COMMISSION OF THE EUROPEAN COMMUNITIES

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M E M O R A N D U M

CONCERNING A COMMUNITY COAL RESEARCH PROGRAMME IN THE FIELD OF MINING ENGINEERING WITH A VIEW TO OBTAINING FINANCIAL AID UNDER THE TERMS OF ARTICLE 55 PARA. 2 c) OF THE E.C.S.C. TREATY

M E M O R A N D U M

CONCERNING A COMMUNITY COAL RESEARCH PROGRAMME IN THE FIELD OF PRODUCT BENEFICIATION WITH A VIEW TO OBTAINING FINANCIAL AID UNDER THE TERMS OF ARTICLE 55 PARA. 2 c) OF THE E.C.S.C. TREATY

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TWO MEMORANDA

The Commission of the European Communities places the highest value on coal research since the results of the latter contribute towards the maintenance of the economy of the coal industry and the improvement of the working environment and safety in mines. The Commission has made it clear that this is included in its energy policy in its Medium-term Guidelines for Coal (1975-1985) and has insisted on the importance of Community research. It has done its utmost, moreover, despite considerable difficulties, to provide the necessary funds from the E.C.S.C. budget.

The maintenance of Community coal production at the 1973 level, i.e., 250 million tce, increased productivity, the stabilisation of costs, improved product upgrading and the improvement of the working environment continue to comprise the main objectives of the coal industry and, consequently, of coal research.

One means, among others, of achieving these objectives is to intensify coal research at the Community level. The Commission, aware of these problems, put its actions into concrete form by providing, for 1975 1976, 1977 and 1978, about 70 million E.U.A. for aid to coal research projects.

For 1979, the Commission has received a series of requests for financial aid under the terms of its Medium-term Coal Research Aid Programme (1975-1980) and Article 55 § 2 c) of the E.C.S.C. Treaty. These proposals have been studied and examined by the services of the Commission in collaboration with the Experts' Committees and the Coal Research Committee (CRC) with a view to concentrating the E.C.S.C's financial efforts on those projects that correspond most closely to the criteria of the Medium-Term Coal Research Aid Programme (1975-1980).

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The draft selection, containing 37 research projects and representing a total expenditure of more than 28 million E.U.A., received approval after examination by the Coal Research Committee. The total aid necessary to carry out this research amounts to 17 million E.U.A., including the cost of dissemination of information.

Two memoranda corresponding to the projects under consideration have been drafted, one relating to mining engineering, for which aid of 9 986 700 E.U.A. is envisaged, the other relating to programmes on coal preparation and upgrading, for which 6 929 400 E.U.A. of aid is foreseen.

A sum of 83 900 E.U.A. is envisaged to cover the costs of dissemination of information and related expenses.

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M E M O R A N D U M

CONCERNING A COMMUNITY COAL RESEARCH PROGRAMME IN THE FIELD OF MINING ENGINEERING WITH A VIEW TO OBTAINING FINANCIAL AID UNDER THE TERMS OF ARTICLE 55 § 2 c) OF THE E.C.S.C. TREATY

(Budgetary year 1979)

1. General remarks

In the context of the objectives of the Community's energy policy, coal is required to play an important part in the future structure of the energy market.

An increased research effort is particularly necessary in the field of mining engineering because the transfer of research results into practice requires long periods of time, particularly, for example, in the planning, construction and development of new mines. The main aim of mining research is to lay, now, the foundations for the modern mines of the future.

On these grounds, the Commission proposes the approval of a Community research programme in the field of mining engineering, which will be carried out in close cooperation by the following institutions and undertakings:

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- The National Coal Board, London (NCB)
- The Steinkohlenbergbauverein, Essen (StBV)
- The Centre d'Etudes et Recherches des Charbonnages de France, Paris (CERCHAR)
- The Institut National des Industries Extractives, Liège (INIEX),

and for which financial aid has been requested under the terms of Article 55 § 2 c) of the E.C.S.C. Treaty.

II. Aims and objectives of the programme

The requirements that must be fulfilled in the field of mining engineering in order to improve the future prospects for coal can be summarised under a few main headings.

Working environment and environmental protection

Here, the first requirement is to be able to offer safe and attractive working surroundings to the labour force that will be required in the future. For this, it is necessary

- constantly to improve mine safety, particularly with regard to the control of firedamp and rock pressure under conditions that are changing and are likely to become worse, and
- to make the surroundings in working places more tolerably by, among other things, taking measures to improve the mine climate, by means of new installations to speed up manriding and to make it safer and more comfortable, by improved ergonomic design of machinery for use underground, etc.

Techniques

In development work it is necessary, on one hand, to develop heading machines that can be used as universally as possible in ever-changing conditions (adjacent rocks, roadway length, cross-section, etc.) and, on the other hand to adapt techniques to new types of cutting for coal winning, e.g., to advance and face-line headings.

In the field of coal winning, available techniques must undergo constant further development so that solutions found can be generally applied, thus giving rise to an improved utilization of reserves. In this connection, the not yet satisfactorily solved problem of face/roadway intersections deserves particular attention.

In the field of outbye services, means of conveying and transport are required that can cope with constantly increasing quantities per face and can be adapted to the ever increasing distances and material quantities and size, and can, at the same time, be used for manriding.

Mining economics and market requirements

From the economic point of view all research projects must, of course, contribute towards improving the results of mining operations and thus to maintaining or improving the competitivity of the Community's coal industry.

The proposed new research programme takes the above-mentioned requirements into account and concentrates on four main fields in the following sub-programmes:

- Development work
- Methane studies, climatic problems, rock pressure and supports
- Methods of working and techniques of coalgetting
- Outbye services underground

III. Programme of work envisaged

The new research programme consists of four sub-programmes containing 20 projects which are presented individually below. The overall programme will be carried out with close collaboration between the research institutions and the Community's coal mines.

Programme "Development work"

This programme comprises four projects and is concerned on one hand with the systematic further development and installation of heading machines and, on the other hand with the development of a machine for drivage ahead of the coal face.

1. Planning and monitoring of tunnelling machine trials (NCB)

The aim of the project is to carry out comparative tests on various types of full-face tunnelling machines and, on the basis of the results, to develop the optimum solution for installation in new mines.

Total cost: £ 315 300

2. Mechanised roadway drivage (INIEX)

It is planned to develop further a prototype machine for fully-mechanised drivage of roadways ahead of the coal face (face/roadway intersection) in conjunction with a mechanised, powered roof support.

Total cost: 10 000 000 FB

3. Drivages: development, in the context of geomechanics, of tools for breaking rock (CERCHAR)

It is intended to develop new tools for rock breaking that will meet increasing requirements, e.g.

- new designs for existing tools
- mullers
- high pressure water jets

Total cost: 3 170 000 FF

4. Activated drilling systems (StBV)

The prerequisites will be determined for the activation of drilling tools for the construction of smaller, more mobile heading machines that can also be used economically in short roadways.

Total cost: 1 500 000 DM

Programme "Methane studies, climatic problems, rock pressure and supports"

This programme consists of six projects and deals with the natural factors with which underground operations have to contend. The work envisaged is based partly on the results of earlier research and should contribute towards the solution of technical and safety problems resulting from the most recent developments.

5. Firedamp prediction and control (NCB)

Further development and refinement of techniques for predicting

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firedamp emission in relation to geological and operating conditions as a basis for effective control of emission and, consequently, improved underground safety.

Total cost: £ 475 100

6. Improvement of the management and control of firedamp (CERCHAR)

This project is aimed at a more exact prediction of gas emission, faster application of the resulting data and the pre-degasification of de-stressed zones. These developments are expected to lead to improved control of firedamp.

Total cost: 3 000 000 FF

7. Controlled recirculation of air in mine workings (NCB/Univ. of Nottingham)

The purpose of the project is to investigate the basic principles and the limitations of air recirculation systems controlled by booster fans. This should lead to effective ventilation and reduced energy costs, particularly in deep and widely-extended workings.

Total cost: £ 70 300

8. Prediction of strata stability from instrumentation and modelling data (NCB/Univ. Cardiff)

The aim of the project is the determination of the relationships between the parameters influencing strata movement and deformation, particularly at faces and in roadways, and the development of new measuring devices and techniques.

Total cost: £ 95 100

9. Rational planning of workings using strata control data (CERCHAR)

The aim of the research is to develop more complete and effective models and methods of simulation giving an approach to the problems of strata control (operational research, business games, etc.)

The methods of research proposed fall within the fields of numerical and hybrid calculation methods for the improvement of predictive models, and of simulation and optimisation techniques.

Total cost: 4 185 000 FF

10. System for strata control (StBV)

In connection with a system for strata control that is to be developed,

the first emphasis will be on bolting and the optimisation of supports at face ends. This will result in favourable effects on both mine safety and undisturbed operation.

Total cost: 5 850 000 DM

11. Measurement technology for the assessment of rock behaviour (StBV)

The aims of the project are the early detection of weak points in mine workings and the investigation of their causes. Favourable repercussions on mine- and working safety are anticipated.

Total cost: 2 000 000 DM

12. Investigation of control of rock bursts and adaptation of supports (CERCHAR)

The aim of the research is to understand the mechanism of formation of rock bursts in order to specify danger factors, to develop means of detecting dangerous zones and to define methods of control that will enable coal extraction to be carried out in safety.

Total cost: 2 062 500 FF

Programme "Methods of working and techniques of coalgetting"

The programme contains five projects aimed at further development or optimisation of existing techniques, the solution of problems at face/raodway intersections, and at improved planning of extraction.

13. Integrated system for automatic control of face alignment and advance (NCB)

The aim is to achieve a system of fully automatic monitoring and control of face alignment and support advance, including a device to align the face conveyor laterally. This will lead to improved reliability of face-equipment, the possibility of increasing the depth of cut, and avoidance of the need to lengthen or shorten the face.

Total cost: £ 2 336 200

14. Optimisation of coal winning techniques and development of new equipment II (STBV)

This proposal, comprising three sub-projects is part of the NCB/StBV Community project "Development of control and monitoring systems for underground workings".

Systematic further development and optimisation is planned for:

- ploughing (optimisation of the technique, extension of the range of application, increase of the surface cut daily)
- shearing (increase of the specific winning rate, reduction of fines and dust formation, improved working safety)
- operational behaviour of face equipment (increased life of chain conveyors and ploughs, reduction in frequency of breakdowns, increased safety by avoidance of dynamic stresses).

Total cost: 2 500 000 DM

15. Development of face end machines (StBV)

It is planned to develop a machine that will make it possible to cut face ends and roadway profiles in a single operation in advancing roadways. This will give a major simplification in operations in the area of face/roadway intersections (and in plough faces) and a corresponding improvement in underground safety.

Total cost: 3 000 000 DM

16. Planning and operations in mining in the presence of geological disturbances (StBV)

The aim is to avoid breakdowns in mining and transport, to achieve better utilization of deposits, to avoid the high cost of going round disturbances, and to achieve safer operation by consideration of geological disturbances both in the planning of workings and by the development of methods for the technology, organisational and geological data.

Total cost: 1 020 000 DM

17. Development of integrated face/roadway conveyors (StBV)

By using face conveyors with curved sections it should be possible to simplify operations in the area of the face/roadway intersection, to improve safety and to reduce dust formation. At the same time, economic advantages are to be expected as a result of the elimination

of a transfer point and a conveyor, the simplification of roadway operations, and rationalisation in sloping seams.

Total cost: 1 700 000 DM

Programme "Outbye services underground"

The programme consists of three projects concerned, on one hand, with the further automation of underground conveying and, on the other hand, with the use of trackless transport.

18. Monitoring of coal transport systems (NCB)

New transducers and monitoring devices for various parameters will be developed with a view to improving the monitoring of transport systems in order to achieve increased reliability and wear-free operation. At the same time, trials will be carried out on these devices under a wide range of conditions using a new test rig.

Total cost: £ 368 400

19. Application of trackless vehicles for underground transportation (NCB)

It is planned to improve underground transport by testing various types of trackless vehicles for carrying both men and materials, and also load-haul-dump vehicles for working areas. Both diesel and battery-driven vehicles will be tested.

Total cost: £ 790 300

20. Mine roadway floor stabilisation (NCB)

Continuation of current work on processes and techniques for the stabilisation of mine roadway floors to facilitate the introduction of free-steered vehicles and thus to improve transport.

Total cost: £ 420 200

IV. Estimated cost and duration of the research work

The total cost foreseen for the programme is 16 644 500 E.U.A.*

The cost and duration of the individual projects are given in the following table.

* Rates of conversion from national currencies are those of 24.10.1978

No.	Project	Proposer	Duration (years)	Total cost E.U.A.
	DEVELOPMENT WORK			
1.	Planning and monitoring of tunnelling machine trials	NCB	3	460 000
2.	Mechanised roadway drivage	INIEX	3	253 500
3.	Drivages: development, in the context of geomechanics, of tools for breaking rock	CERCHAR	3	549 000
4.	Activated drilling systems	StBV	3	599 500
	Total			1 862 000
	METHANE STUDIES, CLIMATIC PROBLEMS, ROCK PRESSURE AND SUPPORTS			
5.	Firedamp prediction and control	NCB	3	692 500
6.	Improvement of the management and control of firedamp	CERCHAR	3	519 500
7.	Controlled recirculation of air in mine workings	NCB/Univ.of Nottingham	3	102 500
8.	Prediction of strata stability from instrumentation and modelling data	NCB/Univ.of Cardiff	3	139 000
9.	Rational planning of workings using strata control data	CERCHAR	3	725 000
10.	System for strata control	StBV	3	2 337 000
11.	Measurement technology for the assessment of rock behaviour	StBV	3	799 000
12.	Investigation of control of rock bursts and adaptation of supports	CERCHAR	3	357 500
	Total			5 672 000

No.	Project	Proposer	Duration (years)	Total cost E.U.A.
	METHODS OF WORKING AND TECHNIQUES OF COALGETTING			
13.	Integrated system for automatic control of face alignment and advance	NCB	4	3 405 000
14.	Optimisation of coal winning techniques and development of new equipment II	StBV	3	999 000
15.	Development of face end machines	StBV	3	1 318 500
16.	Planning and operations in mining in the presence of geological disturbances	StBV	3	407 500
17.	Development of integrated face/roadway conveyers	StBV	2	679 000
	Total			6 809 000
	OUTBYE SERVICES UNDERGROUND			
18.	Monitoring of coal transport systems	NCB	3	537 000
19.	Application of trackless vehicles for underground transportation	NCB	3	1 152 000
20.	Mine roadway floor stabilisation	NCB	2	612 500
	Total			2 301 500
	Grand Total			16 644 500

V. Expected repercussions of the new programme.

The most important repercussions to be expected from the new programme may be summarised as follows:

Mine safety and working environment

The most important result of the work on firedamp is expected to be the development of a comprehensive, universally valid model for the prediction of methane release (Projects 5 and 6). The advantages for mine safety and the whole range of operations are obvious.

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In the field of control of the mine climate, the recirculation of air is expected to lead to technical and climatic advantages (Project 7).

The research on strata control (Projects 8 to 12) will have, on one hand, a direct effect on mine safety in the form of better control of the roof or the avoidance of rock bursts and, on the other hand, indirect consequences stemming from improved coal winning techniques the choice of optimum supports.

The conditions in working places should be favourably influenced by the better arrangement of tools and machines (e.g., Projects 3 and 4), by the introduction of the most up-to-date methods for planning and controlling operations (Projects 16 and 18) and by the improvement of conveying and transport installations (Projects 19 and 20).

Techniques

In connection with development work it can be expected that the economic and technical prerequisites for the wider introduction of full-face tunnelling machines and boom rippers will be established. The consequent abandonment of shotfiring will also lead to improved stability of roadways, since the fracturing of surrounding rocks by the use of explosives will be eliminated (Projects 1 to 4).

In the field of coal winning the work on automatic face control (Project 13) in particular and on the optimisation of techniques (No. 14) should lead to better results and to interruption-free operation. This is also the case for developments concerning face/roadway intersections (Projects 15 and 17), which have great significance for mine safety.

In relation to methods of conveying and transport, trouble-free operations downstream of the face and improved supply to working points are expected (Project 10). In the long term, particular improvements are anticipated from the application of diesel vehicles (Projects 19 and 20).

Organisation of operations

The application of modern techniques for monitoring and control will lead, especially in the area of outbye operations, to the rational

and trouble-free conduct of operations (Project 18).

In addition, the intensive evaluation of data will lay the foundations for planning which will enable every aspect of underground operations to be controlled (Project 16).

VI. Research results

The E.C.S.C. Experts' Committees that are already concerned with research work in the various fields of the new programme will also supervise and keep under review the research work that forms the subject of the requests.

The agreements to be concluded with the benficiaries of the aid will define the rights and obligations of the contracting parties. They will be designed primarily to ensure that the research results will be made available to all concerned in the Community, in accordance with Art. 55 of the E.C.S.C. Treaty.

VII. Conclusions

In view of the importance and interest of the proposed research programme for the technology, the safety, the working environment and the economy of surface- and underground operations in the Community's coal mining industry, the provision of financial aid by the E.C.S.C. for the execution of the individual projects is judged to be both appropriate and justified.

For the execution of the research programme whose total cost is 16 644 500 E.U.A., the Commission proposes to grant aid totalling 9 986 700 E.U.A. to cover its share of the research costs.

Distribution of aid

CERCHAR (France)	1 290 600	E.U.A.
INIEX (Belgium)	152 100	E.U.A.
NCB (United Kingdom)	4 260 300	E.U.A.
StBV (Germany)	4 283 700	E.U.A.

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MEMORANDUM

CONCERNING A COMMUNITY COAL RESEARCH PROGRAMME IN THE FIELD OF PRODUCT BENEFICIATION WITH A VIEW TO OBTAINING FINANCIAL AID UNDER THE TERMS OF ARTICLE 55 § 2 c) OF THE E.C.S.C. TREATY

(Budgetary year 1979)

1. General remarks

A sustained and coordinated research effort is required to ensure that the Community coal industry can achieve its aims. This effort must be directed, first and foremost, towards improving the economy and efficiency of coal mining operations and, in particular, towards the improvement of the working environment and safety in mines. Secondly, in the field of product beneficiation, it must be aimed at ensuring an adequate market for coal by improving its utilization in traditional applications and by developing new uses and new products.

In the field of coal preparation, research must be directed towards enabling the mining industry to keep down treatment costs and to continue, in the face of changing conditions, to meet the requirements of consumers - notably the electricity generation and steel industries - with regard to coal quality.

Both the coal and steel industries can benefit from research on coking technology which will lead to improvements in coke quality (and hence to improved blast furnace performance) as well as to cost savings through the more efficient operation of coke ovens, the improvement of carbonization by-products and the development of new techniques that will make it possible to manufacture metallurgical coke from a wider range of cheaper coals. In addition to these immediate advantages for the steel industry, such research will also lead to better utilization of the Community's coking coal reserves. For coking, as for all other methods of coal processing and utilization, consideration of pollution problems forms a necessary element of any research programme.

In the general area of coal beneficiation, a major aim of Community research is to improve the utilization of reserves of both lignite and hard coal by developing technologies for their conversion into high-value gaseous, liquid and solid products. At the same time, attention must be directed towards the direct utilization or the conversion into useful materials of the waste products of coal mining in order to relieve the industry of a physical and financial burden and to solve the environmental problems arising from the dumping of colliery spoil.

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As imported energy prices continue to rise it will become attractive to extract energy from colliery spoil and other low-grade solid residues and research into the combustion of such materials is therefore of interest.

On these grounds the Commission proposes the approval of a Community research programme in the field of product beneficiation for which financial aid under the terms of Article 55 § 2 c) of the E.C.S.C. Treaty has been requested, and which will be carried out in close cooperation by the following institutions and undertakings:

- The British Carbonization Research Association, Chesterfield (BCRA)
- The Centre d'Etudes et Recherches des Charbonnages de France, Paris (CERCHAR)
- The Deutsche Braunkohlen-Industrie-Verein, Cologne (DEBRIV)
- Hoogovens IJmuiden BV, IJmuiden
- The Kokereigesellschaft Saar mbH, Saarbrücken (KG Saar)
- The National Coal Board, London (NCB)
- Snamprogetti S.p.A., Milan
- The Steinkohlenbergbauverein, Essen (StBV)
- The University of Newcastle upon Tyne

The projects for which aid is requested form three sub-programmes of research in the fields of mechanical coal preparation, coking and briquetting of coal, and new chemical and physical processes and products from coal which are a logical extension of earlier Community programmes but which also include new elements. The allocation of tasks within the programme takes account of the facilities and expertise existing in the various Community countries, and a close collaboration between research workers and coal producers is assured.

II. Aims and objectives of the programme

The research projects in the field of product beneficiation for which aid is requested are related to three main topics, and thus form three programmes:

- mechanical coal preparation
- the coking and briquetting of coal, and
- new chemical and physical processes and products from coal

As a result of developments in mining technology and emphasis on the suppression of dust in mines, raw coal contains increasing quantities of fines and water. Dewatering of the coal to meet the requirements of consumers is consequently becoming more difficult, and the programme on mechanical coal preparation includes a project aimed at alleviating this problem. The programme is completed by a project in which developments in the automation and computer control of coal preparation plants, already supported by the E.C.S.C., will be continued and extended with the aim of improving the performance of such plants and reducing the costs of coal preparation.

In the field of coking and briquetting of coal, the general aims of Community research are to increase the productivity and profitability of coke ovens, to widen the range of coals that can be used to make metallurgical coke while, at the same time, maintaining or even improving the quality of the product, and to solve the problems of pollution associated with coking plants. These aims are covered by the new research programme in this field.

There is a growing interest, on both economic and environmental grounds, in the transport of solid materials by pipeline and the programme includes a study of the application of the technique to the transport of coking coal.

Metallurgical coke is subjected to increasinly severe conditions in large, modern blast furnaces. Importance is, therefore, attached to studies aimed at obtaining a better knowledge of the mechanisms of formation of coke and of its structure and properties, since it is through such knowledge that the aim of improving coke quality can be achieved. Two projects on this topic are included, both of which are extensions of successful Community research.

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In the important field of pollution control, the programme contains a project aimed at improving the purification of liquid effluents and reducing treatment costs.

Work on the optimisation of the yield of tars and other liquid carbonization by-products is included since these materials have a high and increasing value as a source of organic chemicals and can thus make a significant contribution to the economy of the coking process.

The programme also contains projects on the improved control of the temperature in coke oven batteries and of the combustion conditions in the heating flues. These studies are expected to lead to improved fuel economy, to improved product quality and output, and to an increase in the useful life of the expensive refractories used in coke oven construction.

Community aid has been given to research into the use of coal charge preheating as a means of increasing coke oven throughput and widening the range of coals that can be carbonized. It is now planned, in two coordinated projects, to use the technique to widen the coal range still further by, in one case, combining preheating with the addition of binders to the coal and, in the other, by also applying stamp charging.

The use of thin-walled ovens is under investigation as a means of increasing throughput and achieving improved fuel economy. In this connection, it is intended to extend studies of the separation of the coke oven gas into two fractions in order to obtain gases of increased usefulness and value.

Lignite represents a valuable indigenous source of energy and raw materials for the Community and its basic chemical and physical properties are currently being investigated with reference to a variety of uses, in an E.C.S.C. research project. An extension of

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this project is included in the research programme on new chemical and physical processes and products from coal. Also included in the programme is a project which follows on from current and earlier studies of the manufacture of liquid products by solvent extraction and hydrogenation. The aim of this work is to produce both oils and specific organic chemicals from coal.

The remainder of the programme deals with the treatment and use of waste products from the coal industry. The aim of the research projects, which are partly developments of earlier work, is to find outlets for mine waste which would otherwise represent a considerable burden to the mining industry. One project is concerned with the heat treatment of minestone, using the residual coal content as a source of energy, to produce synthetic aggregates, foamed slag, and mineral fibres, all of which could have a high commercial value. A second investigation deals with large-scale uses for mine waste in a range of civil engineering applications. A final study is concerned with the application of fluidised bed combustion to the burning of low-grade materials such as mine waste and the solid residues from coal processing (e.g., gasification and liquefaction) in order to recover the maximum possible amount of energy.

III. Programme of work envisaged

The proposed research programme in the field of produce beneficiation can be summarised as follows:

Programme "Mechanical Coal Preparation"

1. Improved dewatering of fines from preparation plants (StBV)

   Development and improvement of a range of machines and processes for the mechanical dewatering of prepared coal fines in order to produce coking-and power station coal of the required moisture content, despite changes in the quality of run-of-mine coal (increasing fines and water content)

   Total cost: 1 800 000 DM

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2. The application of microprocessors and minicomputers to coal preparation plant control (NCB)

Further development of studies on the automation and computer control of coal preparation plants in order to evaluate costs, performance, etc. of newly-installed computer-based and microprocessor systems.

Total cost: £ 1 260 200

Programme "Coking and Briquetting of Coal"

3. Pipeline transport of coking coal (Snamprogetti)

Study of mechanisms causing deterioration of coking coal in pipeline transport, and of relationships between flow conditions and property changes. Investigation of ways of preventing deterioration of coal quality.

Total cost: 140 500 000 Lit.

4. Fundamental studies of the formation, structure and reactivity of metallurgical cokes as related to blast furnace operation (University of Newcastle)

Study of the mechanisms of formation and gasification of metallurgical coke, and of coke structure in relationship to high-temperature strength and resistance to breakage. The aim of the research is to correlate structure with other properties in order to obtain better understanding of the coking process.

Total cost: £ 118 000

5. Studies of the factors controlling the formation and development of the porous structure of coke (BCRA)

Study of the relationship between coal charge properties, carbonizing conditions and the development of the porous structure of coke with a view to controlling and improving the industrially significant physical properties of metallurgical coke.

Total cost: £ 212 310

6. Treatment of condensates and washing water in coking plants (StBV)

Improved removal or recovery of harmful organic and inorganic materials (Phenol, ammonia, hydrogen sulphide, etc.) from coke oven effluent to reduce treatment costs and water consumption and to minimise the pollution of rivers. The eventual aim is to enable a coking plant to operate without producing liquid effluent.

Total cost: 1 760 000 DM

7. An investigation of the factors affecting the composition and yields of tar and benzole produced by high-temperature carbonization of coal (BCRA)

Investigation of the effect of parameters of the carbonization process on the composition and yields of tar and benzole with the aim of optimising the process of carbonization with respect to the yield of products of maximum commercial value.

Total cost: £ 56 310

8. Development of systematic controls for the thermal regulation of batteries and the production of coke (CERCHAR)

Determination of representative temperatures that can be used for automatic control of thermal conditions in coke oven batteries.

Total cost: 3 278 000 FF

9. Continuous analysis of coke oven waste gases in order to reduce the heat losses per ton of coke (Hoogovens)

Continuous monitoring of waste gas composition to facilitate improved control of coke oven batteries, and thus to increase their thermal efficiency by minimising the amount of heat lost in the waste gases.

Total cost: 484 425 Hfl

10. Carbonization of thermally pre-treated coal with added pitch (StBV)

Widening of the coking coal basis by combining coal preheating with the addition of pitch to enable poorly-coking, but cheaper and more readily-available coals to be carbonized successfully.

Total cost: 1 160 000

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11. Production of blast furnace coke in slot-type ovens from blends without conventional coking properties by the combined application of preheating and stamp charging (KG Saar)

Widening of the coking coal basis by combining processes (preheating and stamp charging, and addition of pitch) that will have additive effects on coke quality. Laboratory, semi-technical and full-scale tests.

Total cost: 2 250 000 DM

12. High-performance silica coke oven with double gas collection system (StBV)

Operation of test ovens with a programme-controlled double gas collection system to separate the gas produced into hydrogen-rich and hydrogen-deficient fractions, and thus to produce gases suitable for various applications (e.g., synthesis, reduction, hydrogenation).

Total cost: 2 088 000 DM

Programme "New Chemical and Physical Processes and Products from Coal"

13. Relationships between raw material quality, process conditions and product quality in the manufacture of high-value products from lignite (DEBRIV)

Continuation of current investigations of the petrographic, physical and chemical properties of lignite in order to determine the parameters relevant to various upgrading processes (e.g., gasification, carbonization, liquefaction), and to optimise process conditions with respect to the raw material properties and the products required.

Total cost: 670 000 DM

14. The production of distillate fuels and chemical feedstocks from coal (NCB)

Further development, on the small pilot scale, of processes for manufacturing liquid products from coal. Optimisation of process conditions, development of methods for manufacturing specific products from coal-derived liquids, investigation of methods of obtaining high yields of light liquid fractions by thermal treatment of coal extracts.

Total cost: £ 1850 000

15. Preparation of slag from colliery shale (NCB)

Preparation of slag by melting colliery spoil in a cyclone combustor using the inherent fuel as a source of heat, and investigation of the effect of different cooling processes on the nature of the material produced.

Total cost: £ 200 000

16. The use of washery tailings in civil engineering (StBV)

Extension of current studies aimed at finding large-scale uses for colliery spoil in the civil engineering industry in order to minimise the formation of tips by providing outlets for the increasing quantities of this material produced by modern mining techniques.

Total cost: 1 500 000 DM

17. Recovery of energy by fluidised combustion of waste material arising from coal mining and coal processing (NCB)

Application of fluidised bed combustion to recovery of maximum energy from low-grade wastes or by-products from coal mining, coal preparation and coal conversion processes.

Total cost: £ 550 000

IV Estimated cost and duration of the research work

The total cost foreseen for the programme is 11 549 000 E.U.A.*

The cost and duration of the individual projects are given in the following table.

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* Rates of conversion from national currencies are those of 24.10.1978

No.	Project	Proposer	Duration (years)	Total cost * (E.U.A.)
	MECHANICAL COAL PREPARATION			
1.	Improved dewatering of fines from preparation plants	StBV	3	719 000
2.	The application of microprocessors and minicomputers to coal preparation plant control	NCB	3	1 837 000
	TOTAL			2 556 000
	COKING AND BRIQUETTING OF COAL			
3.	Pipeline transport of coking coal	Snamprogetti	1	126 000
4.	Fundamental studies of the formation, structure and reactivity of metallurgical cokes as related to blast furnace operation	University of Newcastle	3	172 000
5.	Studies of the factors controlling the formation and development of the porous structure of coke	BCRA	3	309 500
6.	The treatment of condensates and washing water in coking plants	StBV	3	703 000
7.	An investigation of the factors affecting the composition and yields of tar and benzole produced by high-temperature carbonization of coal	BCRA	3	82 500
8.	Development of systematic controls for the thermal regulation of batteries and the production of coke	CERCHAR	3	568 000
9.	Continuous analysis of coke oven waste gases in order to reduce the heat loss per ton of coke	Hoogovens	2	178 000
10.	Carbonization of thermally pretreated coal with added pitch	StBV	2	463 500

Continued ..

No.	Project	Proposer	Duration (Years)	Total cost * (E.U.A.)
11.	Production of blast furnace coke in slot-type ovens from blends without conventional coking properties by the combined application of preheating and stamp charging	KGSaar	3	899 000
12.	High-performance silica coke oven with double gas collection system	StBV	2	834 000
	TOTAL			4 335 500
	NEW CHEMICAL AND PHYSICAL PROCESSES AND PRODUCTS FROM COAL			
13.	Relationships between raw materials quality, process conditions and product quality in the manufacture of high-value products from lignite	DEBRIV	1,5	268 000
14.	The production of distillate fuels and chemical feedstocks from coal	NCB	3	2 696 500
15.	Preparation of slag from colliery shale	NCB	3	291 500
16.	The use of washery tailings in civil engineering	StBV	3	599 500
17.	Recovery of energy by fluidised combustion of waste material arising from coal mining and coal processing	NCB	3	802 000
	TOTAL			4 657 500
	GRAND TOTAL			11 549 000

* Rates of conversion from national currencies are those of 24.10.1978

V. Research results

The E.C.S.C. Experts' Committees which are already concerned with all research work in these fields will also supervise and keep under review the execution of the research work that forms the subject of the requests.

The agreements to be concluded with the beneficiaries of the aid will define the rights and obligations of the contracting parties. They will be designed primarily to ensure that the research results will be made available to all interested parties in the Community, in accordance with Art. 55 of the E.C.S.C. Treaty.

VI. Expected repercussions of the new programme

In the field of coal preparation the research projects comprising the new programme should improve the ability of the coal industry to meet the requirements of the coking industry and the electricity generation industry with regard to coal moisture content in the face of changing conditions, and are expected to lead to improvements in coal preparation as a result of better control and increased automation of the process.

In relation to the coking and briquetting of coal, the research envisaged is expected to have favourable repercussions on the productivity and profitability of coking plant as a result of developments in the treatment of by-products and effluents (treatment of condensates, optimisation of tar and benzole yields, and collection of coke oven gases) and in the monitoring and control of battery temperatures and combustion conditions. The development of pipeline transport for coking coal should also be of economic importance, and is expected to have a favourable impact on the environment, as is the improved treatment of liquid effluents. The better understanding of the properties of coke that is expected to arise from the research programme should make it possible to improve coke quality as the result of increased knowledge of the relationships between the formation of coke, its properties, and its behaviour in use.

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This knowledge, together with the results of the work on combining preheating with the techniques of binder-addition and stamp charging, will also have repercussions on the formulation of coal blends, and hence on the widening of the coking coal range, and will therefore lead to a better utilization of Community resources. Favourable economic effects are also anticipated in this connection, since the research results should make it possible to manufacture metallurgical coke from cheaper coals.

The research programme on new chemical and physical processes and products from coal should lead towards improved utilization of lignite which, in recent times, has been used only for briquette manufacture and electricity generation, but which could become the source of a range of new products. The programme will also contribute towards the development of coal liquefaction, and will thus help to make it possible for coal to be used as a substitute for imported raw materials in the manufacture of liquid fuels and chemical feedstocks. The proposed studies of the treatment and utilization of waste materials will help to improve the economy of the coal mining industry by providing profitable outlets for mine waste or materials produced from such waste, and thus reducing the need for dumping which is becoming increasingly difficult because of problems of cost, availability of space, and environmental considerations. Finally, the work on the combustion of low-grade materials is expected to lead to a useful saving of resources by maximising the recovery of energy from solid materials. The combustion of solid wastes from coal processing should also contribute to the viability of coal gasification and liquefaction processes.

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VII. Conclusions

For the reasons outlined above, the provision of financial aid by the Community for the proposed research work in the fields of mechanical coal preparation, coking and briquetting of coal, and new chemical and physical processes and products from coal is judged to be appropriate and justified.

The research programme will cost 11 549 000 EUA and the Commission proposes to grant aid totalling 6 929 400 EUA.

Distribution of aid

BCRA (United Kingdom)	235 200	E.U.A.
CERCHAR (France)	340 800	E.U.A.
DEBRIV (Germany)	160 800	E.U.A.
Hoogovens (Netherlands)	106 800	E.U.A.
KGSaar (Germany)	539 400	E.U.A.
NCB (United Kingdom)	3 376 200	E.U.A.
Snamprogetti (Italy)	75 600	E.U.A.
StBV (Germany)	1 991 400	E.U.A.
University of Newcastle (United Kingdom)	103 200	E.U.A.