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PROPOSAL FOR A
MULTIANNUAL RESEARCH PROGRAMME
OF THE
JOINT RESEARCH CENTRE

1977 - 1980

(Submitted by the Commission to the Council)

COM (76) 171 final

MULTIANNUAL RESEARCH PROGRAMME

OF THE

JOINT RESEARCH CENTRE

1977-1980

COMMUNICATION FROM THE COMMISSION TO THE COUNCIL

TABLE OF CONTENTS

PART I : INTRODUCTION

- A. Summary
- B. Main features of the next programme
- C. Technical preparation of the programme

PART II : PROPOSALS FOR THE NEXT PROGRAMME

- A. Guidelines
- B. Description of the programme
 - I. Organization of the programmes
 - II. Programme Summary
 - 1. Reactor safety
 - 2. Plutonium fuels and actinide research
 - 3. Nuclear materials and radioactive waste management
 - 4. Solar energy
 - 5. Hydrogen
 - 6. Conceptual studies on thermonuclear fusion reactors
 - 7. High temperature materials
 - 8. Environment and resources

9. Measurements, standards and reference techniques (METRE)
10. Service and support activities
 1. Exploitation of the HFR reactor
 2. Informatics
 3. Training and education
 4. Safeguards
 5. Technical evaluations in support to the Commission.

C. Resources required and implementation

- I. Programme duration, rolling programme
- II. Personnel
- III. Financing of programmes and budgetary credits
- IV. Implementation
 1. Internal management
 2. External relationships

PART III : PROPOSAL FOR A DECISION

APPENDICES

- Opinion of the General Advisory Committee
- Opinion of the Scientific and Technical Committee.

PART ONE : INTRODUCTION

A. Summary :

1. The multiannual programme of the Joint Research Centre, carried out at the four Establishments at Geel, Ispra, Karlsruhe and Petten, will come to an end on 31 December 1976.

The programme was adopted on 14 May and 18 June 1973 (1) and its technical and scientific content partially revised and supplemented by new activities for the Petten Establishment on 25 August 1975 (2).

2. On 22 October 1975, the Commission transmitted to the Council an "Overall Concept" for the next Joint Research Centre programme (3).

(1) Official Journal N° L 153, 9 June 1973 and
Official Journal N° L 189, 11 July 1973
(2) Official Journal N° L 231, 2 September 1975
(3) Doc.COM (75) 529 final, 22 October 1975 or
R/2627/75 (ATO 155), 30 October 1975

On the basis of a critical analysis of the existing instrument, this overall concept set out the guidelines for the future role of the JRC in the context of Community research, as well as the orientation to be given to its scientific and technical activity and the appropriate operational and management procedures.

3. The Council discussed the matter at its meeting on 15 December 1975, together with the "Objective, priorities and methods for a joint R & D policy" (1), in which the Joint Research Centre is naturally involved.

In conclusion, after a searching discussion, the Council noted that the Commission would present, at an early date, a draft programme for the JRC, taking account of the guidelines evolved in the course of that discussion (2).

B. Main features of the next programme

1. The Commission has in fact been encouraged to continue its efforts to maintain a well-organized Joint Research Centre with clearly defined tasks.

To this end, the following guiding principles have been identified :

- the role to be played by the Centre must be one in which primary consideration is given to Community interests in the field of science and technology but which also ensures expert help and scientific and technical advice for the formulation and implementation of sectoral policies in the Community;
- there must be closer links between research projects carried out by direct and indirect action in order to achieve greater homogeneity and improved efficiency;
- there has to be a drastic concentration of activities on a small number of programmes comprising specific projects with fixed objectives and deadlines;
- stress must be placed on research in the energy and environment sectors while at the same time encouragement must be given to the JRC's public service role;

(1) COM (75) 535 final, 29 October 1975 or
R/2724/75 (RECH 33), 5 November 1975

(2) Summary of the decisions taken by the Council at its 375th meeting held on 15 December 1975
Doc.R/235/76 (RECH 2) of 26 January 1976

- the implementation of a staff policy adapted to research requirements is of primary importance, partly in order to facilitate the mobility of research staff;
 - a better balance must be achieved in the ratio of payroll costs to scientific and technical operating expenses in order to improve the efficiency of the Centre and increase the opportunities for cooperation with European research organizations;
 - the structure for the execution and management of projects must be strengthened and the procedure for the assessment of work and results tightened up;
 - a "rolling plan" must be evolved to enable the programme to be adapted to changing techniques and needs;
2. The competent departments of the European Parliament have started their own study of the situation and of the prospects for the JRC (1), based on an analysis of its operation in the past. They have recommended that in future policy be modelled on the guidelines contained in the "Overall Concept" and discussed in the Council.

C. Technical preparation of the programme

The preparation of this proposal for the next multiannual JRC programme has followed the procedure laid down as part of the measures adopted by the Council and the Commission with a view to the reorganization of the Centre (2).

The research and administrative staff at the various JRC Establishments have been broadly consulted at all levels on the study and on the choice and definition of possible fields of activity where necessary in close liaison with those responsible for the indirect action projects.

The research projects were modelled and adjusted in accordance with the general directives which issued by the Commission to the Director-General of the JRC and confirmed in the light of the Council deliberations of 15 December 1975.

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- (1) Fourth interim report on necessary advances to be made in the field of Community research : conditions for the resumption of Community research at the Joint Research Centre
Prov. ref. : EP 43.043/rev III, 11 March 1976
- (2) Commission decision of 13 January 1971 on the reorganization of the JRC
Official Journal N° L 16, 20 January 1971

At the request of the General Advisory Committee (GAC), the relevant drafts were sent for ad hoc consultation to the various Advisory Committees for Programme Management (ACPM's).

The entire technical dossier thus compiled was examined in detail by the General Advisory Committee on 16, 17 and 18 March and by the Scientific and Technical Committee on 21 April. The opinions expressed by these two Committees - which are given in the annex hereto - enabled the final proposals for the activities concerned to be formulated.

PART II : PROPOSALS FOR THE NEXT PROGRAMME

A. Guidelines

When the programme was being prepared, one of the main concerns was to select activities which fitted in with the special role to be played by the Joint Research Centre in the context of Community policy on science and technology.

What is that role ? There are three different aspects which have to be borne in mind :

- 1) firstly, the JRC has to carry out research of a "central" nature. This can take three forms :
 - a) the establishment of a sufficiently broad physical and intellectual research potential to justify its concentration at Community level;
 - b) the execution of tasks which, although not of very wide scope, are of a nature which calls for centralization and even uniqueness;
 - c) while at the same time carrying out its own research activities, the JRC could act as a focus or as a point of crystallization or a catalyst for activities to be coordinated at Community level. In this connection close ties with the indirect action programmes are essential.
- 2) secondly, the JRC could develop the Community public service role by making available to users (official bodies, universities, industry) its equipment, know-how, products and specialized services. A significant factor in this context is the impartial judgement that the JRC can bring to bear in its research owing to the absence of any industrial development involving powerful economic interests.
- 3) lastly, the JRC could perform an essential function in providing the Commission with scientific and technical expertise and support and thus help in the formulation and implementation of Community sectorial policies. Here too there must be close liaison with indirect action projects. It is incumbent upon the JRC to place its research potential at the disposal of other Commission departments.

These various aspects of the JRC's role, which are not mutually exclusive, have served as a basis for the selection of the proposed programmes. The other factors which have played a part in their selection were :

- the wish to concentrate research potential on a small number of projects;
- the concern that the projects adopted should correspond to objectives of clearly defined content and with definite deadlines;
- the need to give priority to research on energy and the environment in view of the importance of these sectors in Community policy;
- finally, the desire fully to exploit the present skills of the Centre; the programme cannot be conceived solely on the basis of what already exists, nor can it be designed without regard to the intellectual and physical potential currently available.

B. DESCRIPTION OF THE PROGRAMME

I. Organization of the programmes

It is proposed that the next multiannual research and training programme (1977-1980) of the Joint Research Centre be broken down into ten programmes (the term "programme" corresponds to a clearly identified line of research, of which the content and budget are to be laid down by a Council decision). Each programme comprises a number of projects, if necessary subdivided into sub-projects.

The ten programmes are :

- reactor safety
- plutonium fuels and actinide research
- nuclear materials and radioactive waste management
- solar energy
- hydrogen
- conceptual studies on thermonuclear fusion reactors
- high temperature materials
- environment and resources
- measurements, standards and reference techniques (METRE)
- service and support activities.

The first three programmes come under the general heading of nuclear safety, the next four relate to future energies, whereas the environment and resources, measurements, standards and reference techniques and service and support activities constitute individual themes.

II. Programme Summary

Each of the ten programmes described below is the subject of a technical fiche; the set of these fiches is reported in the Appendix to the present document; to each fiche is also attached the opinion issued by the appropriate Advisory Committees on Programme Management (ACPM) on propositions for future programmes within their competences in conformity with the wishes expressed by the General Advisory Committee during its 18th meeting on 17 June 1975 (document CCG 157).

NUCLEAR SAFETY

The importance of Nuclear Safety cannot be over emphasized in view of the increased recourse to nuclear energy in the Community energy supply, and of a certain reticence shown by public opinion concerning this matter.

Within this theme, the JRC proposes to carry out three research programmes :

- the "Reactor Safety" programme
- the "Plutonium Fuels and Actinide Research" programme
- the "Nuclear Materials and Radioactive Waste Management" programme.

1. The "Reactor Safety" programme falls within the measures taken by the Community to improve the safety of nuclear installations as recalled in a recent Council Resolution (1).

The actions proposed by the JRC find their Community justification :

- in the central character of these activities, particularly those related to out-of-pile, and even more to in-pile installations, concerned with studies on the effects of depressurization on Light Water Reactors;
- in the public service character of most of the actions undertaken. The work must contribute to the unification of the points of view and working methods of the different national safety organizations with a view to arrive at common regulations for safety and open the way to the required industrial standardization.

The independance and neutrality of the JRC regarding the commercial interests in play guarantees the necessary objectivity to the research;

- finally, in the role of support to the Commission's activities on behalf of the Community's policies. Almost the whole of the proposed JRC's activities contributes to the maintenance of a scientific and technical expertise proper to the Commission. This expertise sustains those Services entrusted with the promotion of greater Community cohesion in the domains of the progressive harmonization of the requirements and criteria of safety and of the coordination of applied research in this area.

The proposed activities logically fall into one of these three types of study :

- overall analysis of safety concepts;
- theoretical and experimental study of possible accidents;
- prevention of component failure.

The overall analysis of different reactor safety concepts will permit the comparison and synthesis of methods of risk evaluation used in the Community as in the USA.

(1) Council Decision on 22 July 1975. Official Journal no. C 185 on 14 August 1975.

The studies of Light Water Reactor accidents will be essentially centred on the analysis (theoretical and experimental), both out-of-pile and in-pile, of the consequence of a depressurization accident in a coolant circuit. The out-of-pile study, already in progress, would be complemented by the construction in ESSOR of a test loop to enable experiments to be conducted on fuel elements under representative failure conditions. An important effort will also be directed to the study of core melt-down and fuel coolant interaction.

Studies on Sodium cooled Fast Reactors concern cooling anomalies in assemblies, fuel, sodium reactions, core melt-down and the mechanical consequences of an explosive accident.

Finally, studies on the prevention of component failures are aimed at detecting the birth and development of faults likely to lead to failures.

The "Reactor Safety" programme consists in six projects :

- Reliability and Risk Assessment
- Light Water Reactors Loss of Coolant Accidents; Out-of-Pile and In-Pile Studies;
- Liquid Metal Fast Breeder Subassembly Thermohydraulics;
- Fuel Coolant Interactions and Core Melt-Down;
- Dynamic Structure Loading and Response;
- Structural Failure Prevention.

1.1. The project "Reliability and Risk Assessment" comprises the following activities :

- development and evaluation of codes for the analysis of the mechanism of accidents in Liquid Metal Cooled Fast Reactors and Light Water Reactors, including the whole core accident in a Fast Reactor;
- probability analysis of accident in Light Water Reactors cores;
- setting up an European Data bank of reliability data.

1.2. The project "Light Water Reactors Loss of Coolant Accidents; Out-of-Pile and In-Pile Studies", for the out-of-pile part, concentrates on depressurization studies in a large loop which simulates a four loop primary circuit of a 1300 MW Light Water Reactor. The influence of the operating conditions of the components on the depressurization phenomenon will be studied in function of the rupture area and position.

The out-of-pile activities comprise :

- the commissioning of the loop and its instrumentation;
- the preliminary calculations to orientate depressurization experiments;
- the execution of the sixty experiments foreseen in the programme established under contract with the German Ministry of Research and Technology;
- the execution of the experiments for the Community programme;
- the parallel development of theoretical studies to compare and develop depressurization codes.

The "in-pile" part of this project concerns the study of a test loop in the ESSOR reactor. This project will proceed in several stages closely followed by appropriate consultative bodies (conceptual study, detailed engineering study, study of operating problems). These studies should allow the Commission, within the general programme revision framework, to submit to the Council, as far as it seems necessary, a detailed proposal concerning the construction of this loop, its experimental programme and associations proposed with the national partners.

1.3. The project "Liquid Metal Fast Breeder Subassembly Thermohydraulics" consists of the following activities :

- theoretical analysis of the consequences of geometrical anomalies in fuel subassemblies under various coolant flow conditions;
- the study of techniques for the early detection of anomalies by temperature noise analysis, comprising experiments both in water and sodium;
- the experimental study of boiling phenomena, in a subchannel and in a subassembly, and the influence of channel blockage on local boiling.

1.4. The project "Fuel Coolant Interaction and Core Melt-Down" in Fast Breeders and light Water Reactors includes the following activities :

- concerning core melt-down : the determination of the physical properties of the core melts, the study of the behaviour of fuel pins during melting, the study of heat transfer and those of the thermal and mechanical loads suffered by core catcher structures;
- concerning fuel coolant interactions : development of theoretical models and calculation codes taking into account the different physical phenomena and their corresponding experimental studies.

1.5. The project "Dynamic Structure Loading and Response" in Sodium Cooled Fast Reactors, comprises the following activities :

- development and experimental verification of dynamic loading and response codes for the behaviour of the primary containment, of the core interior and other primary circuit components;
- determination of the elasto-plastic characteristics of materials and structures.

1.6. The project "Structural Failure Prevention" comprises the following activities :

- study of criteria for crack instability and the evaluation of the effects of embrittlement in Fast Reactor structures;
- study of the laws of crack growth and propagation under fatigue and creep;
- study of microscopic processes;
- development of a probability model for stress corrosion;
- development of the early detection of faults by acoustic and ultrasonic methods.

2. The unity of the programme "Plutonium Fuels and Actinide Research" is based on the special properties (of radioactivity and toxicity) of plutonium and other actinides, for which research activities can only be conducted in very specialized installations. The Karlsruhe Establishment of the JRC has been constructed to concentrate the Community activities in this field. Studies carried out at Karlsruhe furnish in a specific field, results necessary for different nuclear programmes in the Community.

The research on Plutonium Fuels is for one part concerned with the development of Fast Reactor fuels (particularly advanced fuels) and the study of their in-pile behaviour, especially from the safety angle. The other part concerns specific aspects of fuel cycle safety resulting from the presence of plutonium and the elements derived from it. This costly and dangerous research necessitates the particular competences and special installations available at the Karlsruhe establishment.

The second side of the programme concerns Actinide Research and is essentially long term fundamental research for which the Transuranium Institute plays the role of focal point on an European scale. Here again, it is the unique capacity of the Establishment in the matter which justifies its central role in this particular field.

The programme hinges on three projects :

- Utilization Limits of Plutonium Fuels;
- Plutonium and Actinide Aspects of the Safety of the Nuclear Fuel Cycle;
- Actinide Research.

- 2.1. The project "Utilization Limits of Plutonium Fuels" comprises the following activities :

- study of the swelling of advanced fuels submitted to high line power and/or high burn-up, in particular under power cycling conditions and taking into account mechanical fuel/cladding interactions and also chemical interactions;
- study of the compatibility between mixed uranium-plutonium oxide fuels and stainless steel cladding material under severe conditions; study of the corrosion mechanisms;
- study of the thermal behaviour of fuel rods under irradiation, utilizing special devices for direct in-pile measurements under stable and cycling conditions;
- study of the evaporation of nuclear materials above their melting points.

- 2.2. The project "Plutonium and Actinide Aspects of the Nuclear Fuel Cycle" comprises the following activities :

- measurement of integral cross sections and fission yields in fast neutron fluxes especially for higher actinides and some important fission products;
- study of the formation and behaviour of actinides in different fuels;

- development of safe handling techniques and methods of producing well-characterized plutonium products;
- study of certain aspects of the head-end processing of mixed uranium/plutonium carbide fuels with sodium bonding and stainless steel cladding.

2.3. The project "Actinide Research" comprises the following activities :

- the preparation of samples and monocrystals of metals and compounds and their characterization;
- studies of their structural, physical, electronical, etc. properties.

3. The programme "Nuclear Materials and Radioactive Waste Management" constitutes another contribution to the Community research on the technological safety of nuclear installations. Whereas the "Reactor Safety" programme deals with problems relating to the reactor itself, the programme proposed here is concerned with the different steps of the fuel cycle both before and after the reactor and is concentrated in particular on three sectors :

- the first sector concerns management methods of all materials involved in the fuel cycle; it answers the growing preoccupation with the safe and efficient management of fissile material over their entire use, in particular to avoid any diversion, unintentional or deliberate, of these materials.

JRC research is in support of the Commission's actions in this domain;

- the second sector involves the storage and management of radioactive wastes. These activities fall within the frame of the Community action in a matter whose necessity has been underlined in the "Programme of Action of the European Communities on the Environment" (declaration of 22 November 1973). These direct actions support and complement the indirect action programme in the same field (Council Decision of 26 June 1975); the maintenance of an expertise proper to the Commission must contribute to the adoption of solutions of a Community character to the problems raised;
- the third sector concerns the decontamination of reactor components. This activity should be considered as a prolongation of the technical support provided to nuclear power stations operators ; it answers a need clearly stated by these users.

The programme contains both theoretical and experimental studies axed on four themes :

- the "Evaluation of the Long Term Hazard of Radioactive Waste Disposal", comprises essentially the identification and evaluation of the long term safety of the permanent storage of radioactive waste in appropriate geological formations. A probalistic approach is envisaged;
- the study of the "Chemical Separation and Nuclear Transmutation of Actinides"; the objective is to obtain a better appreciation of this new strategy for managing radioactive waste by recycling the isotopes responsible for the long term risk;

- the techniques for "Fuel Materials Management"; the studies point both towards the economic exploitation of the fuel cycle and towards a reduction in the risk of fissile materials diversion, by in particular, setting up methods of analysis and surveillance techniques;
- the "Reactor Component Decontamination Studies" : the water circuit contamination mechanisms, the nature of the contaminated layers and the action of decontaminating agents both on the surface layers and on the component materials, will be studied.

3.1. The project "Evaluation of the Long Term Hazard of Radioactive Waste Disposal" comprises the following activities :

- analysis of the dangers of waste storage and the various options and strategies open in order to optimize the choice of sites;
- study of long term behaviour for medium and high activity waste conditioned in glass or bitumen;
- research on diffusion of actinides into the environment following a fault in the geological barrier;
- studies on the methods of detection and measurement of actinides contained in solid wastes.

3.2. The project "Chemical Separation and Nuclear Transmutation of Actinides" comprises the following activities :

- research on chemical separation of actinides;
- evaluation studies on the production and combustion of actinides in nuclear reactors;
- measurements to improve the knowledge of actinide nuclear cross sections.

3.3. The project "Fuel Materials Management" comprises the following activities :

- measurement and establishment of reference data on irradiated fuels : burn-up, isotopic composition, nuclear cross sections;
- theoretical and experimental studies on the correlation between heavy isotopes and fission products in irradiated fuels, operation of a data bank;
- development and standardization of non-destructive analytical techniques for the isotopic composition of samples or fuel pins.

3.4. The project "Studies for Decontamination of Reactor Components" comprises the following activities :

- contamination mechanisms in high temperature water circuits;
- nature of contaminated surface layers;
- mechanism of action of decontaminants on surface layers;
- depth of attack by decontaminants on coupled alloys of different compositions;
- depth of surface attack after repeated contamination/decontamination cycles.

FUTURE ENERGIES

Under this theme is grouped research on new forms of energy intended to complement or replace present day sources.

This research falls within the long term energy policy strategy for the Community. On 17 December 1974 the Council approved the objectives of a Community Energy Policy for 1985 (doc. COM (74) 1960 final); in this energy policy, scientific research and technological development have a fundamental role to play.

4. In the domain of "Solar Energy", the JRC has attempted to see what contribution it could bring to the global development in Europe of this form of energy, taking into account the recent adoption of a (indirect action) Energy Research and Development Programme (Council Decision of 22 August 1975). This analysis has led to consider essentially a role of support to the indirect action programme, and more specifically actions having a central character (intercomparison, calibration of products developed elsewhere, setting-up of standard measuring stations).

The aspect of support to the Commission relating to the aid to developing countries is also present in this programme.

This programme contains three lines :

- research on thermal conversion in housing (centred on problems posed by solar collectors, heating systems, heat storage and cooling) with a part of applied research on materials;
- the construction of an European installation to simulate solar radiation;
- orientative research on advanced applications of solar energy (essentially dealing with direct conversion by means of electrochemical solar cells and the use of biological conversion).

4.1. The "Habitat and Thermal Conversion" project comprises the following activities :

- definition of a standardized pilot-test facility for the determination of solar collector performances;
- R & D studies on high efficiency collectors and the storage and cooling subsystems;
- experimental studies on combined heating, cooling and storage systems;
- applied research on materials and in particular on selective absorption surfaces;
- other applications of solar collectors : distillation (ethanol, sea water);
- technico-economic studies and project for a documentation and information centre.

- 4.2. In the "European Solar Irradiation Facility" project a close collaboration with industry and the development and construction of a central test station is foreseen.

The station will permit accelerated ageing tests, measurements of system performance, studies of the influence of extreme ambient conditions, development of standardized test procedures.

- 4.3. "Orientative Studies" will be part of this programme. They correspond to the following activities :

- study of electrochemical solar cells based on semi-conductor/electrolyte electrodes;
- study of bioconversion of solar energy.

5. If the proposed research programme on "Hydrogen" should be considered primarily, as in the case of solar energy, in support to the recently approved indirect actions, the special role of catalyst and driving force, played by the JRC in this field, particularly for hydrogen production by the thermochemical route, should not be forgotten. This central role is confirmed by the function of Project Leader assumed by the Commission within the International Energy Agency's programme.

The proposed programme, despite the emphasis placed on the thermochemical route to hydrogen production, nevertheless includes substantial contributions to general assessment studies - concerning notably technicoeconomical comparisons of electrolysis versus thermochemical methods - and to the coupling of the production process with the heat source.

These elements should contribute to defining the role which hydrogen can play in the economy of energy.

The programme hinges on two projects :

- Thermochemical Processes for Water Decomposition;
- Heat Source Coupling.

- 5.1. The project "Thermochemical Processes for Water Decomposition" comprises the following activities :

- basic research on the thermochemical decomposition of water
 - . theoretical studies : identification of new cycles, engineering and cost analysis of selected cycles, cycle flow sheets, list of evaluation criteria, technical design of a full-size plant, collection of industrial data, problems of interfacing with a nuclear reactor;
 - . experimental studies : fundamental research on chemistry and reaction kinetics, and materials research;
- realization of a laboratory test installation.

5.2. The project "Heat Source Coupling" comprises the following activities :

- evaluation of different interface solutions;
- safety and risk analysis.

6. The "Conceptual Studies on Thermonuclear Fusion Reactors" are closely tied to the indirect actions of the Community in the field of controlled thermonuclear fusion and plasma physics; the work of the JRC is oriented exclusively towards the conceptual studies of fusion reactors, studies which were entrusted to it by the fusion Liaison Group in the framework of the 1973-1976 multiannual programme. This contribution of the JRC corresponds with its particular competences in the field of engineering, technology and nuclear physics.

The programme comprises the following activity :

- participation in the conceptual study of an experimental power reactor in connection with the Euratom-CNEN association at Frascati. In particular, blanket neutronics, heat transfer and energy conversion systems, materials, stress-analysis, safety studies and environmental impact, plant engineering, cost analysis.

7. The programme "High Temperature Materials" has been included in the "Future Energies" theme by virtue of the essential role the simple availability, or improvement to properties, of these materials plays in the future development of the energy strategy.

The sectors depending the most on progress to accomplish in the field of materials are :

- the development of chemical processes, particularly for the production of gas and synthetic fuels (coal and lignite gasification, hydrogen production by the thermochemical route, methanol production, etc.);
- the industrial utilization of gas turbines;
- the development of new methods of direct conversion, such as magneto-hydrodynamics.

This progress constitutes an essential element in the introduction of high temperature nuclear reactors on a large scale and from this point of view, the proposed activities should contribute to the increased use of nuclear energy by enlarging its field of application.

The programme included in the present proposal is essentially the continuation of the programme decided by the Council in August 1975. Since this recent decision, nothing leads at present to suggest any fundamental change in the orientations of this programme.

The Petten JRC Establishment is essentially called on to play a role of focusing as the pivot point of these activities in the Community. On the basis of a proper expertise, built upon a certain amount of fundamental and oriented research carried out at the Establishment, the JRC Petten is intended to become the coordinating element, the place for concertation of research carried out in European public institutions and industrial laboratories.

Four projects are proposed in this programme :

- "Meeting Point Petten" project : evaluation of industrial needs for advanced refractory materials and the corresponding R & D programmes; publication and continual updating of a "white book", organization of meetings, setting up of an information service;
- study of the effect of operational environments on mechanical properties of materials in high temperature applications;
- the study of failure modes in high temperature applications;
- the study of the relationship between structure and properties of specific high temperature materials.

8. The programme "Environment and Resources" falls under the heading of research responding to a general concern, both at the level of the competent authorities and of the general public; although it has not so far been raised of the same importance as has energy supply during the last few years, this preoccupation remains of essential importance to the Community.

In the specific field of the environment, JRC activities are pursued in close liaison with the EEC's environmental research and development programme (indirect action); the two actions - direct and indirect - support the Community Programme of Action in this field approved by the Council on 22 November 1973 following the declaration on this date, on the objectives and principles of an environmental policy for the Community. In consequence, the role of supporting a Commission's sectoral policy constitutes the essential motivation for this programme.

If the nature of the studies on this subject undertaken by the JRC since 1972 has not always allowed the Centre to demonstrate a systematic central role, an effort in this direction has actually been accomplished. To this end, the JRC action has been concentrated on a limited number of themes presenting a collective interest and whose importance justifies an approach at Community level.

Activities on resources are essentially centred on renewable (essentially agricultural) resources and relate to the use of remote sensing techniques. Here again, the supporting role to the sectoral policies (agricultural and to a certain extent regional policies) appears to be clear; from the large participation of national institutes on remote sensing activities, the JRC, focal point of a network of experimenters, and interface with the space sector of remote sensing projects, sees, in addition, its central role confirmed.

The proposed research on the protection of the environment is build around themes on pollution of the atmosphere and water, and on noxious chemical products. These themes - if they already figure in the current JRC multiannual programme - are modified in their substance; furthermore, they are most often transformed during the course of the programme by terminating certain activities to the profit of new ones. In addition, a certain progressive orientation towards subjects relevant to the energy ecology is foreseen.

In consequence, the programme content shows an evolutionary character. It is the same for the activities in the resources domain which comprise the continuation and conclusion of the AGRESTE programme (study of agricultural resources in certain areas in the south of France and the north of Italy), at present in progress, and the development of a new activity which will evaluate, using remote sensing, the agricultural potential in under-privileged regions of the Community.

In this perspective, the overall programme "Environment and Resources" is structured in four projects :

- Atmosphere;
- Water;
- Chemicals;
- Renewable Resources (Agricultural).

8.1. The "Atmosphere" project comprises the following activities :

- formation of particles and transport of pollutants (notably physical and chemical analysis, measurements and field experiments, laboratory experiments and also studies on the uptake of SO₂ by plants and soil, and setting up of models of urban air quality);
- ILE : the pathway of automotive lead (notably measurement of atmosphere lead, contribution to absorption in man and the distribution in the ecosystem).

8.2. The "Water" project comprises the following activities :

- eutrophication : studies in three sectors : biology, sedimentology and hydrodynamics;
- Eurasep : investigation of sea and air, pollution in several coasts and cities of European countries in the EEC through the use of satellite data as well as through experimental work, to develop essentially the methodology of analysis, to set-up corresponding models, and to promote the use of these methods;
- ecological effects of chemical and thermal pollution of water (study of the interaction of these two forms of pollution).

8.3. The "Chemicals" project comprises the following activities :

- ECDIN : information and data network relating to chemical products in the environment. This network, at present in the pilot stage, should be developed towards the operational phase. It is foreseen to develop notably the number and nature of data collected, the development of user network and the improvement of the computer system;

- loss of heavy metals by coal-fired electricity generating stations and ecological and biochemical implications. Study of emission, transport in air, transfer to sediments, to the soil, the vegetation and the living organisms; studies of toxicity and development of corresponding models;
- prolongation of action COST 64b "Analysis of micropollutants of water". These studies are based on the recommendations of the Management Committee of action COST 64b and must cover notably the development and improvement of methods and sampling apparatus and also the setting up of an automated library. The pathway of petroleum hydrocarbons C₆-C₁₈ will also be studied. In the framework of the study of the eventual depletion of ozone by halocarbons, the JRC will measure and identify the halocarbons present in different atmospheres.

8.4. The project "Renewable (agricultural) Resources" comprises the following activities :

- continuation and completion of the programme on the study of agricultural resources in certain zones in the south of France and North Italy (project AGRESTE), using notably data from satellites;
- research on crop stresses and diseases by means of remote sensing techniques;
- launching a programme to evaluate soil humidity and thermal balance of certain zones of potential interest from an agricultural and environmental point of view (project TELLUS) having recourse to techniques developed in the previous studies.

9. The programme "Measurements, Standards and Reference Techniques" (METRE) regroups both nuclear and non-nuclear activities of this type into one single framework.

The programme's unity lies essentially in the identical approach to problems, the recourse to similar research techniques and sometimes to the same type of equipment.

The JRC's activity in the nuclear measurements field, concentrated at the Community Bureau for Nuclear Measurements (Geel Establishment), answers the need for nuclear data on a Community scale, a need which can be met efficiently by a central Establishment of the Community.

The JRC activity in the field of standards and reference materials falls within the activities of the Community related to "the elimination, as between Member States, of quantitative restrictions on the import and export of goods, and of all other measures having equivalent effect" and to "the approximation of the laws of Member States to the extent required for the proper functioning of the Common Market" (Article 3 of the EEC Treaty).

This activity is essentially in support to the research programme of the EEC for reference materials and methods (Community Bureau of Reference) (indirect action). The participation of the direct action to the indirect action is beyond doubt deeper than in any other field where both types of action coexist. Whether it is the nuclear part or the non-nuclear part of the programme, all the different aspects of the role of the JRC in Community research, are assembled : executing tasks of a central character, providing support to the Commission's sectoral policies, and maintaining available a public service. The Community justification is thus particularly strong for this programme.

The programme "Measurements, Standards and Reference Techniques" comprises five projects :

- Measurements of Nuclear Data;
- Nuclear Reference Materials and Techniques;
- Non-Nuclear Reference Materials and Techniques;
- Scientific Support to the Services of the Commission;
- Scientific Support to the Secretariat of the Community Bureau of Reference.

9.1. The project "Measurements of Nuclear Data" comprises the following activities :

- determination of neutron parameters using the two Geel accelerators : neutron data relative to certain actinides, effective cross sections of structural materials, capture and resonance cross sections of fission products;
- determination of other nuclear parameters : measurements and evaluation of decay schemes and atomic constants of radionuclides; measurement of effective reaction cross sections for charged particles.

9.2. The project "Nuclear Reference Materials and Techniques" comprises the following activities :

- preparation and characterization of nuclear reference materials to support analytical measurements;
- manufacture and characterization of special nuclear samples and targets;
- analytical measurements in support of Safeguards.

9.3. The project "Non-Nuclear References Materials and Techniques" comprises the following activities :

- establishment of chemical references needed to calibrate measuring apparatus or to verify analytical methods, to satisfy industrial requirements or to serve environmental studies;

- determination of physical and technological properties : characterization of a reference oil for viscosity, thermal parameters measurements, characterization of ultrasonic equipment, resilience calibrations, tribology.

9.4. The project "Scientific Support to the Services of the Commission" comprises the following activities :

- development of reference analytical methods and their application to pesticide residues in foodstuffs;
- research on the release of toxic elements by ceramics;
- study of analytical reference methods for fertilizers;
- assistance for the administration of the Common Customs Tariff;
- expert assistance and scientific secretariat tasks for the benefit of different specialized groups.

9.5. The project "Scientific Support to the Secretariat of the Community Bureau of Reference" comprises activities of assistance, enquiry and information in the different scientific sectors concerned.

10. The programme "Service and Support Activities" associates, as its title indicates, the collection of works which the Joint Research Centre, in function of the competences it acquires by the execution of its research programme, and in conformity with its public service vocation, carries out either for the benefit of other General Directorates or Services of the Commission, or to the profit of organizations, public or private, in the Community. This particular activity - putting its own competences to the disposal of outside users - while remaining a modest fraction of the overall JRC activities corresponds fully to the Community role of the Centre.

If this type of activity necessitates the execution of a minimum of its own research to maintain the scientific and technical competence of its teams, the main task remains nevertheless to provide the services appropriate to the needs of the users of the service support.

In the domain of service activities will be found in particular :

- the operation of the reactor HFR, where the JRC makes available its competence and installations to European users;
- the services EUROCOPI and ESIS, which disseminate on a wide scale, information, scientifically established and controlled, on computer programmes, on the one hand, and on nuclear shielding techniques, on the other hand;
- the activity of education and training which answers the concern to place the scientific and technical competence acquired during the execution of the programmes, before a wider audience.

Concerning the activities of support to the Commission's services, one may identify more specifically :

- work on Safeguards aimed at assisting the Commission's Directorate competent in these matters;
- technical evaluations for the Commission where the JRC plays the role of a specialized Consultant Bureau for the benefit of interested General Directorates and Services.
- certain informatics research, especially that related to the European Information Network (COST 11), those related to Software Engineering, and those related to automatic documentation.

The programme "Service and Support Activities" is composed of five projects :

- the Exploitation of the Reactor HFR;
- Informatics;
- Training and Education;
- Safeguards;
- Technical Evaluations in Support to the Commission.

10.1. The project "HFR" concerns the utilization of the Petten reactor for customer experiments.

10.2. The project "Informatics" comprises the following activities :

- participation in the European Informatics Network (COST 11);
- management of the programme library EUROCOPI, related to scientific and technical software;
- management of the ESIS service, relative to reactor shielding;
- development in the field of "Software Engineering" and automatic documentation.

10.3. The project "Training and Education" refers to the organization of high level courses on subjects related to the JRC's activities.

10.4. The project "Safeguards" concerns activities in support of the competent General Directorate. It deals with :

- the conception of control systems;
- measuring methods and techniques;
- surveillance techniques;
- special problems of reprocessing plants.

10.5. The project "Technical Evaluations in Support to the Commission" covers activities carried out on demand from different services of the Commission, in sectors such as energy, raw materials, renewable resources, environment and informatics.

C. Resources required and implementation :

I. Programme duration, rolling programme

It is proposed that the next JRC multiannual programme should run for four years (from 1.1.1977 to 31.12.1980) like the present programme.

For the renewal of, or later adjustments to the programme, it is proposed to introduce a rolling system which would operate as follows :

The programme adopted for a period of four years would be submitted for revision during its third year; at the same time a new four year programme would be adopted by the Council so that the last year of the initial programme would become the first year of the new programme. The new programme would itself be submitted for revision during its third year at the same time as a decision would be taken on the following programme. If no decision were taken on a new programme and the revision of the current programme, the current one would be continued according to the Council's original decisions.

The three year cycle was chosen by the Commission to allow on one side for the seemingly irreducible length of time required for the programme decision-making process and the following budget accompanying mechanism and on the other side, for the necessity to carry on the programme for a sufficiently long period of time, in order to draw enough experience from it.

Furthermore, this arrangement should ensure that JRC programmes are adapted to research policy trends.

II. Personnel

1. The main concern over personnel expressed by the Council, and also shared by the Commission, about the mobility of the researchers, can be satisfactorily resolved by the proposed new regime for the personnel who are paid from the research and investment budgets (1).

This new regime should facilitate a degree of staff renewal and a leveling of social inequalities; in particular the local agents would be classified as personnel.

(1) proposal for a Council regulation to amend Council regulation n° 259/68 defining the conditions of employment of staff of European Communities and also the conditions applying to other agents of the Communities - doc COM(75) 545 final, of 31 October 1975 or R/2740/75 (STAT 88) (FIN 715) (ATO 160), of 6 November 1975.

In the opinion of the Commission, this proposal - which is still under examination by the Council - should be adopted as soon as possible, and in any case, no later than the decision on the new programme.

The question has already been treated by the European Parliament which approved the broad lines of the Commissions proposal and voted the corresponding resolution (1).

2. The number of JRC personnel is kept at 1,888 (staff and local agents). This figure corresponds to the complement decided by the Council on 25 August 1975 (2) and permitted by operating budget for 1976. Included in the proposed new regime are 471 local agents who are not at present classed as personnel because they are paid from funds allocated year by year from the appropriate section of the budget.

The indicative distribution of personnel between the programmes is given in the table annexed to this document.

As indicated in a foot note of this table, to the number of personnel required for the various programmes one must add 183 agents assigned to the ESSOR reactor, Community installation put at disposition of the Italian Government under article 6/c of the Euratom Treaty.

(1) Decision of the European Parliament of 9 April 1975 - ref EP 44.092/fin.

(2) Official Journal L 231 of 2 September 1975.

TABLE I

Summary of programme staff and allocation (1)

Programme	Personnel			Specific Programme expenditures in MUC	Staff research costs in MUC (4)	Global supporting costs in MUC	Total costs in MUC
	Total	Number of research staff	Others (2)				
I. Reactor Safety	440	239	201	16.520	38.380	36.820	91.720
II. Plutonium fuels and actinide research	209	121	88	6.600	15.300	21.060	42.960
III. Nuclear materials and radioactive waste management	161	97	64	4.360	15.780	14.680	34.820
IV. Solar energy	57	35	22	4.860	5.670	6.050	16.580
V. Hydrogen	78	50	28	2.400	8.140	6,220	16.760
VI. Conceptual studies on thermonuclear fusion	14	8	6	0.280	1.280	1,380	2.940
VII. High temperature materials	51	36	15	2.210	4.440	2.310	8,960
VIII. Environment and resources	188	115	73	5.010	18.730	16,580	40,320
IX. Measurements, standards and reference techniques	286	181	105	8.050	25.640	25.760	59.450
X. Service and support activities	221	116	105	26.510	14.940	18.430	59.880(5)
Total	1,705(3)	998	707	76.800	148.300	149.290	374.390

(1) Amounts expressed in units of account based on value at 1 January 1977

(2) not including 471 local agents

(3) not including 183 employees for the ESSOR plant under article 6(c) of the Euratom treaty

(4) cost of research staff includes salaries and associated laboratory equipment costs

(5) this sum does not include expenditures on the "Technical evaluations in support to the Commission" project; these expenditures are financed by another section of the budget.

3. A new concept has been introduced to determine the number of personnel directly attached to a research programme. It is the "research-staff" concept; which covers not only the personnel directly involved in the research (until now described as "first line" staff or "programme staff" these personnel can include all categories, not only those with academic qualifications) but also the associated technical support staff (study groups, chemistry, electronics and workshops attached to divisions). The adoption of this concept is motivated by a desire for greater clarity in the internal administration of the Centre, a desire which has led to a corresponding modification of the budgetary structure for 1977 onwards. It modifies the distribution of the personnel, but has no effect on their number.
4. The installation of the JET project at Ispra, mentioned in the "overall concept" and which has been proposed by the Commission (1) has not been considered in this document because no decision has yet been taken on the implementation of the JET project.

At an appropriate date, the implications for the programme of a favourable decision in this respect, in particular the allocation of 100 JRC personnel for the project, will be examined by the Commission in conjunction with the consultative bodies, in particular with the General Advisory Committee.

III. Financing of programmes and budgetary credits

The overall financial requirements for execution of the proposed programme as defined by its technical content and schedule, are 374.4 MUC for the four year period. Following the line previously presented in the "overall concept" debated with the Council on 15 December 1975, this maximum is expressed in units of account with a value as at 1 January 1977 and on the basis of a technical evaluation of costs under the economic conditions effective at that date.

(1) communication of the Commission to the Council on the site of JET doc COM(76) 8 final, of 21 January 1976 or R/253/76 (ATO 5) of 2.2.1976

It is foreseen that this sum will not be divided into equal annual parts primarily because of the investment expenditures which will occur only at certain points in the programme; in fact, the provisions show a decrease in the annual budgets between 1977 and 1980.

The planned allocations of the financial resources and personnel to the proposed programmes is presented in table I annexed to this document (see page 25). In addition, each technical sheet in the annexe contains a detailed break-down of personnel and specific credit requirements (major investments, equipment and specific operational expenses) of the programme in question.

2. If the "research staff" number and the amount of specific programme expenditure are taken together as a measure of the relative importance of each of the 10 proposed programmes, and if these programmes are regrouped under the four themes given below, the distribution of effort during the next multiannual programme appears as follows :

- nuclear safety	48 %
- new energies	12 %
- environment and resources	10 %
- reference measurements, standards and techniques	17 %
- service activities	13 %.

This corresponds to a concentration of 70 % of the total effort in the field of energy and environment, while the remaining 30 % is mainly devoted to the JRC's public service activities.

It should be noted that, in the framework of the new proposal, fundamental research is no longer an independent activity.

It is nevertheless necessary to maintain at the JRC like at all other research organizations, an appropriate level of basic or orientation research to accompany the main programmes. This work will be covered by allocating resources to the extent of about 10 % of the total allocation of the programmes.

3. In order to improve the scientific efficiency of the Joint Research Centre, to increase cooperation with European research organisations and industry and to renovate certain equipment an adjustment of the proportion spent on salaries to that on scientific and technical running costs has been favoured.

The proportion thus becomes close to 60 %- 40 %, that is, at the level favoured by the experts both in the Council and in Parliament.

In the table below the allocations of financial resources are grouped under a number of main headings.

:	:	:	:	:
: A. Personnel expenditure	:	214.6	:	57 %
:	:	:	:	:
:	:	:	:	:
: B. <u>Running costs</u>	:	:	:	:
:	:	:	:	:
: B.1. Specific scientific credits	:	77.3	:	21 %
:	:	:	:	:
: B.2. Specific supporting credits (infra- structure, laboratory equipment)	:	82.5	:	22 %
:	:	:	:	:
: Subtotal B	:	159.8	:	43 %
:	:	:	:	:
:	:	:	:	:
: Grand total	:	374.4	:	100 %
:	:	:	:	:

Table II : the main categories in the proposed division of financial resources

Corrigendum to
original page 28

:	:	:	:	:
: A. Personnel expenditure	:	199,27	:	53 %
:	:	:	:	:
: B. <u>Running costs</u>	:	:	:	:
:	:	:	:	:
: B.1. Specific scientific credits	:	76,80	:	21 %
:	:	:	:	:
: B.2. Specific supporting credits (infra- structure, laboratory equipment)	:	98,32	:	26 %
:	:	:	:	:
: Subtotal B	:	175,12	:	47 %
:	:	:	:	:
: Grand total	:	374,39	:	100 %
:	:	:	:	:

Table II : the main categories in the proposed division of financial resources

4. The expression of the financial resources in units of account with a value as at 1 January 1977 enables the technical costs of the programme to be defined unambiguously and permits a distinction to be made between programme and financial decisions. A periodical actualization of the needs to be adopted by the budgetary authority is required.

Each annual budget would be set in current prices for the year under consideration. For this purpose, the various types of expenditure would be treated adequately and be subject to defined trend coefficients to allow comparison of the state of the current programme with the original estimates. A distinction would be made between :

- expenditure on personnel
- other expenditures

The relative size of these expenditures in the different national currencies would be established either from statistics based on past experience or from the estimates of the programme.

The updating and accounting of these expenditure in the framework of the annual budget would be achieved with the following machinery :

- for expenditure on personnel, the salary bill would be based on the salary scales in force on 1 January of the year in question. In the new regime encompassing all present categories of personnel, a provisional credit evaluated on the basis of the increases retained by the Commission for the whole of its personnel would be classified as a reserve under article 9 of the budget.

Any decision by the Council to modify the initial level would be accompanied at the same time by a decision to provide the necessary credits from this reserve (1).

This system has been in operation for several years.

- concerning the other expenses : research contracts, service contracts, general costs (insurance, water, telephone, heating, etc) technical running costs and equipment etc, any trends will depend on the amount of labour involved and on the impact of market prices and national and international regulations.

(1) as long as this new system is not introduced, the salary increases of employees which are determined by local market forces (union agreements) could be foreseen in a manner analogous to that of the staff by forming a budgetary reserve under article 8 of the budget. In this way the Commission would have access to these funds which it would use as far as necessary during the programme keeping the Council informed a posteriori.

Experience shows that it is at least necessary to distinguish between :

- expenditure related to procurements and contracts
- general costs (except service contracts);
- scientific and technical expenses.

In the framework of its medium term economic estimations, based on an equilibrium and unification of a series of evolving factors specific to each nation and each currency, the Commission has indexes which enable the sums, estimated case by case, which are necessary to counterbalance variations in purchasing power occurring during the programme to be accommodated a priori in the budget from the planned budgetary "pool".

These indexes should be communicated like all other estimated items in the budgetary calculations - including an accounting of execution for the preceding period.

IV. Implementation

1. Internal management

The setting up of a new JRC programme which concentrates on a small number of major projects should facilitate efficient management. In addition, the measures taken to rationalize and improve the working of the Centre will be continued.

Certain features of the management are particularly noteworthy :

- 1.1. - the rationalization and streamlining of internal procedures on the financial level and with respect to contracts. The present form of the operational budget will be revised for the new programme.
- 1.2. - the reinforcement of the matrix management structure

This reinforcement essentially concerns the Ispra establishment, where during 1975, a structural change was made to separate the management of approved programmes from the day to day work in the specialized divisions. In terms of the matrix organization the scientific and technical groups form the vertical lines (competences) and the projects - by nature multidisciplinary - form the horizontal lines of the matrix (tasks). This system, which makes a break with the traditional pyramidal management structure, allows the best utilization of the staff corresponding to the required priorities and competences, reduces the rigidity effects inherent to the structures of the departments and ensures an efficient control of the advancement of the projects.

The experience obtained until now shows that this organizational system has been satisfactorily launched in the Establishment. Taking into account the necessary administrative adjustments which will be made during 1976, this system constitutes a solid framework for an efficient implementation of the new multiannual programme.

- 1.3. - reinforcement of project management procedures.

The project management procedures aim at ensuring that the programme objectives are completed within the set time limits and to optimize use of men and materials.

It is necessary to define precisely both the objectives and time-table with regard to the means available. The line of action thus indicated is drawn up in a "plan of action" which should be the basic document for all programme management actions. This plan is not an end in itself : it is a tool for forecasting and controlling, it should stay simple and flexible and should be a living document regularly kept up to date and giving instantly the state of advancement of the programme. Essentially, it includes the following information :

- resources allocated to the objective;
- definition of the finalities and of the work plan (plan of action)
- identification of critical activities and steps;
- work schedule with indication of milestones

All these elements are collected into an overall plan using the planning techniques most appropriate to the state of advancement of the project.

Any deviation of the project from this plan is a signal which should bring immediate action : analysis of causes, remedies to be applied : reallocation of resources, adaptation of plan to a new situation, even reorientation of the work.

The responsibility of keeping to the plan is entirely in the hands of the project director. His most useful tool is a kind of network planning. Actually, techniques such as PERT are only of limited usefulness when major uncertainties exist about the necessary activities and time requirements, thus they are only effective in the later stages of research and development programmes.

A more flexible technique involves the use of research planning diagrams, which are based on both the methods of network planning and on computer programming of functional diagrams. They allow a complete analysis of alternative actions, the possible consequences and suitable courses of action, with subjective probabilities applied to the relationships between the elements of the diagram in order to allow time and costs to be quantified to some extent.

These techniques are not only being practiced and being introduced on a larger scale at Ispra. Karlsruhe makes detailed plans of work development with the help of functional project diagrams. The planning timetable of men and equipment is reviewed each year and revised bi-annually for each specialized team in the project.

2. External relationships

- 2.1. A close and effective liaison with the organs set-up by the Council or the Commission is an indispensable element for the success of the next programme. It is through these organs that a permanent dialogue should develop between the institutions and competent organizations of the Member states and the JRC.
- 2.2. The Commission, concerning this point, places particular importance on the role of the Advisory Committees on Programs Management (ACPM). Such committees, which are common to both direct and indirect actions - when they coexist - ensure cohesion of the research undertaken. In addition, these committees have a role to play in searching for increasing cooperation with work undertaken at the national level.

The Commission freely recognizes that the existence in the new programme of a smaller number of subjects poses an organizational problem at the level of the Advisory Committees on Programme Management. If it seems necessary to maintain the coherence of the 10 proposed programmes while at the same time avoiding control of the same project or sub-projects by several committees, the question of the competences required of the experts who sit in these committees cannot in some cases be ignored.

Table III below shows the structure proposed for the Advisory Committees on Programme Management of the JRC's new multiannual programme.

Programme	ACPM
I. Reactor safety	ACPM "Reactor safety"
II. Plutonium fuels and actinide research	ACPM "Plutonium fuels and actinide research"
III. Nuclear materials and radioactive waste management	ACPM in common with the indirect action "Treatment and storage of radioactive waste"
IV. Solar energy	ACPM in common with the indirect action "solar energy"
V. Hydrogen	ACPM in common with the indirect action "Hydrogen"
VI. Conceptual studies on thermo-nuclear fusion reactors	Fusion associations liaison group
VII. High temperature materials	ACPM "High temperature materials"
VIII. Environment and resources	ACPM in common with the indirect action "Environment" with the support of the Permanent Agricultural Research Committee for the agricultural resources section
IX. Measurements, standards and reference techniques	ACPM in common with the indirect action "BCR" for the non nuclear part, ACPM "Central Bureau for nuclear measurements" for the nuclear part, with common meetings organized periodically
X. Service and support activities - HFR - Informatics - Safeguards	ACPM " HFR" ACPM "Informatics" (ECSAM Committee)

Table III : structure of the Advisory Committees on Programme Management

PART III : PROPOSAL FOR A DECISION

1. The multiannual research programme for the JRC is based on Article 7 of the EAEC Treaty or Article 235 of the EEC Treaty, depending on which of the 10 sub-programmes is concerned.

A proposal for a decision is given in the Annex to this Note.

2. This proposal for a decision has been established taking into account the Council Resolution of 17 December 1970 on the detailed rules for the adoption of research and education programmes (1).

(1) Official Journal N° L 16, 20 January 1971

PROPOSAL FOR A COUNCIL DECISION

OF

ADOPTING A RESEARCH PROGRAMME TO BE PERFORMED BY THE JOINT RESEARCH CENTRE FOR THE EUROPEAN ATOMIC ENERGY COMMUNITY AND FOR THE EUROPEAN ECONOMIC COMMUNITY

THE COUNCIL OF THE EUROPEAN COMMUNITIES,

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

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

Having regard to the proposal from the Commission, submitted after consultation with the Scientific and Technical Committee for the nuclear actions;

Having regard to the Opinion of the European Parliament;

Whereas in the context of the common policy in science and technology the multi-annual research and training programme is one of the principal means whereby the European Atomic Energy Community can contribute to the rapid and safe growth of nuclear industries and also to the acquisition and dissemination of knowledge in the nuclear field;

Whereas Article 2 of the Treaty establishing the European Economic Community assigns to the Community, inter alia the task of promoting throughout the Community a harmonious development of economic activities, a continuous and balanced expansion and an increase in stability; whereas the objectives of the Community's activities for these purposes are set out in Article 3 of the same Treaty.

Whereas the non-nuclear research projects which form part of the subject of this Decision appear necessary in order to achieve these objectives;

Whereas the Treaty establishing the European Economic Community made no provision for the powers required for these purposes;

Whereas the programme was drawn up in accordance with the Council Resolution of 17 December 1970 on the detailed rules for the adoption of research and education programmes (1);

Whereas the Italian Government has undertaken to take over the ESSOR complex, made available to it by the Commission in accordance with Article 6 (c) of the Treaty establishing the European Atomic Energy Community,

HAS DECIDED AS FOLLOWS :

(1) Official Journal No L 16, 20 January 1971, p. 13

ARTICLE 1

A research programme, indicated in Annexes I and II, is hereby adopted for a period of four years from 1 January 1977. The Annexes form an integral part of this Decision.

ARTICLE 2

The commitment for expenditure, necessary for carrying out this programme, shall be 374.390 million units of account with a value as at 1 January 1977, on the basis of a technical evaluation of costs under the economic conditions effective at that date.

The maximum number of staff shall be 1,705 officials.

The allocation of funds and staff is given in Annex II.

ARTICLE 3

The programme defined in Annex I shall be subject to review at the beginning of the third year with a view to a Council Decision for a new four-year programme in accordance with the appropriate procedure.

ARTICLE 4

The information resulting from the implementation of the non-nuclear parts of the programme defined in the Annex will be disseminated in accordance with regulation (EEC) No 2380/74 of the Council on 17 September 1974 (1) adopting provisions for the dissemination of information relating to research programmes for the European Economic Community.

ARTICLE 5

The Commission shall ensure that this programme is carried out.

(1) Official Journal No L 255, 20 September 1974, p. 1

ANNEX IMULTIANNUAL RESEARCH PROGRAMMEI. REACTOR SAFETY

(Nuclear)

The programme comprises six projects covering the following research :

- reliability and risk assessment;
- light water reactor loss of coolant accident; out-of-pile studies and in-pile studies;
- liquid metal fast breeder subassembly thermohydraulics;
- fuel coolant interactions and core melt-down;
- dynamic structure loading and response;
- structural failure prevention;

II. PLUTONIUM FUELS AND ACTINIDE RESEARCH

(Nuclear project)

The programme comprises three projects covering the following research :

- utilization limits of plutonium fuels;
- plutonium and actinide aspects of the safety of the nuclear fuel cycle;
- actinide research.

III. NUCLEAR MATERIALS AND RADIOACTIVE WASTE MANAGEMENT

(Nuclear)

The programme comprises four projects covering the following research :

- evaluation of the long-term hazard of radioactive waste disposal;
- chemical separation and nuclear transmutation of actinides;
- fuel materials management
- studies for decontamination of reactor components.

IV. SOLAR ENERGY

(Non-nuclear)

The programme comprises three projects covering the following research :

- habitat and thermal conversion;
- European solar irradiation facility;
- orientative studies;

V. HYDROGEN

(Nuclear)

The programme comprises two projects covering the following research :

- thermochemical processes for water decomposition;

- heat source coupling.

VI. CONCEPTUAL STUDIES ON THERMONUCLEAR FUSION REACTORS

(Nuclear)

The programme comprises the following activities :

- participation in the conceptual study and development of specific designs for an experimental power reactor;
- analysis and evaluation of a complete power plant.

VII. HIGH-TEMPERATURE MATERIALS

(Nuclear)

The programme comprises four projects covering the following fields :

- meeting point Petten;
- study of the effect of the operational environment on mechanical properties of materials in high-temperature applications;
- study of failure modes in high-temperature applications;
- study of the relationship between the structure and properties of specific high-temperature materials.

VIII. ENVIRONMENT AND RESOURCES

(Non-nuclear)

The programme comprises four projects covering the following fields :

- atmosphere;
- water;
- chemicals;
- renewable resources (agricultural).

IX. MEASUREMENTS, STANDARDS AND REFERENCE TECHNIQUES (METRE)

The programme comprises five projects covering the following activities :

- measurement of nuclear data (nuclear project);
- nuclear reference materials and techniques (nuclear project);
- non-nuclear reference materials and techniques (non-nuclear project);
- scientific support to the services of the Commission (nuclear project);
- scientific support for the secretariat of the Community Bureau of References (non-nuclear project).

X. SERVICE AND SUPPORT ACTIVITIES

(Nuclear)

The programme comprises five projects covering the following activities :

- exploitation of the HFR reactor;
- informatics;
- training and education;

- safeguards;
- technical evaluations in support to the Commission.

ANNEX II

ILLUSTRATIVE BREAKDOWN OF FUNDS AND STAFF

PROGRAMMES	COMMITMENT FOR EXPENDITURE (in millions U.A.) (1)	STAFF (2) (3)	
		TOTAL	of which research staff
I. REACTOR SAFETY	91,720	440	239
II. PLUTONIUM FUELS AND ACTINIDE RESEARCH	42,960	209	121
III. NUCLEAR MATERIALS AND RADIO-ACTIVE WASTE MANAGEMENT	34,820	161	97
IV. SOLAR ENERGY	16,580	57	35
V. HYDROGEN	16,760	78	50
VI. CONCEPTUAL STUDIES ON THERMO-NUCLEAR FUSION REACTORS	2,940	14	8
VII. HIGH-TEMPERATURE MATERIALS	8,960	51	36
VIII. ENVIRONMENT AND RESOURCES	40,320	188	115
IX. MEASUREMENTS, STANDARDS AND REFERENCE TECHNIQUES (METRE)	59,450	286	181
X. SERVICE AND SUPPORT ACTIVITIES	59,880	221	116
T O T A L	374.390	1,705	998

(1) expressed in constant values as at 1 January 1977.

(2) excluding 183 officials made available under Article 6(c) (ESSOR project)

(3) excluding 471 local staff.

APPENDICES

- Opinion of the General Advisory Committee
- Opinion of the Scientific and Technical Committee.

Brussels, 18 March 1976

CCG 169 /

OPINION

of the General Advisory Committee during its 20th meeting (16-18 March 1976)
on the multiannual research and training programme of the Joint Research
Centre (JRC)

As provided for in Article 6 of Commission Decision of 13 January 1971 on the reorganization of the JRC, the Commission has given the Director-General the guidelines for drawing up the new multiannual programme of the JRC for the period 1977-1980 (document COM (75) 529 final, 22 October 1975).

These guidelines indicate, inter alia, that a significant part of the effort should be devoted to research on energy and the environment, and that the staff should be limited to its present level of 1,888.

The Director-General has prepared, on his own responsibility, a draft programme which has been submitted to the General Advisory Committee for its opinion.

The General Advisory Committee, during its 20th meeting held in Brussels between 16 and 18 March 1976, under the chairmanship of Mr P. H. von Bülow, on the whole, views this proposal favourably. It congratulates the Director-General on presenting a programme concentrated on a limited number of items dealing with concrete projects; it further notes the close agreement of the Director-General's proposal with the conclusions of the work of the relevant Advisory Committees on Programme Management (ACPM).

It notes, in particular, that in the light of the guidelines mentioned above, the proposed programme as a whole represents a satisfactory use of the capabilities of the JRC for Community needs.

The General Advisory Committee feels, however, that the work it recommends could perhaps be carried out by a total staff of less than 1,888.

One member of the Committee does not share this view and expresses the following opinion :

"The doubts expressed during this meeting about the number of staff for various parts of the programme have always been directed towards a small section of this staff and have been put forward by a limited number of members of the Committee, who have generally not had the support of the majority.

"In fact the matters at present before the Committee tending to such a view on a difficult subject, are insufficient for such a view to be put forward, even though it is a conditional view."

The proposal for a programme comprising a more limited number of items raises the question of the structure of the ACPMs.

The Committee draws the attention of the Director-General to the necessity to reconsider the terms of reference and the composition of the ACPMs, taking into account not only the logical set-up resulting from the grouping of programmes, but also the field of competence of the experts, which could be called into question.

The General Advisory Committee makes the following detailed comments with regard to the various programmes :

1. REACTOR SAFETY

In the field of Reactor Safety, the General Advisory Committee, as a whole, expresses a favourable opinion save in the case of the COFAS project referred to below. It particularly stresses the quality of the cooperation with the competent ACPM, a cooperation which ensures that this programme goes hand in hand with the action carried out at a national level.

In view of the various guidelines of the national programmes, the experts express slightly different points of view about the relative importance of the projects. This problem should be settled through the normal process of programme management.

As regards the COFAS project, which could not be submitted to the relevant ACPM, the General Advisory Committee recognises the general interest of the objective pursued. The General Advisory Committee however considers that pending

- the results of certain experiments, now in progress or in preparation and
- the experience gained from the construction and commissioning of the SARA loop in ESSOR

the undertaking of the COFAS programme cannot at present be recommended.

Before undertaking a detailed study of the COFAS loop, a preliminary study should be carried out in consultation with the ACPM.

2. PLUTONIUM FUELS AND ACTINIDE RESEARCH

The General Advisory Committee expresses a favourable opinion on this programme. It notes with satisfaction the high degree of cooperation with the relevant ACPM.

One member expresses doubts about a premature termination of the basic carbide research and has reservations on the SHAPE programme since the Karlsruhe Establishment is not very experienced in manipulating nuclear fuels on an industrial scale. For the same reasons another member expresses reservations on the RECARD project.

A third member regards the experimental studies related to the head end reprocessing of carbides as no being urgent.

3. MANAGEMENT OF NUCLEAR MATERIALS AND RADIOACTIVE WASTE

The General Advisory Committee expresses a favourable opinion regarding project 1 (Evaluation of the long-term hazard of radioactive waste disposal) and 2 (Chemical separation and nuclear transmutation of actinides).

One member recommends that greater efforts be devoted to the analysis of the hazards of radioactive waste disposal (project 1); another member urges that the model analysis of the relative hazards of various methods of disposal (project 1) should include the method of disposal at sea.

For project 3 (Fuel materials management) no important technical objection is raised, although some Committee members express the wish to combine this activity with the safeguards project.

The Director-General presents to the Committee a new proposal entitled "Study on the decontamination of reactor components", based on a recommendation of the ACPM "Technical support to nuclear power stations". A generally favourable opinion is expressed to this, in view of the practical character of the project and its implications for reactor operators.

4. SOLAR ENERGY

The General Advisory Committee welcomes this programme but considers that it could be carried out with a somewhat smaller staff than that proposed by the Director-General. It recommends that the close coordination of direct and indirect actions be maintained.

The Committee shares the opinion of the ACPM on the importance of avoiding duplication of the work of industry, and recommends the preservation of the character of support to industry of project 1 (Habitat and thermal conversion) and project 2 (European solar irradiation facility).

The Committee particularly emphasizes project 2, and recommends the Director-General to work in close cooperation with the ACPM in specifying this test facility and in improving the accuracy of the estimates.

Some members consider that project 1 does not deserve the same priority; some of these members have the same view of project 3 (Orientation studies).

5. HYDROGEN

The Committee expresses a favourable opinion on this programme.

The Committee however stresses that it is of vital importance to follow closely general developments in this field (including the development of the nuclear heat source) and considers the programme revision foreseen for 1978 is imperative.

The Committee adopts the recommendations of some of its members on the need for a close relationship of the JRC with the interested industrial bodies.

6. CONCEPTUAL STUDIES ON THERMONUCLEAR FUSION

The General Advisory Committee recommends that this programme should be sent for discussion in the near future to the recently created Advisory Committee on Fusion, to enable the Commission and Council to take its advice into account in their discussion of the JRC programme proposal.

Several members think that the present capacity and activities of the national laboratories are sufficient to cope with all the work necessary in the field of fusion reactor technology.

7. HIGH TEMPERATURE MATERIALS

The General Advisory Committee notes with satisfaction the activities carried out, in particular those concerning the survey on the present state of knowledge and on the needs of research and development in the field of high temperature materials, as well as the close contacts established with European industries and research institutes.

It recalls that this programme has been recently decided upon (August 1975) and that it is necessary that the results of the survey be presented as soon as possible to the ad hoc group from which the programme originated, to allow future activities to be defined in detail.

At the present stage, the Committee has no particular observation to make on the Director-General's proposals.

8. ENVIRONMENT AND RESOURCES

The Committee expresses its agreement with the content of the programme; it notes in particular the excellent degree of homogeneity of the work proposed in both direct and indirect actions, and the relevance of the proposals to the "Community action programme on Protection of the Environment".

The Committee urges that the work be carried out with due attention to the use that the legislature can make of the results when later defining future standards and methods.

Several members recommend that a larger effort be devoted to the activity "Urban air modelling", while others consider that this should be reduced unless qualified staff are available for this type of activity.

With regard to the programme TELLUS, several members insist that this programme be retained only if it receives the endorsement of the "Standing Committee on Agricultural Research".

The Committee recommends the Director-General to adjust the level of activities in accordance with the order of priority stipulated by the ACPM.

9. MEASUREMENTS, STANDARDS AND REFERENCE TECHNIQUES (METRE)

The Committee comments on the high quality of the work at present carried out and expresses a positive approval of the proposed programme as a whole but two members express some reserves about the number of staff for the non nuclear part of the programme.

The Committee insists on the necessity of an appropriate tarification for outside work and the re-utilization of the corresponding resources.

10. SERVICE AND SUPPORT ACTIVITIES

The General Advisory Committee expresses in general a favourable opinion on the five projects comprising this programme (1. HFR, 2. Informatics, 3. Training and Education, 4. Safeguards and 5. Supporting technical evaluations for the Commission).

Brussels, 21 April 1976

OPINION OF THE SCIENTIFIC AND TECHNICAL COMMITTEE

At its meeting on 21 April 1976 the Scientific and Technical Committee, under the chairmanship of Mr G. Cesoni, studied the proposal for a multiannual research programme for the Joint Research Centre for 1977-1980 and, more especially, the research activities based on Article 7 of the EAEC Treaty.

The Scientific and Technical Committee was, on the whole, in favour of the proposal and made the following comments on specific programmes :

a) Reactor Safety

The Committee expressed the wish that, through suitable rearrangement of the "Safety" programme, the project on "Dynamic loading and response of structures" should cover all types of reactors and not only fast breeders, and that the "Reliability and risk assessment" project should also cover the analysis of failure in large structural components.

The in-pile studies were thought to be interesting but the Committee felt they needed to include a critical analysis of the national programmes of Member States and of some other countries (in-pile and out-of-pile tests).

The Committee wished to be consulted before any major decisions in this field were taken.

b) Plutonium fuels and actinide research

The Committee noted with satisfaction the proposed balance between applied research and basic research; however, it was concerned lest too rigid a limit be set for the decision regarding completion of the studies on carbides in general, including aspects of manufacture and reprocessing.

c) Management of nuclear materials and radioactive waste

The Committee laid particular stress on the project on "Evaluation of the long-term hazards of radioactive waste storage".

This research should help to identify a common basis for assessing the effects of scientific constraints on the establishment of a policy in this field.

The Committee recommended that there should be increased coordination between the various programmes in this area.

The Committee expressed its approval of the project on "Reactor component decontamination studies" since it considers it most important to maintain a very high level of personnel protection against radiation during maintenance and repair work.

d) Fusion

As regards the allocation of staff and appropriations, the Committee was not opposed to the JRC proposals, but would rely on the judgement of the Fusion Advisory Committee as regards the scientific usefulness of the programme and its relative priority.

e) Measurements, standards and reference techniques

(Nuclear : Central Bureau for Nuclear Measurement)

The Committee issued a favourable opinion on this work.

f) High flux reactors

The Committee raised no objection regarding continuation of this programme under the present conditions.

g) Safety

The Committee stressed the need to organize suitable machinery for billing for services performed.