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AN ENERGY STRATEGY FOR THE COMMUNITY : THE NUCLEAR ASPECTS

(Communication from the Commission to the Council)

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A) Part One : The General Background

I. Nuclear energy and the Community's dependence

1. In its Communication on the development of an energy strategy for the Community⁽¹⁾, the Commission underlined the Community's objectives, which can be summarised as an effort to reduce dependence on oil by means of a more rational use of energy and a greater diversification of supplies.
2. The Community must continue unceasingly in its efforts to ensure that alternative energy sources (solar and geothermal energy, wind power, etc.) and later thermonuclear fusion can as quickly as possible make a significant contribution to energy supplies. Some substitution for oil products is already provided by natural gas through its use in industry and the home. Nevertheless, between now and the year 2000, any real diversification can be achieved only by having recourse to coal and nuclear power.

Coal is the subject of a simultaneous Communication to the Council⁽²⁾ while the aim of the present Communication is to examine the conditions for a more widespread recourse to nuclear power and to outline the action to be taken at Community level in order to tackle the specific problems posed by this energy source as regards :

- the supply of fuels;
 - the safeguarding of nuclear materials;
 - the protection of the health and safety of workers and the general public and the protection of the environment;
 - information to the public.
3. As regards the security of supply, nuclear energy makes a positive contribution to the Community in several respects :
 - it helps to diversify the type of energies used and the geographical origin of supplies;
 - thanks to the specific properties of the fuel used, it enables huge amounts of potential energy to be stored fairly easily and at relatively low cost;
 - European industry has gained access to the whole of nuclear technology including all the stages in the fuel cycle.

⁽¹⁾ COM(81)540 final, 1.10.1981.

⁽²⁾ COM(82)31, 27.1.82.

Lastly, it should be stressed that after being used in today's thermal reactors, uranium loses only a small fraction (1-2%) of its energy content. The adoption in future of the fast reactor design - a technology that is more advanced in Europe than elsewhere - will make it possible to increase the energy yield from uranium about 60-fold.

4. In the Community today, 16% of electricity production, i.e. 6% of overall energy consumption, is already supplied by nuclear energy by means of a network of power stations whose available capacity amounts to 41,000 MWe. According to the Member States' forecasts, this capacity should exceed 110,000 MWe by 1990. Nuclear energy thus substituted more than 56 million tonnes of oil equivalent (toe) in 1981 and should substitute more than 150 million toe by 1990.

These figures should be compared with the Community's net oil imports, which amounted to nearly 370 million toe in 1981 and should rise, according to Member States' forecasts, to approximately 460 million toe by 1990.

5. The achievements made in nuclear energy and the prospects for its further development as outlined above have nevertheless undergone a serious (i.e. more than 50%) setback compared with the objectives the Community set for itself on 17 December 1974⁽¹⁾. This setback can be explained :
- partly by a much lower growth in electricity demand than was envisaged at the time. (This phenomenon, which is also due to a praiseworthy effort to save energy, mainly reflects the reduced rate of economic growth that the Community is experiencing at present; an economic recovery would not fail to have repercussions on the expansion in the demand for electricity. Furthermore, in the context of a more rational use of energy and an optimisation of the cost to the consumer, increased market penetration possibilities for electricity can be predicted.);
 - to a greater extent by opposition to nuclear power, which has resulted in the implementation of a large number of projects being abandoned or postponed. Such opposition has made itself felt to differing degrees in the Member States that are implementing nuclear programmes; the general picture does not therefore truly reflect the situation in each Member State.

(1) In its Resolution, the Council set the following objective for the development of nuclear energy : // an available installed capacity of at least 160,000 MWe, and if possible of 200,000 MWe, by 1985.// Current forecasts envisage a capacity of approximately 70,000 MWe being reached by the year 1985.

6. Since 1974, the Community has periodically felt the need to revise its energy objectives; according to the latest revision, dating from June 1980, the share of electricity production based on coal and nuclear energy should range between 70 and 75% of total production by 1990. According to current forecasts carried out by the Member States, this share should prove to be in good agreement with these objectives, being broken down approximately as follows : nuclear power 38% and coal 38%.

Nevertheless, such forecasts reveal a wide variation in the share of nuclear power in the different Member States, which ranges from 80% of electricity production in France to zero in Denmark, Ireland and Luxembourg, countries that are not for the time being contemplating adopting this source of energy.

II. The economic impact of nuclear energy

7. For several years already, electricity of nuclear origin has been competitive with that produced from other sources. On the basis of presently foreseeable economic conditions, the choice for future investment in large power stations is henceforth reduced to the alternative between nuclear and coal. It is no longer envisaged, except under very special conditions and in a very limited number of cases, to build large units fired by natural gas or petroleum products; the contribution of lignite and peat cannot for their part be increased considerably.
8. Estimates made in 1981 by a working party set up by UNIPEDE⁽¹⁾ have confirmed the economic benefit of nuclear energy to the Community. The Commission has been associated with this work as it was essential that the objectivity of the methodology used could not be put in question. The results will be published at the next UNIPEDE congress, to be held in Brussels on 6-14 June 1982. They have, however, already been made available within the Commission. They show that, depending on the conditions specific to each national or regional situation, electricity produced from coal is 30-90% more expensive than electricity of nuclear origin⁽²⁾. As to electricity produced from oil, this would be three to four times more expensive than that from nuclear plant.

(1) International Union of Producers and Distributors of Electrical Energy.

(2) Taking into account all costs, including those relating to waste disposal and the eventual dismantling of plant.

9. In view especially of the high initial investment and resultant cost, the length of time necessary for construction plays a crucial role in determining the cost advantage of nuclear power relative to other forms of electricity production.

If delays in construction of nuclear plant are particularly long or uncertain, and when operating conditions for coal plant are favourable, cost comparisons between electricity from nuclear power stations and from coal-fired power stations could show an advantage in favour of coal. But in the Community delays of this order do not have an economic, technological or industrial origin and, in addition, the costs of operation of coal-fired plant are relatively high because of geological conditions.

10. In general, consumers in the Community who are supplied with electricity which is mainly produced from nuclear energy will benefit in increasing numbers from more and more advantageous economic conditions. This is particularly the case for energy-intensive industrial users, since the price of electricity supplied to them is more influenced by its cost of production than is that of electricity supplied to small consumers, for which latter the costs of transmission and distribution are predominant. Such industrial users will therefore have a margin of competitiveness over and above that deriving from their intrinsic productivity; this will necessarily entail adverse effects in those Member States which, though enjoying no cheap sources of energy of their own, abstain from launching a suitable nuclear programme.

11. The pattern of production costs of electricity of nuclear origin, which is characterised by high investment costs but also by low fuel costs, implies a relatively low sensitivity in its cost to increases in the price of fuel, and as a result there is,

- for firms, the possibility of developing in the long run a greater self-financing capacity where the cost benefit is not entirely reflected in the selling price;
- for the collectivity and where the fuel has to be imported, a smaller balance of payments deficit and a greater added value in the Community, which is favourable for employment.

These benefits make a significant contribution to the attainment of the main objectives of the Community's fifth medium-term economic programme⁽¹⁾.

⁽¹⁾ COM(81)344 final, 22.7.1981.

12. Nuclear energy is helping to improve the overall technological balance of the Community. A significant nuclear power programme provides export outlets not only for the nuclear industry itself, but also for other industries, since the repercussions of nuclear programmes are vast and diversified.

III. Medium-term perspectives

13. The production of electricity of nuclear origin by means of thermal reactors has now reached industrial maturity; this is in particular the case for production by reactors using low-enriched uranium, on which current programmes for the development of nuclear energy in the Community are mainly based. The technologies and industrial capacities are already widely available for implementing such programmes, including those which belong to the essential stages of the fuel cycle, namely in stages upstream of the reactor⁽¹⁾ which embrace in particular the production, supply and enrichment of uranium.

14. If the technical prospects for the development of nuclear energy were limited to that phase, we would be faced with the problem of the conditioning and storage, for an indefinite period, of irradiated fuel elements, which would then have to be regarded as highly-active wastes. To follow such a course would lead to two main consequences :

- a) the wastage of virtually all the energy potential of the uranium;
- b) particular problems of interfacing with the environment, in view of the fact that the plutonium produced during irradiation would be disposed of as a waste product, together with the "nuclear ash" (fission products).

The serious disadvantage residing in the fact that Europe is by its nature particularly vulnerable as regards energy would thus be compounded by further problems connected with the disposal of radioactive waste.

15. To deal with these disadvantages, recourse to reprocessing of irradiated fuels is necessary. The objective of this operation is to :

⁽¹⁾ The front end of the fuel cycle.

- a) extract the plutonium as an energy source and therefore pave the way for its recycling, in particular in breeder (or fast neutron) reactors, the advantages of which in terms of the security of supplies have already been underlined in point 3 above; the fuel cycle is thus closed;
- b) separate out the highly-radioactive fission products and condition them with a view to final storage in a way that is compatible with safety and environmental requirements.

16. Plutonium and the operations in which it comes into play - in particular reprocessing, the fabrication of plutonium-containing fuels and storage - are, however, sensitive from a non-proliferation policy standpoint ⁽¹⁾.

17. This whole problem was studied in depth and discussed in the context of the International Nuclear Fuel Cycle Evaluation (INFCE) programme, a vast international exercise that lasted more than two years (from the end of 1977 to the beginning of 1980).

The conclusion was clear, particularly for the highly-industrialised regions of the world that depend heavily on imports for their energy supplies: the option of developing reprocessing, and consequently the breeder reactor, must be kept open.

In February 1980, the Council already took the same view, by adopting two Resolutions concerning these two topics ⁽²⁾.

18. Clearly, such a policy would bring about an increase in the flow of sensitive materials and industrial capacities. In order to cope with this situation and minimize the risks it involves, two courses of action are possible. The first consists in falling back on national arrangements,

⁽¹⁾ Highly-enriched uranium is also considered sensitive in this respect. But there are at present no plans to increase considerably the production and utilisation of this special fissile material, which is confined to research reactors and power reactor designs whose industrial development is still uncertain.

⁽²⁾ OJ C 51, 29.2.1980, p.4.

in asserting that it is easier to supervise at this level; this would, however, widen the gulf between those nations that have adequate technological and industrial potential and those that do not. The second course of action consists, on the other hand, in seeking solutions through multinational cooperation, conceived first on regional bases and then gradually extended to a broader scale: this would enable the gulf to be bridged and avoid any accentuation of tensions which would result therefrom.

The choice of the second course of action is recommended in the conclusions to the INFCE proceedings as being the strategy which in the long run most reduces the risks inherent in the sensitive nature of certain nuclear activities and materials and which is most in line with the objectives of the Non-Proliferation Treaty.

The measures recommended are of both an institutional and a technical nature and relate both to non-proliferation and to nuclear supplies aspects, in view of the interdependence between the latter. This is why the Community and its Member States are playing an active part in the work conducted under the auspices of the International Atomic Energy Agency (IAEA) with a view to setting up an International Plutonium Storage (IPS) system and, through the Committee on Assurances of Supply (CAS), aimed at making the international system for the supply of nuclear materials more stable and reliable.

19. In its Communication to the Council on the results of INFCE⁽¹⁾, the Commission already stated its opinion on the matter, declaring among other things that "the Community must certainly follow closely whatever action may be taken on the results of INFCE, since this exercise has shown that the peaceful use of nuclear energy at world level can in the future be envisaged only in the context of increased international cooperation both in terms of securing supplies ^{in the wide sense} and in terms of minimising the risks of proliferation".

Since then, nothing has led the Commission to believe that this course of action should be changed, indeed, quite the contrary.

If the Community is to be able to derive the maximum benefit from strengthened international cooperation, collaboration must be increased at the level of the Community and the ^{Member States} / by making full use of the political, institutional, economic and technical framework we possess.

(1) COM(80)316 final, 11.6.1980.

Considerable progress has been achieved already; efforts in this direction must be continued.

IV. The role of the national and Community authorities

20. To draw up a nuclear power programme requires a long-term appraisal of the development in the demand for electricity, the main way of using nuclear energy, and of the trends in the supply of primary energy sources, some of which will compete with nuclear power. The implementation of such a programme is characterised by long construction and amortization periods; any commitment is therefore of a long-term nature.

European industry, and more generally European economic operators, have demonstrated that they have the capacity and resources necessary for such a purpose. Nevertheless, they cannot be required to bear, all alone, the unusual risks resulting from the necessary scale of certain constructions, the length of lead times and the volume of investments as well as from technological innovation and the international implications of nuclear energy.

21. This is why the implementation of nuclear power programmes on an industrial scale requires, in the first instance, a clear political choice by the public authorities regarding the objectives to be set and the resources to be brought into play.

It is then necessary to maintain, over a period of time, the continuity of the policy adopted: otherwise, efforts already made could be wasted, without their objectives being attained.

when they have made their option
It is the task of the public authorities/to create a political, economic and legal climate capable of reducing as much as possible the uncertainties associated with the implementation of nuclear programmes.

In this area the political responsibility of the Governments must be total. The Community, for its part, constitutes a framework in which they can find useful and relevant points of reference, and a unit whose solidarity can be a useful instrument. The roles of the Member States and the Community are therefore complementary.

22. It is the Community's task in particular to offer Member States and undertakings an overall view of the conditions for the development of nuclear power and to promote, where it could improve profitability and efficiency, the coordination, convergence or pooling of efforts. R&D is one of the areas receiving special attention in this respect.

In addition, as regards the safety of installations and radiation protection although substantial responsibilities are in the hands of the national authorities, the Community has the duty to ensure that an equivalent and adequate level of protection is afforded to workers and the general public.

Lastly, the Community offers specific guarantees, thanks also to the system of safeguards set up by the Euratom Treaty, regarding the supply of nuclear fuels and the movement of such materials within the common market.

B) Part Two : Community action to tackle the problems

I. Investigating the economic aspects of the development of nuclear power

23. Member States and industrial enterprises have, within the limits of their respective competence, the power to decide on and implement plant construction programmes. Nevertheless, in pursuance of Article 40 of the Euratom Treaty, which provides for the periodic publication of "illustrative programmes", the Commission may indicate orientations aimed at encouraging the framing of national policies and the setting-up of undertakings, placing the latter in the context of a broader strategy implying a convergence of efforts regarding both the capacity of the plant to be installed and the timetables to be respected. These orientations may also help to keep the public better informed about the context and the conditions surrounding the development of nuclear energy and enable the Community to make an increasingly significant contribution to studies of the prospects for the development of nuclear energy conducted in competent international arenas.
24. The frequency of publication of illustrative programmes has been inadequate - so far only two have been published.

Henceforth the Commission intends regularly to publish illustrative programmes, the first one coming out in 1983; the frequency of publication will be considerably increased.

25. To that end, the Commission will carry out detailed studies - to be updated at regular intervals - on subjects essential to the nuclear economy. It will enter into appropriate consultations with all the sectors concerned by the development of nuclear energy, and thus approach those who, from an economic and social standpoint, play a specific role in the field; but it will also talk with those who wish to be heard in view of their position with regard to nuclear energy.

The subjects covered in this way will come among others under the following general topics :

- the costs of producing electricity⁽¹⁾;
- the impact of the development of nuclear energy on the major economic equilibria (balance of payments; inflation; growth; employment; security of supply; and scientific, technological and industrial development);
- the study of the prospects for the Community's nuclear industry, including the complex factors relating to the opening of markets;
- forecasts of the investment requirements resulting from nuclear power programmes (requirements for research, demonstration activities, prospecting for raw materials, production plants, storage facilities, etc.) and of financing requirements.

26. In order to help undertakings to solve the problems encountered in financing nuclear power stations and fuel cycle installations, the Community has devised a special financial instrument known as the Euratom loan (or borrowing) which has been operating since 1977 and has so far opened lines of credit amounting to more than 800 million ECU.

The Commission invites the Council to decide as quickly as possible on the proposal (COM(81)790 of 7 December 1981) it has already transmitted, aimed at increasing the ceiling of this financial instrument from 1,000 to 2,000 million ECU;

II. Ensuring a "regular and equitable supply" of nuclear fuels

Background

27. Before relying on nuclear energy for a large share of their energy supplies, the Community and its Member States must be assured about the supply of nuclear materials and about their free movement throughout the Community.

(1) This aspect is connected with the transparency of energy prices, which constituted the main subject of the Commission's recent Communication to the Council entitled "Energy pricing : policy and transparency" (COM(81)539 of 30 September 1981), which the Council began to examine in detail on 27 October 1981.

28. The Community imports some 80% of its uranium requirements.

Proven and exploitable reserves of uranium are concentrated in a relatively small number of countries.

The supply of nuclear fuels is an area in which public involvement is considerable; it is also subjected to specific constraints due to the nature of the materials in question. Such constraints contribute to the creation of a climate of uncertainty as regards the security of supply, especially in the long term, and thus reduce industry's margin of commercial manoeuvre.

Experience has shown that the terms on which the supplier countries are prepared to provide the Community with nuclear materials can undergo swift and far-reaching changes.

These changes have hitherto been dictated principally by considerations relating to the non-proliferation policy of the supplier countries; however, it is possible that changes might in future occur for other reasons, whether political or economic.

The Community has, since its inception, made great efforts to ensure good terms for external supplies; but in the last analysis it still remains subject to considerable risks in this area. It is therefore necessary to continue the effort at Community level to avert and reduce these risks and to ensure that the Community's nuclear industry has access to sources of supply on reasonable terms.

29. The import of sufficient quantities of uranium constitutes, however, merely one aspect of the satisfactory supply of fuels for the Community's nuclear reactors. The nuclear fuel cycle is complex and involves a large number of industrial processes.

Only a few Member States are in a position to install, at national level, industrial plant covering the whole of the nuclear fuel cycle. In any case, it would be highly wasteful for each Member State adopting nuclear power to have to equip itself with the entire industrial cycle for its own needs alone; if this were done, the economic benefits deriving from the nuclear option could be substantially reduced or even disappear. So the Member States must be sure that nuclear materials will move freely within the common market, provided that Community rules relating to safeguards, safety and public health are complied with.

The role of the CommunityAnalysis of the situation

30. A primary task assigned to the Community under Article 2 of the Euratom Treaty is to ensure that all users receive a regular and equitable supply of ores and nuclear fuels. In Chapter VI of the Treaty (Articles 52-75), the modalities for accomplishing that task are also laid down. They envisage, in particular, the principle of equal access to supplies for all users and the exercise by the Supply Agency of an exclusive right to undertake purchases and hence sales. However, it was recognised from the start that, since the civil nuclear industry was at a stage of initial and experimental development, it might become necessary to adapt these modalities in the light of experience. To this end, provision was clearly made in Article 76, not only that Chapter VI would be confirmed or amended seven years after the entry into force of the Treaty, but also that amendments could be made by means of a procedure which does not involve ratification by the Member States, namely a unanimous decision of the Council acting on a proposal from the Commission after consulting the European Parliament.
31. As a result of the supply situation, and of the structure of the nuclear industry within the Community, certain practices developed from the start contrary to the concept of the exclusive trading right conferred by the Treaty upon the Supply Agency. This exclusive right has thus not been exercised in all the cases provided for in the Treaty and, where it has been exercised, it has rarely been done in a manner fully in conformity with the system laid down in Chapter VI. For this reason, the Commission put forward proposals for amendments on two occasions, in 1964 and 1970; in neither of these cases, however, could agreement be reached by the Council. In June 1979, the Commission forwarded a further communication to the Council which was intended to give new impetus to the discussion and which indicated, without expressing any preference, the three possible options : amendment, confirmation or interpretation of Chapter VI. One month later, the French Government placed before the Council a memorandum putting forward certain suggestions for amendments. In order to inquire into the requests made in this memorandum, the Commission subsequently entered into detailed discussions with experts from the Member States (see paragraph 34 below).

32. In spite of these difficulties, the Community has obtained very important results, over the last 20 years, in accomplishing its task in respect of supplies. Amongst more striking achievements figure the agreements concluded with three of the principal suppliers of the Community, that is to say, the United States, Canada and Australia. Under these agreements, the Community as a whole obtains from each of the three countries guarantees of continuity of supply which are much more comprehensive than those which could have been obtained by the countries of the Community negotiating individually.
33. In addition, the Community has been able to create, within the Common Market, conditions for free movement of nuclear materials of whatever origin.

Orientations

34. In the light of the experience acquired and of the discussions with experts from the Member States, the Commission has made a new assessment of the questions associated with supplying nuclear fuel to the Community. Bearing in mind developments in the peaceful uses of nuclear energy, the Commission considers it necessary to valorize further the role of the Community in guaranteeing real security of supply to all those concerned while respecting the principle of non-discrimination. However, the uncertain application of Chapter VI referred to above hinders the pursuit of this essential objective. Maintenance of the present status quo can no longer be contemplated; nor for that matter, pure and simple confirmation of the original provisions.
35. The Commission has concluded that it is possible, given mutual understanding and goodwill by all the parties concerned, to surmount former obstacles and adopt a system centred on the following essential points :
- replacement of the principle of equal access to the sources of supply by the principle of non-discrimination : equal access is equitable in that it is aimed at applying, in respect of each type of activity, the same conditions of supply (prices and others) to all purchasers; but it gives rise to problems in that it tends to restrain competition between suppliers and dissuade purchasers from themselves taking measures to reinforce their own guarantees of supply. Non-discrimination means the absence of any distinction between Community users as regards the use they intend to make of supplies requested for peaceful and non-explosive purposes; in other words, Community users would have access to the sources of supply

on an equal footing in respect of the conditions of production, transfer, use and storage of the nuclear materials; in addition, the replacement of the principle of equal access by that of non-discrimination gives assurance to those concerned that they will be able to make investments which will then enable them to have rights corresponding to those of others;

- the Euratom Supply Agency would, in particular, be responsible for verifying, under the supervision of the Commission, that transactions were in accordance with Community law and Community obligations (in particular, non-discrimination); for evaluating supply and demand; and for participating, at the request of users who so desired, in the negotiating and/or concluding of contracts;
- optimum utilisation of Community powers with regard to external relations in the nuclear field;
- the principle of Community solidarity would be applied, in particular by pursuing a stock policy adapted to circumstances and by the preference given to Community production in the case of a surplus;
- the possibility of Community participation in prospecting operations would be extended to non-Community countries;
- application of rules of competition analogous to those in the EEC Treaty, adapted as necessary.

The system which is briefly described above does not require that the exclusive right of purchase and sale conferred at present on the Supply Agency be maintained. It enables the Community to accomplish the task assigned to it under Article 2(d) of the Euratom Treaty. Furthermore it maintains the necessary instrument for the Commission to accomplish its obligations while at the same time permitting industry to continue to play its role within the framework of present reality.

36. In the view of the Commission, the projected changes to the present provision concerning supply could not be effected with the requisite legal security unless Chapter VI were formally amended.

After new consultations, the Commission will, before June 1982, place before the Council a proposal containing a precise definition of the system sketched out above.

The obligations foreseen in Article 2(d) are so fundamental that any

system must allow them to be fully respected. This being so, the Commission will, on the one hand, display the requisite flexibility as regards the modalities for accomplishing that task where the obligations of Member States and industrial enterprises in relation to the Supply Agency are concerned. On the other hand, it will not fail to evaluate carefully the implications that the adoption of the proposed system might have for the exercise of all rights and responsibilities laid down in the Treaty.

Reprocessing of irradiated nuclear fuel : situation and prospects

37. The reprocessing sector, the importance of which has already been stressed in the first part of this communication, gives grounds for concern which are connected with obstacles of various kinds that hinder the timely installation of capacities for the reprocessing of uranium-oxide fuel.

The Member States which have not yet taken up industrial-scale reprocessing are faced with two problems :

- a problem of the optimum size of installations from the technical and economic standpoint in order to be able to cope with their own requirements, and
- a problem of access under acceptable conditions to capacities installed in other States.

The Community framework can facilitate their search for solutions that are difficult to find satisfactorily at national level.

In the light of these considerations, the Commission requests the Council to hold a discussion on the best solutions to be applied to the problems of reprocessing. To facilitate the discussion, the Commission is forwarding to the Council, together with this communication, the report prepared for it by the Committee for the Reprocessing of Nuclear Fuel (CORECOM) set up by the Council in February 1980, accompanied by comments and a recommendation adopted by the Commission

and addressed to the Governments of the Member States, the competent national authorities, promoters and users. This recommendation essentially concerns the establishment of reprocessing companies in which the interests of several Member States would be represented.

Uranium prospecting

38. As regards uranium prospecting in the territories of the Member States :

The Commission will forward to the Council within the next few months a report on all the activities it has conducted in this field from 1976 to 1981 pursuant to Articles 70 and 71 of the Euratom Treaty, at the same time indicating the objectives of future activities.

III. Providing safeguards for nuclear materials within the Community and helping to strengthen the consensus required for a world-wide safeguards system

39. The contribution of nuclear energy to the overall energy equilibrium was conditioned from the start by the putting into place of appropriate safeguards guaranteeing that nuclear materials would not be used for military purposes. Moreover, the importance of the physical protection of nuclear materials and installations has more recently been recognised.

40. In the field of safeguards, the European Community played the role of world pioneer by setting up, in 1958, pursuant to the Euratom Treaty, a system of safeguards, which has proved itself and which has been recognised internationally, and notably by the USA and Canada.

41. Since then, the Community and its Member States have contributed unremittingly to work aimed at "multilateralising", spreading throughout the world and optimising safeguards in the field of peaceful uses of nuclear energy.

It is in this way that Euratom contributes on a permanent basis to the proper operation and technical improvement of a safeguards system on a world-wide scale which is highly credible but does not involve unjustifiable financial burdens being borne by the industrial enterprises concerned.

It suffices here to mention :

- the conclusions of three verification agreements between Euratom, the Member States and the IAEA;

- cooperation between the IAEA and Euratom concerning R&D in the field of safeguards on the basis of large-scale Community programmes in that sector;
- the signing by the Community, along with its Member States, of the International Convention on the Physical Protection of Nuclear Materials;
- the participation of the Community and its Member States in the INFCE⁽¹⁾ and the work which, under the responsibility of the IAEA, is performed as a follow-up to this far-reaching survey (in particular, studies on a plan for international plutonium storage (IPS) and the work of the Committee on Assurances of Supply (CAS)).

42. The Community, which has the task of establishing the conditions necessary for the rapid creation and growth of nuclear industries, has been accorded powers to fulfil this task, particularly in the fields of safeguards and supply (the former conditioning the latter to a very large extent, as stated above).

The day-to-day exercise of its duties in these two areas provides the Community with a body of knowledge,^{an} experience - inter alia in the field - and a corpus of legislation and procedures, and consequently a credit, which enable it to play an important role in international organisations such as the IAEA, which exercise responsibilities at world level in the nuclear field.

For its part, the Commission, in close liaison with the Member States, will continue to make its contribution to the fulfilment of the tasks assigned to that world Agency, whose effectiveness it esteems and whose credibility must be maintained.

43. At regional level, the Euratom safeguards system meets, on the one hand, the Community's own requirements (Article 77(a) : conformity of use, and Article 77(b) : particular safeguarding obligations under agreements concluded with third States or international organisations) and on the other hand, is responsible, in cooperation with the IAEA, for the observance of NPT obligations in accordance with the procedures laid down in the three verification agreements concluded between Euratom, its various Member States and the IAEA⁽²⁾.

(1) International Nuclear Fuel Cycle Evaluation.

(2) For the purposes of implementing these Agreements, the procedures for applying the Euratom safeguards were adapted by means of a new Regulation (N° 3327/76) which has been in force since 1 January 1977.

44. The Euratom safeguards, as distinct from the IAEA safeguards, are also intended to ensure observance of commitments undertaken by the Community in respect of third States, in particular three major suppliers of materials and services to the Community : the United States, Canada and Australia. By thus offering to supplier countries the guarantee that, within the Community, use is being made of their nuclear materials in accordance with the conditions that they request, Euratom safeguards create a condition essential to the free movement of the materials within the Community.
45. The presence of two safeguard systems with complementary activities, the joint existence of a civil cycle and a military cycle in the nuclear-weapons Member States and, lastly, the commitments entered into by those States not to take industrial or economic advantage of their special status, gives rise to a complex situation. On the whole, the formulas adopted in the aforementioned Regulation are not disputed. Nonetheless, certain modalities of application will have to be improved in the light of experience. The Commission intends to deal with this matter in consultation with the Member States, whilst respecting the obligations to third States undertaken by the Community and its Member States in this regard, its objective being to facilitate the application of the safeguards in the years to come.

In the latter half of the year, the Commission will place before the Council a full report on the implementation of the three verification agreements between Euratom, its various Member States and the IAEA.

IV. Contributing to the protection of the health and safety of the public and workers and to environmental protection

46. The safety of installations and the protection of the health of the public and workers constitute a condition "sine qua non" for the development of the peaceful uses of nuclear energy. These aspects have been a central concern of the public authorities and the public and private nuclear operators since that development began.
47. Furthermore, the principle of public control of all activities, whether or not they are conducted for the purpose of energy production, has been asserted with particular rigour, and, in the public administrations themselves, there has generally been a desire to distinguish responsibility for promotion activities, on the one hand, from that in respect of licensing on the other. For the same reason the Commission adheres to the distinction between promotional aspects of nuclear energy and safety aspects. It is at present carrying out an internal review of all its activities in the nuclear safety field to evaluate the scope of its action in the context of the development which the application of nuclear energy has reached. Following this review, a communication on nuclear safety will be sent to the Council.
48. The efforts undertaken up to now in this area in the Community and elsewhere have certainly produced positive results, as are shown by the accident statistics⁽¹⁾. These show that the level of safety in nuclear installations is certainly not less favourable than that achieved in other branches of industry.
49. As in any human activity it certainly cannot be ruled out that an installation might suffer or cause a more serious accident than those which have occurred so far, safety must remain an essential preoccupation, in close relationship with the growing development and the rapid evolution of nuclear technology. In illustration of this, almost all the current Community research programmes are concerned with safety.

(1) In particular, over 200 power reactors have been functioning for more than 10 years without any fatal irradiation accidents.

- As regards reactor safety, special large-scale installations are used in combination with theoretical research to study, forestall and control any accidents that might occur in light-water or fast-breeder reactors. Evaluation of the level of confidence to be applied to power station components, improvements to operational quality and safety and harmonisation⁽¹⁾ of criteria, codes and standards are being continued in parallel.
- As regards radiological protection, work on broadening knowledge of the various effects of ionising radiation on man is being continued in respect of both short-term effects and genetic effects; simultaneously, studies are being conducted on the environmental pathways taken by radioactive elements and on radiation dosimetry methods and instruments.

This programme represents the Community's contribution to the continual improvement of the "basic standards for the protection of the health of workers and the general public against the dangers arising from ionising radiations". These standards, originally laid down in the form of a Directive in 1959⁽²⁾, have already been revised four times (1962, 1966, 1976 and 1980)⁽³⁾. They form the principal instrument at Community level of health and safety policy (Chapter III of the Euratom Treaty).

In this context, it should be pointed out that the Commission has recently adopted a revision of the 1960 recommendation concerning plans for releases of radioactive effluents from nuclear installations (Article 37 of the Euratom Treaty).

50. What has been said about the importance of nuclear safety in relation to the orientation of R&D programmes is especially true for questions related to radioactive waste, often considered to be the most sensitive due to the special nature of the waste products.

The Commission's R&D programme on the management and storage of radioactive waste is a long-term activity which is to be continued and expanded as part of the twelve-year (1980-1992) Community plan of action. These instruments represent a coordinated effort aimed at finding the requisite solutions for all these questions in good time.

⁽¹⁾ See Council Resolution of 22.7.1975 on the technological problems of nuclear safety (OJ N° C 185 of 14.8.1975).

⁽²⁾ OJ N° 11 of 20.2.1959.

⁽³⁾ OJ N° L 246 of 17.9.1980.

In particular, the Commission will intensify its efforts in this context with a view to ensuring consultation and cooperation between the Member States in studies on units for permanent storage and in establishing such units. Moreover, the work conducted within the Community must take due account of that carried out elsewhere. The Commission has already concluded a cooperation agreement with AECL (Atomic Energy of Canada Limited) and has recently forwarded to the Council a Communication concerning a similar agreement to be concluded with the USDoE (United States Department of Energy)¹. The Commission intends to develop such contacts with other non-Community countries where they will facilitate the attainment of the Community's objectives.

51. Radioactive waste is produced throughout the nuclear cycle and possesses characteristics that vary widely (physico-chemical forms, radioactivity and lifetime, quantities produced).

Certain categories of waste (mainly of low- and medium-level activity) have been produced for several decades: the technology necessary for their management has long since attained the stage of industrial maturity; it is nonetheless advisable to modify the existing conditioning processes and the storage and disposal practices in order to cope with the increasing volumes of waste produced (at present several tens of thousands of cubic metres per year for the Community as a whole).

The accumulation of irradiated fuel discharged from reactors gives rise to other questions; the fuel contains uranium, plutonium and "nuclear ashes".

The chemical operation of reprocessing makes it possible to separate the uranium, and the plutonium of the "nuclear ashes" which last are long-lived, high-level activity waste. They are in liquid form and are stored in steel tanks specially designed for that purpose and set up in the vicinity of the reprocessing plants .

This waste is then converted into solid form and incorporated in suitable matrices, such as glass or ceramics. These processes are either being developed or have already reached industrial maturity and are being commercially applied, such as the AVM vitrification process developed in France.

¹ COM(81)818 final of 14.1.1982.

² Experience has shown that this type of storage is extremely satisfactory over periods of several decades.

The products thus treated represent only a small volume⁽¹⁾ and can be stored for decades or even longer before their final disposal becomes necessary⁽²⁾; this provides a considerable degree of flexibility in the planning of a strategy for the long-term management of such waste.

Alternatively, the policy adopted may be not to reprocess the fuel immediately, but to store it in purpose-designed installations for several decades. Beyond that point, it is advisable to reprocess the irradiated fuel or to consider it as a long-lived, high-level activity waste that should be suitably conditioned and disposed of definitively. The latter solution, however, involves a serious disadvantage in the energy field and gives rise to additional technological problems (see also para. 14 of this Communication).

Of the options that can be considered for the final disposal of long-lived, high-level activity waste and which ensure that such waste is adequately contained away from the biosphere, burial in underground caverns prepared for that purpose in geological formations possessing the characteristics necessary to guarantee stability and containment (salt, granite and clay) seems at present to be that most likely to provide a solution to the problem of disposal on the timescale envisaged. Priority must be given to the continuation of this essential research.

(1) The volume of conditioned waste produced annually per unit of 1000-MWe power is about three cubic metres.

(2) It should be noted that these products do not require cooling during storage. See below on the question of final disposal.

V. Providing continuity for R&D work and ensuring that its results are put to the best possible use

52. In its recent Communication to the Council¹ on research, the Commission gave prominence to the extent of Community accomplishments and the need to define an overall strategy based on making the best possible use of these results and on utilizing the advantages presented by the Community dimension, such a strategy to be capable of responding to the great socio-economic challenges of the present time.

In the field of energy and its various sources, the Commission stressed in respect of nuclear fission that the R&D programmes in progress, which are mainly concentrated on reactor safety, radioactive waste management and storage, radiological protection and the safeguarding of fissile materials, represent a joint response to the problems that arise at Community level. (See also paragraph 49 above).

53. The research activity conducted under the Community programmes in the fields mentioned above at present involves an expenditure of the order of 130 million ECU per year. In sectors such as that of reactor safety and radioactive waste management and storage, about 25% of the total amount of research in all the Member States is directly or indirectly covered by the joint programmes. In other sectors such as radiological protection, the proportion amounts to 80%. Finally, where safeguards on fissile materials are concerned, the contribution of Euratom amounts to 50% of all the research work carried out in this field.

¹Scientific and technical research and the European Community, COM(81)574 of 12 October 1981.

It is the Commission's intention to consolidate research on these priority topics, and most particularly on that of radioactive waste, in order to ensure that the peaceful uses of nuclear energy remain compatible at all times with requirements in respect of safety, health protection, the environment and safeguards.

54. Special attention will have to be paid to the dissemination of the information obtained and to making the best possible use of the results.

The effectiveness of the present system of disseminating the information acquired under the Community's programmes will be critically evaluated.

The use to which the results of the R & D programmes are put will facilitate subsequent industrial application through demonstration operations that will also be eligible for Community financing. To be complete, such utilization of the results will have to be accompanied by the establishment of norms, codes and standards as the need for them arises.

VI. Contributing to providing full and reliable information for the public on questions regarding nuclear energy

55. The public raises questions about nuclear energy.
While there is general agreement that the public must be better informed, the basic question in this area is still that of discovering how this should be achieved.
56. The efforts made so far must be continued, intensified or even reorientated in order to find solutions to what increasingly appears to be more a problem of communication than one of information, since it not only involves providing the public with information, but also, and more importantly, establishing a system of liaison to help the public assimilate such information more easily.

57. The principal role in this regard falls to the governmental and regional authorities and to the electricity producers by reason of their public service responsibilities.

The Commission can, however, make a useful contribution to this action in respect of two points: first of all, it

will provide regular information on developments in the Community's overall energy situation and the reasons for which a contribution from the nuclear industry is essential in order to cope with our future energy requirements, as well as on the results of its action, in particular, in the nuclear safety field.

In this context, the regular publication of the illustrative programme referred to in para. 24 above will be particularly useful and effective.

Secondly, the Commission

will follow developments in public opinion at Community level by carrying out regular surveys

as it does in the context of Eurobarometer.

These surveys should contribute to enlightening public opinion itself, the sectors concerned and the national and Community authorities in respect of this important parameter of the Community's energy policy.

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C) CONCLUSIONS

58. The Commission requests the Council, on the basis of this communication, to hold a political discussion in depth on the prospects for the use of nuclear energy in the Community.

It hopes that the Council will concur with the Commission's analysis (see paras. 1 to 22 above) of the context in which nuclear energy should be considered. It hopes, furthermore, that the Council will approve the broad lines of the approach envisaged by the Commission with regard to the Community's role in this field. The essential points of this approach are as follows :

- (a) more frequent publication by the Commission of illustrative programmes with a view to helping the understanding of the economic basis of nuclear development;
- (b) a doubling of the ceiling on Euratom loans;
- (c) a new approach by the Community to questions relating to supplies of nuclear materials, resulting in particular in a redefinition of the system applicable in this regard;
- (d) a speeding-up of the measures to be taken within the Community with regard to the installation of interim storage capacities and reprocessing capacities for irradiated fuel, combining efforts wherever possible;
- (e) a rapid solution to certain problems that still exist, following the conclusion of major international agreements, in the modality of application of Euratom safeguards within the Member States;
- (f) a consolidation and intensification of the activities, already considerable, which are conducted by the Community in the field of research and development in nuclear safety and in particular the extension of joint efforts in the field of radioactive waste management and storage;
- (g) a reinforcement of the Community's contribution to the campaign to inform public opinion on questions concerning nuclear energy.