COMMISSION OF THE EUROPEAN COMMUNITIES

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NUCLEAR INDUSTRIES IN THE COMMUNITY

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THE NUCLEAR POWER STATION DESIGN AND CONSTRUCTION INDUSTRY AND COMPLETION OF THE EUROPEAN SINGLE MARKET

(Update of the Illustrative Nuclear Programme
for the Community - PINC, adopted by the Commission in 1984
under Article 40 of the Euratom Treaty
and published in 1985 together with the opinion of the ESC)

NOTICE

The Commission adopted on 26 July 1989 a document on the "Nuclear Industries in the Community : Update of the Illustrative Nuclear Programme under Article 40 of the Euratom Treaty[1]". In accordance with this Article, the document has been submitted to the Economic and Social Committee for their opinion, and was adopted by that Committee in its plenary session of 19 December 1989.

This present document reproduces the text adopted by the Commission in 1989 accompanied by the opinion of the Economic and Social Committee.

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PREFACE

On 22 November 1984 the Commission adopted a document entitled "Nuclear Industries in the Community: Illustrative Nuclear Programme under Article 40 of the Euratom Treaty", hereinafter called PINC.

Pursuant to Article 40, the document was submitted to the Economic and Social Committee for its opinion, which was delivered at that Committee's session of 30 May 1985.

The Commission formally published the document, together with the opinion of the Committee, on 23 July 1985 (Doc. COM(85)401 final).

The 1984 PINC set out the Commission's guidelines with regard to the nuclear-power production objectives in the Community; it also examined the implications of attaining these objectives for all parties concerned with the nuclear sector: public authorities, electricity producers and nuclear industries.

All the interrelated aspects of nuclear power are covered by the overall energy policy and the 1984 PINC was one of the elements taken into account when the Council established the energy objectives for 1995 in September 1986.

The guidelines presented by the Commission in the 1984 PINC are, in the main, still valid today. However, it is advisable to examine the impact which the advent of the internal market will have on the nuclear industry. For this reason, the Commission announced in its Programme for 1989 that it would update the Illustrative Nuclear Programme to take account of the prospects after completion of the single European market.[1]

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This document fulfils that commitment and deliberately deals exclusively with matters relating to the nuclear power-station design and construction industry. The Commission will publish it formally after receiving the opinion of the Economic and Social Committee.

The publication of the next PINC, which will comprehensively update the objectives and recommendations for nuclear power production in the Community, under Article 40 of the Euratom Treaty, is scheduled for 1992.

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1 See para. 222.

SUMMARY

When adopting its working document on the completion of "The Internal Energy Market" (COM(88)238 of 2 May 1988), the Commission was anxious to include the nuclear power-station construction sector in the scope of that document, while acknowledging the specific features of the sector.

It is now essential that the priority action identified in that document be initiated if the whole exercise of completing the internal energy market is not to be put at risk. The aim of the action in question is to create a genuine common market for equipment and components and ensure its transparency, thereby reducing the investment costs and improving the competitiveness of the industries in this sector.

The current indications are that there will be very few annual orders for nuclear power stations, at least until the resumption of activity which could result from the need to replace the existing installations in 15 to 20 years time. The equipment market (complete power stations or NSSS)[2] and the component market (vessels, steam generators, turbines, alternators, pumps, etc.) will hence be very modest in numerical terms, although it will continue to be appreciable from the standpoint of turnover.

The nuclear market is, moreover, characterized by certain specific features: the decisive importance of national safety authorities, the need for long-term continuity and hence to safeguard technical skills, the volume of service and maintenance activities and the small number of undertakings competent in this sector.

All things considered, the quite specific nature of nuclear power markets does not preclude the implementation of a policy for opening up the market, but it does mean that some adjustment of that policy will be necessary.

This will require action and a special procedure where standardization is concerned. Standardization is necessary in order to decompartmentalize the market and should, moreover, provide a result compatible with safety requirements. The link between these two aspects should be considered by the Commission in a very special way. Since safety is an aspect of primary importance in the preparation of technical standards, the state of progress of the work on standardization should be communicated to the "safety" groups of experts in order to prevent inconsistencies and incompatibility between the standards and the safety levels required throughout the nuclear production cycle. This procedure could not, however, be substituted for the formal agreement of the national safety authorities, but it would increase the likelihood of that agreement's being obtained at the appropriate time.

2 NSSS: Nuclear Steam Supply System (nuclear part of the power station).

In addition, the Commission will set up a group of experts which will be responsible for helping it to assess the technical aspects of the nuclear power market from the standpoint of the internal market. That group, chaired by a Commission representative and made up of representatives of the investors concerned, mainly electricity producers, will periodically report to the Commission on its observations and inform it of ways and means of ensuring a "coordinated development of investments" within the meaning of Article 40 of the Euratom Treaty.

In the longer term, fast breeder reactor (FBR) technology, once it has reached full maturity, is likely to open up major new opportunities as regards energy supply by making optimum use of the stock of depleted uranium in the Community. At all events, combined operation of the FBR and other current reactor types could stabilize the uranium market for a very long time.

In the Community, development efforts are now focused on the EFR (European Fast Reactor Project); the various design, research and development activities conducted by industry, electricity producers and research organizations as a contribution to the project are being closely coordinated. These are accompanied by rationalization which will result, on the one hand, in substantial savings of resources and the setting-up of an integrated industrial structure and, on the other hand, in the definition of a single - and in consequence exemplary - set of standards which, at the appropriate time, will facilitate the operation of the internal market.

The EFR project will be fully evaluated in the middle of the next decade from the standpoint of both economic and safety aspects. This evaluation will make it possible to assess the potential of the concept on the basis of a project involving a reactor designed for construction by a European industrial group in all the Member States concerned in which it can obtain a construction permit.

In view of the importance of this evaluation for determining future nuclear investments, it is desirable for the Commission to be associated with it; indeed, under Article 40 of the Euratom Treaty, the Commission has a specific responsibility in this area.

In the meantime, work on the development and mastery of the technology should be continued, particularly with a view to promoting safety at every stage of the nuclear production cycle and lowering investment and operating costs, in order to render the concept economically competitive when the electricity-generating installations are being replaced in 15 to 20 years time. Such matters cannot be entrusted solely to future investors, since responsibility in respect of the long-term energy supply policy must be assumed primarily by the public authorities.

A. INTRODUCTION

1. Since the adoption of the Single European Act in December 1985, completion of the internal market has been the Community's main priority. In the energy sector, the starting point of the Community action is represented by a Commission working document entitled "The Internal Energy Market" (COM(88)238 final of 8 May 1988), which lists the obstacles to completion of that market together with the basic areas to be studied as a matter of priority.

2. As regards nuclear energy, it is pointed out that the priority area is the equipment and component market. This subject had already been raised in PINC as an objective of the Community strategy for the development of nuclear energy (para. 72), an essential basis of that strategy being the laying-down of common design and construction rules (para. 73).

3. It is now essential to initiate action in this area if the whole exercise of completing the internal energy market is not to be put at risk. The aim of the action in question is to create a genuine common market for equipment and components, as provided for in Article 97 of the Euratom Treaty, and ensure its transparency; in this way it will be possible to reduce investments costs and improve the competitiveness of the nuclear industries.

4. It must be stressed that this process, as stated in PINC (para. 74), will take place in the context of a structural evolution in an industry which is adapting to the new dimensions of the market.

   Industrial rationalization in the design and construction of fast breeder power stations (equipped with fast reactors) is currently progressing towards an integrated structure (paras. 75 and 76), which has certain parallels with the developments observed in the aerospace sector (Airbus and Ariane). An identical trend could occur in the case of conventional nuclear power stations (equipped with pressurized-water reactors - PWR) (para. 77), which, in principle, would not rule out activity by non-Community suppliers on the internal market.

5. The present document, after analysing the background to and the medium-and long-term outlook for investments in the nuclear industry, particularly with regard to the setting-up of the "electricity common market", examines practical ways and means of decompartmentalizing the equipment market and the services market and describes the actions taken at Community level; finally, it presents the exemplary case of fast breeder power stations equipped with fast reactors, which are being developed by European efforts within the framework of a single project.

6. This approach is especially necessary given that nuclear energy has become the most important contributor to electricity production in the Community. It accounted for 34% of that production in 1988,[3] even though only six Member States produced electricity of nuclear origin in that year: Belgium (65%), Germany (34%),[4] Spain (38%), France (70%), the Netherlands (5%) and the United Kingdom (19%).

7. The repercussions of the Chernobyl accident on European public opinion, the continuing apprehension about the issue of radioactive waste and, on the other hand, the relative relaxation of tension observed on the world energy market have had the effect of deterring the development of nuclear programmes in several Member States.

In other Member States the more recent concerns about atmospheric pollution and the increase in carbon dioxide levels in the atmosphere militate in favour of the nuclear option.

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3 We are here referring to the Community of the Twelve. In 1983, the year before the adoption of PINC, nuclear energy accounted for 22.4% of electricity production in the Community of the Ten; in the case of the twelve present Member States, that proportion was 21.2%. See Annex 1.

4 This value, however, masks considerable regional extremes; thus, 70 to 80% of the electricity supply in northern Germany is of nuclear origin.

Consequently, Belgium, Italy (which has shut down its nuclear power stations) and the Netherlands have chosen to defer the continuation of their nuclear power programmes. Furthermore, there are no longer any nuclear power stations under construction[5] or on order in Germany. In Spain, the moratorium on the construction of nuclear power stations, instituted before Chernobyl, remains in force.

The United Kingdom, on the other hand, has decided to expand its nuclear power capacity, basing further development on the PWR concept,[6] the most widespread concept in Europe and the world as a whole. France will continue to invest in nuclear power as a function of the demand.

The remaining Member States (Denmark, Greece, Ireland, Luxembourg and Portugal) are continuing to dispense with the production of nuclear electricity within their territories, while potentially capable of importing it from other Member States or non-Community countries.

All things considered, programmes of investment in nuclear power stations will hence continue to be on a modest scale, at least until the resumption of activity that could result from the need to replace the existing installations.

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5 With the exception of the prototype fast breeder SNR 300 at Kalkar, the start up of which has not yet been authorized by the public authorities of the Land of North Rhine-Westphalia.

6 PWR: Pressurized water reactor.

B. INVESTMENTS IN NUCLEAR POWER

Operating efficiency of nuclear power stations

8. In respect of certain quantitative assessments, the 1984 PINC was based on assumptions - which turned out to be pessimistic - concerning the lifetime of nuclear power stations and their availability: 25 to 30 years and 60 to 65%, respectively.

Nowadays, accumulated experience with the construction and operation of various types of light-water reactor, which covers over 400 reactors and more than 4 000 years of reactor operation throughout the world, and the results of many technical studies on ageing show that an average technical lifetime of 40 years can henceforth be envisaged.

Availability is generally over 70%. This does not mean that the load factor of all power stations is currently as high; to achieve this, it would be necessary for all the nuclear power stations to be called upon - in response to the demand expressed by the consumers - to operate to the fullest extent allowed by their availability. The difference is of the order of 10% (64% as against 74%). Annex 2 illustrates this difference, country by country and for the Community as a whole over the last five years.

Fixed constraints in the nuclear power industry

9. Nuclear electricity comes into its own when production is required to cover sustained annual periods of maximum demand.

In addition to highly sophisticated equipment, nuclear power stations require a long period of construction. At present, it is estimated that up to 10 years may elapse between a decision to make an investment in nuclear power and the start of the corresponding installation's industrial operation. Since the likely technical lifetime of a nuclear power station is 40 years, the decision in question will have its effect over a period of 50 years.

Coal-fired power stations also require a considerable investment and a long construction period owing to the constraints arising from the new atmospheric protection standards.

Totally different considerations form the basis for a decision concerning investment in a power station fuelled by hydrocarbons - gas or oil. On the one hand, it takes only four years to construct the installation.[7] On the other hand, the fuel cost is a more important factor than the investment cost. If the fuel market is persistently depressed, the power station can be written off in 10 to 15 years, whereas, if that market is characterized by high prices, it may never be economically viable.

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7 And even only two years for power stations equipped with gas turbines.

Optimization of electricity production

10. In an electricity market based on the regional "concession" of consumers to producers, the concept of economic viability is a relative one. The producers make use of locally available production units in such a way as to minimize the electricity production cost in the concession area and pass on that cost to the consumers, generally under the supervision of the public authorities. There is no incentive to make intensive use of more economical means of production located in other concession areas.

The opening up of the electricity market within the Community will make the concept of a regional concession relative and the concept of return on investments will be seen in a different light. It will then be possible, in particular, to ensure that every group of consumers benefits from the advantageous prices of any nuclear electricity produced outside the area of consumption.

The increase in electricity exchanges and the lowering of costs on the internal market could also have beneficial effects on opportunities for exports from the Community.

The impact of this development on future investments, as measured against the average number of power stations ordered each year, will, however, remain limited. This parameter, considered to be one of the market indicators, reached a high point in 1978 (with 12 units of about 900 MWe ordered) and is currently at its lowest point (an average of less than one unit ordered per year, but within the range 1300 to 1500 MWe. If the abovementioned prospects are confirmed, it should settle at a level of one or two units per year for the next 15 to 20 years. It is only later, when it becomes necessary to replace ageing installations after 2010, that the indicator will rise to five or seven units per year. The decisions that will then be taken will cover future industrial activity to beyond 2050.

Competition on the world production-equipment market

12. At present, the installed nuclear power capacity in non-Community countries is more than double that in the Community itself.[8] It will not be possible to change this ratio radically in the foreseeable future. Firms within the Community stand to gain considerably from exporting nuclear power stations; however, the threat of imports into the Community from outside firms cannot be disregarded.

The Community has no power to force the European nuclear power-station design and construction industry to adopt the form of organization which will best facilitate its access to external markets and enable it to withstand foreign competition. Nonetheless, the Commission believes it necessary, as pointed out in para. 2 above, for that industry to make arrangements for adopting common - or commonly recognized - design and construction rules as soon as possible[9] and for the electricity producers, in compliance with Article 97 of the Euratom Treaty, to order equipment and components without restrictions based on the suppliers' nationalities.

This problem as it affects power stations equipped with light-water reactors and those equipped with fast reactors is dealt with, respectively, in Sections C and D of this document.

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8 World nuclear power production is divided up approximately as follows:
- 30% in the Community (508 TWh in 1987);
- 28% in the USA (480 TWh in 1987)
- 42% elsewhere, mainly in Japan and the Eastern European countries (748 TWh in 1987).

9 The lack of such common rules derives from the fact that the different Member States have hitherto adopted nuclear power in accordance with widely varying procedures and at different times and that the construction industry has hence developed on national bases.

C. THE EQUIPMENT, COMPONENT AND SERVICES MARKET

Completion of the internal energy and nuclear-power market

When it adopted its working document on the completion of "The Internal Energy Market",[10] the Commission wished to have the nuclear-power station construction sector covered by the scope of the document, account being taken of its special features.

13. The Commission recently put forward proposals concerning the de facto opening-up of public works and public supply contracts to intra-Community competition.

The "Proposal for a Council Directive on the procurement procedures of entities providing water, energy and transport services"[11] establishes a set of requirements concerning the procedures for selecting candidate and tendering firms. Its purpose is to ensure that the contracting entities will be able to choose the best offer from among those put forward by all firms within the Community which are in a position to compete.

The requirements as regards transparency and the provision of information concern, in particular:

(a) the transparency of the procurement procedures and especially the right of access of Community suppliers to any qualification systems set up by contracting entities;

(b) the obligation to communicate to the suppliers the applicable specifications, even if they are internal specifications;

(c) the preferential use of European standards or common technical specifications where they exist.

The justification for these proposals is primarily economic and is based on recent studies concerning cost reductions to be achieved by completion of the internal market. It is also political, and the Governments of the Member States, at meetings of the European Council, have repeatedly stressed how important it is for the Community institutions to take rapidly the decisions required for opening up public sector procurement contracts.

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10 COM(88)238, 2 May 1988
11 COM(88)377 final - SYN 153, 11 October 1988.

14. In the nuclear field, completion of the internal market was intended to enable the following objectives to be gradually attained:

I. the boosting of the competitiveness of the Community's manufacturing industries on the world market without excluding other equipment manufacturers elsewhere in the world from the internal market;

II. the establishment of a system of common standards with the aim of promoting competition on the components market, other equipment suppliers elsewhere in the world being obliged to comply with these standards whenever they offer their products on the internal market;

III. the placing of electricity producers on an equal footing as regards their investments in nuclear power;

IV. the "de facto" adoption by all Member States of the same extremely stringent safety principles and criteria for reactors, without diminishing national responsibility from the standpoint of construction permits and operating licences.

The background to the development of European standardization

15. Provision has been made for other measures to supplement the Community system for awarding public works contracts. The proposed procurement procedures will, in fact, guarantee an opening-up of the contracts under consideration only if it is possible to reduce the differences between practices for specifying the subject matter of the contracts. In such contracts with a high technological content, the detailed technical specifications drawn up by the clients contribute to widening the divergence between national industrial practices and are a major obstacle to the proper functioning of the single European market. Without necessarily being discriminatory, the fact that they are so numerous confers an important advantage on a well established supplier who knows and exploits their characteristics.

It is hence necessary to ensure that a set of common European technical specifications and standards be prepared and applied.

A work programme was drawn up and entrusted by the Commission to the European standardization bodies CEN/Cenelec. It concerns identification of the subjects which should be dealt with as a matter of priority and the setting-up of detailed standardization programmes.

The formulation of common European specifications and standards will take time, but at least the work has begun. The existing technical specifications in the excluded sectors are based on a great deal of concrete experience; they will be replaced only gradually to keep pace with the gradual development of European standards.

The specific features of nuclear power

15. In the nuclear power industry, certain aspects assume special significance owing to the very nature of nuclear fission and its industrial utilization:

(a) First of all, the permanence and decisive importance of concern about safety necessarily involve the public safety authority in the supervision of a project, including power-station operation.

(b) Secondly, the long productive lifetime expected of a nuclear power station (nowadays 40 years) makes it necessary to safeguard skills. If he has not acquired such skills himself, the operator must be in a position to rely upon the technical competence of the constructor and the manufacturers until the installation is dismantled.

(c) As a corollary, the extent of investments in the nuclear sector and requirements regarding availability and reliability in that sector have brought about a services, maintenance and spare parts market of quite considerable size; centred on the existing installations, that market is of the same volume as the future market for the new units still to be constructed.

(d) The nuclear power market is particularly narrow and oligopolistic. Apart from the fast breeders dealt with in the following Section, the development of nuclear power in the Community will henceforth be based almost exclusively on water reactor concepts and mainly on the PWR concept; 87 PWR units are in service or under construction. Seven Member States have now had experience with that reactor type to varying extents and in various forms, and only a small number of firms possess the know-how and the capability to construct such units, that is to say, mastery of the technology. Furthermore, the nuclear power industry, like the electromechanical sector of which it is a branch, is currently being restructured around a small number of major world-wide groups.

All things considered, the relatively specific nature of the nuclear power industry requires that application of the policy of opening up public contracts be surrounded by special precautions, as pointed out in paras. 17 to 24 below.

Standardization in the nuclear power industry

17. Although the present new nuclear equipment market is considerably smaller that that in the late 1970s, standardization in the nuclear power industry is an important action. First of all, it forms part of the standardization of all electricity generating equipment, including all sources of primary energy. Without it, it would be impossible to open up the different national markets, some of which are nowadays mainly nuclear while others are closed to that form of energy, on a balanced basis.

Furthermore, although the component market is often occupied by a small number of firms, standardization will bring about uniformity and facilitate putting projects up for tender. Finally, it may assist the industry to evolve towards a more rational industrial structure, better adapted to the size of the market, and thus contribute to maintaining skills in the more efficient European firms.

18. The standardization action will focus on the following points:

(a) Establishment of a working method for identification of needs for European standards which could be used by authorities awarding public contracts. The following sectors in the nuclear power industry are targeted here:

I. Mechanical components;
II. Electrical components;
III. Services;
IV. Civil engineering;
V. Specifications of a horizontal nature: certification of products and processes, qualification of suppliers, quality assurance, test, monitoring, analytical and inspection methods, etc.

(b) Proposal of the features to be covered by the envisaged standards with a view to promoting their application, particularly in the field of public contracts;

(c) Identification of the subjects to be dealt with as a matter of priority in accordance with their economic importance, their technical feasibility and their desirability;

(d) Establishment of detailed standardization programmes and timetables.

This action will be geared mainly to the technology of light-water reactors, which is the predominant technology in Europe and throughout the world.

Standardization and nuclear safety

19. There is an interface between standardization in the nuclear power industry and the safety aspects. Indeed, every plan for a nuclear power station has to be approved in its entirety by the safety authorities, who deliver their opinion not only with regard to the safety principles and criteria, but also in respect of the manufacturing specifications and standards applied in the project. The project developer (the client or the industrial architect acting in his name) is thus encouraged to use technical specifications and manufacturing standards approved at national level; this practice consolidates the intra-Community partitioning of the market and may even encourage a preference for suppliers in a non-Community country (at present the USA) when the project design is derived directly from a model proposed by a constructor in that country.

In order to create a single market, it is hence essential to associate the safety authorities with the nuclear standardization programme.

At Community level, experts from the national safety authorities, together with representatives of industry and the electricity producers, participate in the activities of a working group dealing with the "Technological safety of thermal reactors (methods, criteria, codes and standards)". That group's work on nuclear power station safety was recently the subject of a communication from the Commission to the Council,[12] in respect of which the Council has just delivered its opinion.[13]

12 COM(88)788.
13 Of 20 June 1989.

The group, which has already conducted a number of exploratory studies in the field of nuclear standardization, is the Commission's preferred partner in taking steps to form a link between safety and standardization and in contributing to the establishment of a working method which will take that interface fully into account. In addition, it provides a certain degree of assurance that the future standards will be favourably received by the national safety authorities.

20. The results of the standardization activities will be submitted by the Commission to the Community's group of experts on the technological safety of nuclear installations for its opinion.

The standardization programme implemented for industrial purposes is an activity distinct from the process of harmonizing safety criteria. Nonetheless, it is complementary to it and its execution should have a synergistic effect on the evolution of that process.

Hence, in the shortest possible time, the design, construction and operation of nuclear power stations will take place under optimum technical conditions, reflecting, in the specific sector of the nuclear power industry, the concerns about levels of protection that are addressed in the Single Act without the responsibilities of the Member States being affected.

Competition and industrial structure

21. It has hitherto been possible to consider formally that there is a state of competition on the internal nuclear power market, since several design and construction firms have been active on the markets in the Member States. However, such competition had little effect in practice. This is reflected even at sub-contracting level, where intra-Community flow, which from the outset has been modest, is decreasing.

Furthermore, competition within Member States where there was more than one constructor was also more formal than real.

In these States - as in the others - the low level of market activity, measured against the number of units ordered over a given period, combined with the absence of a national constructor capable of constructing an entire nuclear power station from start to finish, prompted clients to deal "first with one and then with another" of the few firms active in that field. They sought more to try cooperating with these constructors one after another than to benefit from competition between them. This is confirmed by studying the investment costs.

22. In this connection, the Commission occupies a privileged position: not only does it participate in the work of UNIPEDE[14] concerning the estimated cost of installations possibly to be placed in service over a 10-year period, but it receives and - under a confidential procedure - discusses with the investors pursuant to Articles 41 et seq of the Euratom Treaty all the information which enables it to determine the cost of each installation and break it down by major items.

This privileged position allows it to establish that achievement of low costs for a nuclear power investment as a whole mainly depends on the investor's organizational and engineering capacity and on the effect of series production backed up by investment programming.

On the basis of these facts, the Commission concludes that it is advisable to seek more specifically to coordinate investments in the nuclear power industry within the Community as provided for by Chapter IV of the Euratom Treaty.

Current developments

23. In the recent past (late 1958/early 1959), an important world-wide trend has emerged towards cooperation between major industrial groups, some of which directly affect the nuclear power-station designers and constructors.

In the Community, the constructors Framatome, France, and Siemens/KWU, Federal Republic of Germany, have just signed an agreement to set up a joint subsidiary, NPI (Nuclear Power International).

This agreement, which concerns the development of nuclear power stations for export to markets outside France and Germany, does not provide for reciprocal opening-up of the German and French nuclear power station markets, which cannot be decided on by the equipment or component suppliers, although it may be anticipated that, in the long term, one or more identical products will be proposed and manufactured under it.[15]

However, it represents the appearance of a powerful industrial group, amounting to a European solution as compared with the agreements already concluded or being negotiated by the industries in other Member States interested in nuclear power with industries in non-Community countries: the United States of America, Switzerland/Sweden and even Japan.

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14 Union Internationale des Producteurs et Distributeurs d'Energie Electrique (International Union of Producers and Distributers of Electrical Energy).

15 This could happen as the result of rationalization of production by both associates. These products would hence comply, not only with the same manufacturing specifications (standardization aspect), but also with identicial safety requirements. In this regard, it should be noted that the agreement also provides for the pooling of systems development efforts proposed by both firms with a view to developing new models of light-water nuclear power stations.

In comparison with the latter, which possess the technology and are capable of developing it, the European industries - other than Framatome and Siemens/KWU - are mainly playing the role of technology importers and it is not easy to see how they could disseminate such technology on any European markets other than their own national markets, contrary to Article 97 of the Euratom Treaty.

Were such to be the case, each developer (constructor, electricity producer or even safety inspectorate) could still be tempted to maintain the special characteristics of his product and to sing the praises of one or other safety-related aspect; this might jeopardize the attainment of the objectives of the internal market in the nuclear field, particularly the establishment of a system of common standards and the adoption of the same safety principles and criteria (para. 20).

Analysis of the nuclear-power market

24. With an oligopolistic market on which competition between potential suppliers is subject to very special conditions and, in the case of certain components, investor demand is confronted with a scarcity of supply, completion of the European internal market must be accompanied by special precautions, although there is not necessarily a need to provide for a regulatory framework.

In order better to assess the state of the market in question, the Commission will set up a group of experts for the nuclear power market which it will consult periodically on the situation in this market and its likely future trends.

This group, which will be chaired by a Commission representative, will be made up of representatives of the investors concerned, chiefly electricity producers.

It must be the Commission's task, assisted by the group of experts, to examine in particular the methods of implementation and the results of the following actions by undertakings:

(a) identification of components which might be difficult to supply in quantity (volume and/or high cost of components on offer) and which give rise to problems of quality (ability of the suppliers to comply with the specifications).

Accordingly, during the requisite updating of the procedure for applying Articles 41 et seq of the EAEC Treaty (Council Regulation No 4 and Commission Regulation No 1) and the updating of Annex II to the Treaty, the Commission will request that information on sensitive components (suppliers consulted; supplier chosen) be communicated to it.

(b) taking stock of the similarities and dissimilarities between the light-water reactor projects developed in the Community.

(c) drawing up of a list of requirements which would be likely to receive the approval of all the Community electricity producers concerned;

(d) use of the form of the "Joint Undertaking" provided for in Chapter V of the Euratom Treaty for the development of a European reference model derived from these projects.

The putting into effect of such measures will facilitate the coordinated development of investments (within the meaning of Article 40) in such way as to obtain the maximum benefit from the effect of series production and the planning of the work.

D. AN EXAMPLE OF COOPERATION: THE CASE OF THE FAST BREEDER

The value to Europe of the fast reactor

28. The fast reactor provides a form of nuclear fission energy which enables the potential energy yield of uranium to be fully utilized, instead of only exploiting some 1% as is the case with reactors of the present generation.

From an energy standpoint, the adoption of the fast reactor concept - in parallel with reactors of the present generation - could thus prolong the life of uranium resources without creating tension on the world market for this sensitive raw material.

For this reason, several European countries - and other countries elsewhere in the world such as the USA, the USSR, Japan and India - are developing fast reactor technology. From the outset, the Community has contributed in various ways to this development.

A new stage began in 1984[16] with the cooperation agreement between five Member States (Belgium, Germany, France, Italy and the United Kingdom). The purpose of that agreement, which can be extended to other partners, is to render the concept competitive with light-water reactors on the European market.

In addition to its fundamental value from the energy standpoint, this objective thus possesses an economic and an industrial aspect which are of special relevance to the field covered by this document, since the fast reactor can, if the need arises, be adopted as an option in a single European market.

The competitiveness of the fast reactor

29. The commercial competitiveness of the fast reactor should be assessed by comparing its economic efficiency with that of the concepts it is likely to replace under the conditions obtaining when the replacement is carried out, i.e., at the beginning of the next century.

It is hence inappropriate to compare, as has been done in the recent past, the cost of the first large-scale prototype (Superphenix) with that of the cheaper PWRs constructed in series in France.

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16 Signed on 10 January 1984 in Paris (see also the 1984 PINC, para. 41).

Detailed studies, including some carried out by the Commission with the assistance of UNIPEDE, have shown that significant progress could be made and that fast reactors could be competitive by the beginning of the next century.

The industrial aspects of the fast reactor: the EFR project

27. Developing a new reactor concept is expensive, but the stakes here are very high. It is for this reason that the European countries currently involved (see para. 25) have decided to rationalize their efforts and implement five sectoral agreements relating to the following subjects: R&D, information, industry, investment and fuel. The agreements on the first three subjects are now operative.[17]

The main objective was to combine the three projects developed in the Europe[18] into a single European project. The 1984 PIRC foresaw that this union would take place after each of the three projects had come to fruition. It also stressed the value of setting up an appropriate industrial structure, preferably an integrated one.

At the request of the electricity producers concerned, European constructors joined together to submit a proposal containing the main features of a single project.[19]

Henceforth, the single European project EFR (European Fast Reactor) will serve as a reference for the economic assessments.

28. In addition to initiating an appropriate industrial structure, the EFR project has other advantageous aspects: it enables the qualities of the various national industries to be used to best advantage and unites the conditions for placing on the market at the appropriate time a single product designed to meet the requirements of any Member State that may become involved. The EFR will be the most efficient and least expensive fast reactor possible and will be acceptable to all the national safety authorities associated with the project design.[20]

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17 Signed in Bonn on 16 February 1989.

18 "Project 1500" developed by Novatome (Framatome) (France) and Ansaldo (Italy), SNR 2 developed by Interatom GmbH (Siemens-KWU) (Germany), Belgonucléaire SA (Belgium) and Neratoom b.v. (the Netherlands) and CDFR developed by the National Nuclear Corporation (GEC) (United Kingdom).

19 For its part, the Commission had previously requested industry to conduct a comparison of the three projects.

20 From a formal standpoint, the safety authority exercises its responsibility only during the licensing procedure; however, it is in the general interest for it to be informed in some way of the state of progress of the project.

Moreover, EFR provides the most appropriate framework for the development of a set of standards applicable throughout the Community. (It will be noted that the Commission Working Group on Codes and Standards, made up of fast reactor experts from the Member States, will provide the EFR project with the results of its work relating to that project).

Those countries which prefer to dispense with the construction of a fast reactor will find that the existence of the electricity "common market" will also guarantee them a power supply in the very long term.

Finally, in keeping with the statements made by the partners currently associated with the development of the EFR, participation in further work on the project is open to other industrial firms and other electricity producers in accordance with procedures to be determined by those concerned. For its part, the Commission will encourage such a development.

Follow-up action and the responsibility of the public authorities

29. If the existing installations have to be replaced, this will be the occasion to usher in the fast reactor concept.

For this reason, it has been agreed that the EFR project should undergo, half way through the next decade, an exhaustive and detailed assessment covering, in particular, the economic and safety aspects. This assessment will enable the developers and the Community to adjust the research policies accordingly and/or to propose that investments be made.

Continuation of development work with a view, in particular, to achieving an additional lowering of the investment and operating costs cannot be left solely in the hands of future investors. It is the responsibility of the public authorities to attend to the long-term energy supply conditions and to assist in the development of promising concepts up to and including the precommercial phase. For the Commission's part, in view of the responsibilities conferred upon it under Article 40 of the Euratom Treaty, it is particularly desirable for it to be associated with the assessment of the EFR project.

F. CONCLUSIONS

The purpose of this communication is to define and initiate the process of completing the equipment and component internal market in the nuclear power sector.

30. By examining the characteristics of this sector and the problems which the undertakings encounter in it: the nuclear power station design and construction industries - the suppliers -, on the one hand, and, on the other hand, the electricity production industries - the investors -, this communication has highlighted the following salient points:

(a) generally speaking, it is necessary for the suppliers to organize in such a way that it will be possible to formulate common - or commonly recognized - design and construction rules within a short time and the investors will be able to order equipment and components without any restrictions based on the suppliers' nationalities (para. 12).

(b) as regards the approach envisaged, it should enable the following objectives to be attained gradually (para. 14):

I. a boosting of the competitiveness of the Community's manufacturing industries on the world market, without the exclusion of other equipment manufacturers elsewhere in the world from the internal market;

II. the establishment of a system of common standards which will promote competition on the components market and will have to be complied with by other equipment suppliers elsewhere in the world when they offer their products on the internal market;

III. the placing of electricity producers on an equal footing as regards their investments in nuclear power;

IV. the "de facto" adoption by all the Member States of the same safety principles and criteria for reactors without any weakening of national responsibility from the standpoint of construction permits and operating licences.

(c) In order to minimize the detriment caused by the narrowness of the market - measured against the expected rate of ordering in the foreseeable future - from the standpoint of investment costs, it is advisable to seek more specifically to coordinate investments in nuclear power within the Community (para. 22).

(d) As regards ensuring long-term electricity supplies and the rationalization of the necessary technological and industrial development, the EFR fast breeder reactor project will henceforth be the focal point of European efforts; in the main, this project is in keeping with the objectives set out in sub-paragraph (b) above and, in accordance with procedures to be determined by those concerned, suppliers and investors other than those initially involved in the project will be able to participate in it (para. 28).

31. At the operational level, the Commission will:

(a) initiate a standardization action specific to the nuclear power sector (para. 18) which will supplement the general standardization programme already being implemented (para. 17);

(b) associate the working group on technological safety with the nuclear power standardization action by submitting to it the progress reports for its opinion; this procedure, which cannot be substituted for the formal agreement of the national safety authorities in respect of the future common standards, will nonetheless have the advantage of increasing the likelihood of this agreement being obtained at the appropriate time (para. 20);

(c) update the procedures (Council Regulation No 4 and Commission Regulation No 1) for implementing Articles 41 et seq of the Euratom Treaty and Annex II thereto (para. 24);

(d) examine, with a view to better facilitating the coordinated development of investments (Chapter IV of the Euratom Treaty) (para. 24) and assisted by a group of experts, the procedures for implementation and the results of the actions carried out by undertakings, which include:

I. the identification of components liable to give rise to difficulties of supply;

II. taking stock of the similarities and dissimilarities between the light-water reactor projects developed in the Community;

III. drawing up of a list of requirements which is likely to meet with the approval of all the electricity producers in the Community involved in these projects;

IV. making use of the "Joint Undertaking" (Chapter V of the Euratom Treaty) to establish a European reference model derived from these projects;

(e) encourage efforts intended to lead, halfway through the next decade, to an assessment being made of the single European fast breeder reactor project EFR, by being associated with that assessment (para. 29).

ANNEX. 1

PROPORTION OF ELECTRICITY PRODUCTION IN THE EEC ACCOUNTED FOR BY NUCLEAR POWER (1980-88)

(SOURCE 'EUROSTAT')

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988
Belgium	23,3	25,4	30,5	45,7	50,8	60,3	67,2	66,0	65,5
Fed. Rep. Germany	11,9	14,6	17,4	17,8	23,6	31,1	29,5	31,3	34,0
Spain	4,7	8,6	7,7	9,1	19,3	22,2	29,3	31,2	36,1
France	23,5	37,7	38,7	48,3	58,7	64,9	69,8	69.8	69,9
Italy	1,2	1,5	3,8	3,2	3,8	3,8	3,8	-	-
Nether-Lands	6,4	5,6	6,4	5,9	5,8	6,1	6,1	5,2	5,2
UK	12,1	12,8	15,2	17,0	17,9	19,4	18,4	17,5	19,3
EEC	11,7	16,0	17,8	21,2	26,4	30,7	32,3	32,4	33,9

ANNEX 2

LOAD AND AVAILABILITY FACTORS OF THE NUCLEAR POWER STATIONS IN THE EEC

(SOURCE 'EUROSTAT')

Country	1984		1985		1986		1987		1988	
	Load	Avail.	Load	Avail.	Load	Avail.	Load	Avail	Load	Avail.
Belgium	86,6	86,7	82,0	83,0	78,0	83,0	83,0	84,0	84,8	85,2
Fed. Rep. Germany	78,8	79,0	84,0	85,0	78,0	80,0	75,0	80,0	73,6	84,4
Spain			64,0	66,0	73,0	74,0	80,0	82,0	75,7	79,3
France	70,8	76,1	74,0	78,0	70,0	76,0	63,0	72,0	58,8	71,1
Italy	59,5	59,5	61,0	62,0	75,0	75,0	1,0	2,0	,0	,0
Netherlands	78,5	78,5	82,0	82,0	90,0	90,0	75,0	77,0	73,1	80,0
UK	64,7	64,9	82,0	84,0	61,0	61,0	61,0	62,0	58,7	65,1
EEC	72,6	75,4	78,0	80,0	71,0	76,0	68,0	73,0	64,1	74,0

EUROPEAN COMMUNITIES

ENERG/167

ECONOMIC AND SOCIAL COMMITTEE

Brussels, 19 December 1989

OPINION
of the Economic and Social Committee
on
NUCLEAR INDUSTRIES IN THE COMMUNITY
The nuclear power station design and construction industry and completion of the European Market
(Update of the Illustrative Nuclear Programme for the Community (PINC)
- Article 40 of the EURATOM Treaty -
(COM(89) 347)

Rapporteur: Mr CAMPBELL

CES 1365/89 PF/CCP/ht

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On 18 September 1989 the Commission decided to consult the Economic and Social Committee, under Article 40 of the Treaty establishing the European Atomic Energy Community, on the

Nuclear industries in the Community - the nuclear power station design and construction industry and completion of the European Single Market (update of the Illustrative Nuclear Programme for the Community - PINC)

(COM(89) 347).

The Section for Energy, Nuclear Questions and Research, which was responsible for preparing the Committee's work on the subject, adopted its Opinion on 30 November 1989. The Rapporteur was Mr CAMPBELL.

At its 272nd Plenary Session (meeting of 19 December 1989) the Economic and Social Committee unanimously adopted the following comments:

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While endorsing in general the update of the 1985 Illustrative Nuclear Programme, the Committee has doubts about the timeliness of this document and would make a number of comments which are detailed below.

1. Preliminary comments

1.1. Under Article 40 of the EURATOM Treaty, the Commission is obliged to publish periodically "illustrative programme indicating in particular nuclear energy production targets and all types of investment required for their attainment". Therefore the objective of the *PINC* is only to set the framework for future nuclear power.

1.2. Three programmes have been published to date, the latest in 1985[1]. The present document is a partial update of the objectives and recommendations contained in the 1985 programme, namely those concerning nuclear power station design and construction.

1.3. The approach to nuclear power has changed considerably since the 1984 illustrative programme, following the Chernobyl accident. One of the Committee's conclusions on the 1984 programme was to "highlight the major importance of greater Community political will in the implementation of programmes concerning the various aspects of nuclear energy"[2].

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(1) COM(85) 401 final - 23 July 1985.

(2) CES 472/85 - 30 May 1985 - point 4.

1.4. Since then, public concern, in particular, has had, as stated by the Commission in its document, "the effect of deterring the development of nuclear programmes in several Member States". Some of them have deferred the continuation of their nuclear power programmes, other have slowed down or stopped nuclear station construction.

1.5. Nevertheless, it has to be recalled, that in 1988, nuclear energy accounted for 34% of electricity production in the Community (compared to about 22% in 1983), even though only six Member States produced electricity of nuclear origin.[3]

1.6. The Commission's present document is intended neither to deal with nuclear power production - this will be the subject of a comprehensive update in 1992 - nor to open a political debate in favour or against the nuclear option, in relation to environmental concerns, in particular.

1.7. Secondly, it is not intended to deal with nuclear safety, either of power station operation or of workers in the stations or of the general public. The matter of safety was the subject of a separate Commission Communication on "Assurance of safety of nuclear power plants" (COM(88) 788 final of February 1988).

1.8. In that context, the Committee would underline the clear difference between design standards and the safety principles and criteria which preside over the licensing of nuclear power stations by national authorities. Nevertheless, it should also be stressed, as the Commission does in its document, that there is an interface between common standards and the safety aspects, since manufacturing specifications and standards have to be approved by national safety authorities. Design standards are dependant on previously determined safety standards.

1.9. The objective of the present PINC is to review the short and long term requirements for nuclear power stations and suggest ways in which, in relation to the completion of the internal market by 1992, the specifications for design and construction can be harmonized in the Community in order to improve the economics of production, to standardize safety requirements for design, to improve the conditions for competition in a limited Community market and to afford opportunity for a strong Community industry to compete in world markets.

1.10. The Commission suggests that the present low level of nuclear power station requirements will continue for another 15/20 years or so. Thereafter, unless new forms of energy production are developed, all the existing sources of energy, including nuclear power, will be required to meet demand. As

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(3) See Annex 1 and 2 to COM(89) 347.

existing stations become life-expired after some 40 years of operation, the replacement of existing installations will therefore be required. A firm plan for replacement will, however, be required 10 to 15 years before existing plants can be effectively replaced.

1.11. Nuclear power generations will probably be available in the form of advanced pressurized water reactors (PWR) or as Fast Breeder Reactors (FBR), which are likely to be available in the time scale.

2. **General comments**

2.1. The Committee reviewed the existence of codes and standards available in the EEC (France, UK, the Federal Republic of Germany), in the USA and in the International Atomic Energy Agency. Diverse standards exist and there is no doubt that if it can be achieved, a European standard for Advanced PWR's and for FBR's would be beneficial.

2.2. The production of codes and standards is a lengthy and costly process. The Commission document appears to set a target of harmonization in a timescale of the 1992 single market. The Committee believes that comprehensive common standards, acceptable to all Community States, will take longer to produce and should be directed towards the increasing requirements after the year 2000.

2.3. These requirements are likely to be identified more specifically once the 1995 Energy objectives have been reviewed. This review, which will take place in 1990, is likely to give a more positive impetus to the need for harmonization in the decade 1990-2000. This is the reason why the Committee expresses some doubts as to the need for the present partial update of the PINC prior to a complete and in-depth review planned for 1992.

2.4. Despite these doubts about timing the Committee does broadly agree with the analysis set out in the Programme and the conclusions as applied specifically to safety and common standards of design and construction. This does not pre-empt its Opinion on the present situation and future development of investments in the nuclear field and of nuclear power programmes, or on the Safety of Operation of Nuclear Power Stations.

2.5. On the assumption that there is going to be a need for a replacement of life-expired power stations, it is prudent for the Community to combine its total technical and production resources to enable more effective competition among European nuclear contractors in a limited market and thus to obtain maximum economic benefit, through the harmonization of the various elements of design and construction, both for Advanced PWR's and FBR's and the completion of a Single European Market for supply and construction.

2.6. In addition to the general endorsement of the principles of PINC, the Committee has a number of specific comments which it believes are relevant.

3. **Specific comments**

3.1. It seems that the PINC concentrates on the largest installations of Advanced PWR's and FBR's. The future development of new reactor concepts especially of smaller next generation plants, which could have a market beyond Community boundaries, should not be neglected.

3.2. At a time of low demand, consideration should be given to how best to use limited resources on the very large amount of work required to achieve harmonisation. Concentration of effort should be directed towards the requirements of the next century and should not necessarily be geared to the timetable of the Single European Market of 1993.

3.3. Whilst accepting that PINC is in effect a conceptual document and not an executive plan it would have been helpful if the actions and results which had emanated from previous programmes had been discussed and used as a firm foundation on which to base the 1989 PINC.

3.4. It is assumed that harmonisation can be achieved by extensive discussion. There is no central authority which will impose standards. It is therefore essential that all competent authorities should be represented in the CEN/CENELEC discussions and that standards should not be dictated unilaterally by powerful commercial interests in industry.

3.5. It is a general problem that whilst seeking harmonisation within the Community, innovation based on research and testing by responsible authorities worldwide should not be inhibited by rigid standardisation. There must be the capability of amending standards to take advantage of scientific advance.

3.6. The PINC does not envisage the use of the Joint Research Centre, despite its major role in nuclear safety and prenormative research. Whilst it is accepted that the task is mainly to harmonise a multitude of existing standards, full use should be made of the JRC, as an impartial and independent technical expert. In this respect, attention is drawn to the comments the Committee has made in its Opinion on the Proposal for a Council Decision concerning the Framework Programme for Community activities in the field of research and technological development (1990-1994)[4].

3.7. One of the conclusions of the Committee's Opinion on the 1984 PINC related to the decommissioning of power stations and storage, reprocessing and disposal of nuclear waste. There is

(4) CES 1250/89 of 15 November 1989.

no mention in the present document of these important matters. Whilst it is recognised that there are specific research programmes in these areas the Committee believes that harmonisation of design in all these operations should be part of any comprehensive PINC.

3.8. In a number of its Opinions and Reports over recent years the Committee has urged the preparation of a widespread public information service on all aspects of nuclear power. There is unfortunately no significant mention of this in the 1989 PINC. Whether or not future use of nuclear power is essential or is politically acceptable, there is no doubt that the present generation of power stations will be in operation for many years, that some construction will continue both within the Community and elsewhere in the world. It is essential that the public should be informed by responsible authorities as to the present and future state of the industry and should not have to rely on less well informed and possibly biased sources. Whatever may be the future of nuclear power it will depend on the support of a well informed public.

4. Conclusion

4.1. The Committee has expressed doubts about the need for this document, at this time. Subject to this reservation, it endorses in general the content of this partial update of the 1985 Illustrative Nuclear Programme for the Community - PINC - as an interim statement of intent.

4.2. The Committee looks forward to the revision, in 1990, of the 1995 energy objectives for the Community and a further in depth revision of the PINC in 1992.

Done at Brussels, 19 December 1989.

The Chairman of the Economic and Social Committee	The Secretary-General of the Economic and Social Committee
Alberto MASPRONE	**Jacques MOREAU**

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