifically covers the cost of missions and the organization of meetings. It has been estimated on the basis of average requirements.

### c) Expenditure on contracts

This expenditure covers the financial participation of the Community in research carried out under cost-shared contracts (studies, research etc.) to be concluded with research institutions in the Member States specialized in the field. Since the specific nature of the various topics and the qualifications of the contracting parties are likely to vary, it has not been possible to devise a uniform method of calculation. Consequently, the estimate of requirements is a hypothetical one based on the number of contracts to be negotiated and on average financial participation by the Community approximating to 50 % of total costs. At all events, the Advisory Committee on Programme Management will be consulted over the allocation of the appropriations.

## 6. FINANCIAL IMPLICATION IN RESPECT OF APPROPRIATIONS FOR STAFF AND

### CURRENT ADMINISTRATIVE EXPENDITURE :

(see point 5 above)

**7. FINANCING OF EXPENDITURE :**

7.4 The requisite appropriations to cover the Community's participation in this project are to be entered under future budgets.

**8. IMPLICATIONS IN RESPECT OF REVENUE :**

- Community taxes on officials' salaries
- Officials' contributions to the pension scheme

**9. TYPE OF MONITORING TO BE APPLIED :**

- Administrative checks by the DG for Financial Control with regard to the implementation of the budget and to ensure that the expenditure has been incurred in a regular and proper manner plus checks carried out by the Contracts Service of DG XII.

- Scientific checks : ACPM ;

Scientific officers from DG XII

- Checks by the Court of Auditors in accordance with the Treaties

FINANCIAL DATA

1. BUDGET CHAPTER : 7359.4

2. TITLE OF THE BUDGET HEADING : Sub-programme V : Recycling of urban and industrial waste

3. LEGAL BASIS :

- Implementation of Article 235 of the Treaty establishing the European Economic Communities
- Council Decision on 12.11.79 O.J. L 293

4. DESCRIPTION, OBJECTIVES AND JUSTIFICATION OF ACTION

4.1 Description

Implementation of a research programme on recycling of urban and industrial waste (formerly called "secondary raw materials") carried out by means of shared-cost contracts concluded with research bodies in the Member States and relating to :

- a) separation of urban waste
- b) thermal treatment of waste
- c) fermentation/hydrolysis (agricultural and industrial waste)
- d) recovery of materials from waste rubber

4.2 Objectives

R & D aimed at :

- improving technological knowledge in the field of recovery and recycling
- encouraging savings of materials by stepping up recycling.

4.3 Justification

Recycling of urban and industrial wastes at Community level will help to conserve scarce resources and help a better use of energy and its linked economic benefits.

In addition to the coordination of on-going research in the Member States, it proves necessary to supplement it by an indirect action by means of cost-sharing research contracts.

5. Total financial incidence of Action in ECU

5.0 Incidence on expenditure

5.0.0 Total cost during the term envisaged	1979-1983	1984-1985 (*)
- on Community budget :	9.000.000	p.m.
- by national administrations :	7.541.000	p.m.
- by other sectors at national level :		
Total :	16.541.000	p.m.

5.0.1 Multiannual schedule

Commitment

	1979-81	1982	1983	1984	1985	Total
Staff	-	245.000	264.000	p.m.	p.m.	-
Manag.	-	245.000	264.000	p.m.	p.m.	-
Contracts	-	1.548.000	658.000	p.m.	p.m.	7.541.000
TOTAL	5.776.000	2.038.000	1.186.000	p.m.	p.m.	9.000.000

Payment

	1979-81	1982	1983	1984	1985	1986	Total
Staff	-	245.000	264.000	p.m.	p.m.	-	-
Manag.	-	245.000	264.000	p.m.	p.m.	-	-
Contracts	-	1.348.000	2.472.000	1.236.000	p.m.	p.m.	7.541.000
TOTAL	2.926.000	1.838.000	3.000.000	1.236.000	p.m.	p.m.	9.000.000

(\*)- Additional funding, if needed, to be transferred from heading 359.5

## 5.0.2 Evaluation method

(included multiannual previsions)

### a) Staff expenditure

The needs are estimated to be 5 staff for this programme.

- 2 Category A staff
- 1 Category B staff
- 2 Category C staff

In addition to staff number estimates, the calculations also take account of the rates of salary increases of Commission staff used to estimate the appropriations entered in the 1982 budget; the estimated overall increases in the general Community price index used in drawing up the triennial estimates, i.e. 7,7 % per annum.

### b) Administrative and/or technical expenditure

This expenditure specifically covers the cost of missions and the organization of meetings. It has been estimated on the basis of average requirements.

### c) Expenditure on contracts

This expenditure covers the financial participation of the Community in research carried out under cost-shared contracts (studies, research etc.) to be concluded with research institutions in the Member States specialized in the field. Since the specific nature of the various topics and the qualifications of the contracting parties are likely to vary, it has not been possible to devise a uniform method of calculation. Consequently, the estimate of requirements is a hypothetical one based on the number of contracts to be negotiated and on average financial participation by the Community approximating to 50 % of total costs. At all events, the Advisory Committee on Programme Management will be consulted over the allocation of the appropriations.

## 6. FINANCIAL IMPLICATION IN RESPECT OF APPROPRIATIONS FOR STAFF AND

### CURRENT ADMINISTRATIVE EXPENDITURE :

(see point 5 above)



7. FINANCING OF EXPENDITURE :

7.4 The requisite appropriations to cover the Community's participation in this project are to be entered under future budgets.

8. IMPLICATIONS IN RESPECT OF REVENUE :

- Community taxes on officials' salaries
- Officials' contributions to the pension scheme

9. TYPE OF MONITORING TO BE APPLIED :

- Administrative checks by the DG for Financial Control with regard to the implementation of the budget and to ensure that the expenditure has been incurred in a regular and proper manner plus checks carried out by the Contracts Service of DG XII.
- Scientific checks : ACPM ;  
Scientific officers from DG XII
- Checks by the Court of Auditors in accordance with the Treaties

FINANCIAL DATA

1. BUDGET CHAPTER : 7359.5
2. TITLE OF THE BUDGET HEADING : : Subprogramme VI. Recycling of non-ferrous metals
3. LEGAL BASIS :
  - Implementation of Article 235 of the Treaty establishing the European Economic Communities;
  - Decision of
4. DESCRIPTION, OBJECTIVES AND JUSTIFICATION OF ACTION

4.1 Description

Implementation of a coordinated research programme on Recycling of non-ferrous metals carried out essentially by means of shared-cost contracts concluded with research bodies and industries in the Member States and relating to :

- a) Collection and physical and chemical characterization of non-ferrous metal scrap and residues;
- b) Physical processes for the treatment of non-ferrous metal scrap and residues;
- c) Metallurgical processes for the treatment of non-ferrous metal scrap and residues.

Complementary studies in several Member States of Technico-Economical nature for the future evaluation of the recycling potential of non-ferrous metals of strategic interest.

4.2 Objectives

R & D aimed at :

- improving technological knowledge in the field of recovery and recycling
- encouraging savings of essential raw materials through increased recycling
- ensuring a long-term security of supply for essential raw materials

4.3 Justification

A research programme at Community level in the field of non-ferrous metals recycling could contribute to help keep EC industry competitive in this field.

The execution of coordinated research in the Member States permits to avoid duplication of efforts and to optimise the results.

5. Total financial incidence of Action in ECU

5.0 Incidence on expenditure

5.0.0 Total cost during the term envisaged  
- on Community budget :

11.000.000

- by national administrations :

10.280.000

- by other sectors at national level : }

Total :

21.280.000

5.0.1 Multiannual schedule

Commitment

	1982	1983	1984	1985		Total
Staff	101.000	108.000	116.000	125.000		450.000
Manag.	60.000	65.000	70.000	75.000		270.000
Contracts	1.000.000	3.497.000	5.783.000	-		10.280.000
TOTAL	1.161.000	3.670.000	5.969.000	200.000		11.000.000

Payment

	1982	1983	1984	1985	1986		Total
Staff	101.000	108.000	116.000	125.000	-		450.000
Manag.	60.000	65.000	70.000	75.000	-		270.000
Contracts	200.000	927.000	2.814.000	3.100.000	1.600.000		10.280.000
TOTAL	361.000	1.100.000	3.000.000	4.300.000	2.239.000		11.000.000

### 5.0.2 Evaluation method

(included multiannual previsions)

#### a) Staff expenditure

The needs are estimated to be 2 staff for this programme.

1 Category A staff

1 Category C staff

In addition to staff number estimates, the calculations also take account of the rates of salary increases of Commission staff used to estimate the appropriations entered in the 1982 budget; the estimated overall increases in the general Community price index used in drawing up the triennial estimates, i.e. 7,7 % per annum.

#### b) Administrative and/or technical expenditure

This expenditure specifically covers the cost of missions and the organization of meetings. It has been estimated on the basis of average requirements.

#### c) Expenditure on contracts

This expenditure covers the financial participation of the Community in research carried out under cost-shared contracts (studies, research etc.) to be concluded with research institutions in the Member States specialized in the field. Since the specific nature of the various topics and the qualifications of the contracting parties are likely to vary, it has not been possible to devise a uniform method of calculation. Consequently, the estimate of requirements is a hypothetical one based on the number of contracts to be negotiated and on average financial participation by the Community approximating to 50 % of total costs. At all events, the Advisory Committee on Programme Management will be consulted over the allocation of the appropriations.

## 6. FINANCIAL IMPLICATION IN RESPECT OF APPROPRIATIONS FOR STAFF AND

### CURRENT ADMINISTRATIVE EXPENDITURE :

(see point 5 above)

7. FINANCING OF EXPENDITURE :

7.4 The requisite appropriations to cover the Community's participation in this project are to be entered under future budgets.

8. IMPLICATIONS IN RESPECT OF REVENUE :

- Community taxes on officials' salaries
- Officials' contributions to the pension scheme

9. TYPE OF MONITORING TO BE APPLIED :

- Administrative checks by the DG for Financial Control with regard to the implementation of the budget and to ensure that the expenditure has been incurred in a regular and proper manner plus checks carried out by the Contracts Service of DG XII.
- Scientific checks : ACPM ;  
Scientific officers from DG XII
- Checks by the Court of Auditors in accordance with the Treaties

FINANCIAL DATA

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1. BUDGET CHAPTER : 7359.6
2. TITLE OF THE BUDGET HEADING : Sub-programme VII : Substitution
3. LEGAL BASIS :
  - Implementation of Article 235 of the Treaty establishing the European Economic Communities
  - Decision of
4. DESCRIPTION, OBJECTIVES AND JUSTIFICATION OF ACTION

4.1 Description

Implementation of a research programme on Materials Substitution to be carried out by means of shared-cost contracts concluded with research bodies in the Member States and by coordination of research financed at national level in the following areas :

- a) technologies used in the electrical and electronics industry
- b) technology of surface treatment and coating
- c) technology of cutting and machining
- d) stainless steels and alloys
- e) other uses (soldering and brazing technologies, leather tanning)

A series of case studies of a technical and economic nature is also proposed.

4.2 Objectives

R & D aimed at :

- improving technological knowledge in the field of materials substitution
- encouraging savings of materials by stepping up substitution

4.3 Justification

The Member States of the EC have a number of problems in common. As far as substitution is concerned, in fact, certain materials are in short supply throughout the Community.

Creating cooperation and supporting industrially-oriented research in the field of substitution is a priority for the EC, and this can be obtained by developing advanced technology and by preparing research centres to face rapidly, in case of necessity, the diversification of materials.

5. Total financial incidence of Action in ECU

5.0 Incidence on expenditure

5.0.0 Total cost during the term envisaged

- on Community budget :	10.000.000
- by national administrations :	}
- by other sectors at national level :	
<b>Total :</b>	<b>9.147.000</b>
	<b>19.147.000</b>

5.0.1 Multiannual schedule

Commitment

	1982	1983	1984	1985		Total
Staff	101.000	108.000	116.000	125.000	/	450.000
Manag.	90.000	97.000	104.000	112.000		403.000
Contracts	1.246.000	4.555.000	3.346.000	-		9.147.000
<b>TOTAL</b>	<b>1.437.000</b>	<b>4.760.000</b>	<b>3.566.000</b>	<b>237.000</b>		<b>10.000.000</b>

Payment

	1982	1983	1984	1985	1986		Total
Staff	101.000	108.000	116.000	125.000	-	/	450.000
Manag.	90.000	97.000	104.000	112.000	-		403.000
Contracts	296.000	1.295.000	2.780.000	2.963.000	1.813.000		9.147.000
<b>TOTAL</b>	<b>487.000</b>	<b>1.500.000</b>	<b>3.000.000</b>	<b>3.200.000</b>	<b>1.813.000</b>		<b>10.000.000</b>

## 5.0.2 Evaluation method

(included multiannual provisions)

### a) Staff expenditure

The needs are estimated to be 2 staff for this programme.

- 1 Category A staff
- Category B staff
- 1 Category C staff

In addition to staff number estimates, the calculations also take account of the rates of salary increases of Commission staff used to estimate the appropriations entered in the 1982 budget; the estimated overall increases in the general Community price index used in drawing up the triennial estimates, i.e. 7,7 % per annum.

### b) Administrative and/or technical expenditure

This expenditure specifically covers the cost of missions and the organization of meetings. It has been estimated on the basis of average requirements.

### c) Expenditure on contracts

This expenditure covers the financial participation of the Community in research carried out under cost-shared contracts (studies, research etc.) to be concluded with research institutions in the Member States specialized in the field. Since the specific nature of the various topics and the qualifications of the contracting parties are likely to vary, it has not been possible to devise a uniform method of calculation. Consequently, the estimate of requirements is a hypothetical one based on the number of contracts to be negotiated and on average financial participation by the Community approximating to 50 % of total costs. At all events, the Advisory Committee on Programme Management will be consulted over the allocation of the appropriations.

## 6. FINANCIAL IMPLICATION IN RESPECT OF APPROPRIATIONS FOR STAFF AND

### CURRENT ADMINISTRATIVE EXPENDITURE :

(see point 5 above)



7. FINANCING OF EXPENDITURE :

7.4 The requisite appropriations to cover the Community's participation in this project are to be entered under future budgets.

8. IMPLICATIONS IN RESPECT OF REVENUE :

- Community taxes on officials' salaries
- Officials' contributions to the pension scheme

9. TYPE OF MONITORING TO BE APPLIED :

- Administrative checks by the DG for Financial Control with regard to the implementation of the budget and to ensure that the expenditure has been incurred in a regular and proper manner plus checks carried out by the Contracts Service of DG XII.
- Scientific checks : ACPM ;  
Scientific officers from DG XII
- Checks by the Court of Auditors in accordance with the Treaties