COMMISSION OF THE EUROPEAN COMMUNITIES

Problems, resources and necessary progress in Community energy policy 1975-1985

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Contents

Abbreviations:

Mtce	million tonnes of coal equivalent (7 000 kilocalories per kg): 7.10^{12} kcal
Mtpe	million tonnes oil equivalent (10 000 kilocalories per kg): 10^{13} kcal
kg ce	kilogramme coal equivalent (7 000 kilocalories)
GWe	gigawatt of electricity: 10^6 kW
Gcal	gigacalorie: 10^6 kilocalories

A - Energy policy: problems and resources 1975-1985

(submitted to the Council by the Commission)

INTRODUCTION

Energy policy is intended to create a situation in which consumers may obtain the primary energy they need, in the most favourable conditions as regards quantity, quality and price.

To do this it must take into account not only factors which are specific to the energy economy (developing patterns of demand, availability of the various types of energy, the economic and political conditions affecting the supply of energy from different sources, etc.) but also factors external to the energy market itself (for example, the maintenance of the economic and financial equilibrium, or the exigencies of foreign or domestic social policy).

In analysing these constraints and thus defining the extent to which freedom of action is possible, an idea emerges of the various combinations available for selection. Such is the purpose of the present document, based first on the study of demand prospects [1] and secondly on the studies of the future supply situation for the principal sources of primary energy; [2] it is a descriptive synthesis of the essential problems of energy policy which will be encountered between now and 1985. It seeks, moreover, to identify the available policy options and to evaluate the consequences of each. Thus it contains the basic reasoning underlying the guidelines proposed by the Commission in "Progress necessary in Community energy policy".

[1] Forecasts of primary energy demand in the Community, 1975-80-85 (Doc. XVII/153/72).
[2] Medium-Term Forecasts and Guidelines for the Oil Sector,
Medium-Term Forecasts and Guidelines for the Gas Sector,
Second Illustrative Nuclear Programme for the Community.

I — PROSPECTS FOR ENERGY DEMAND

1. New features of the energy market

The main characteristics of the world energy market from 1960 to 1970 were ample availability and relatively low prices.

Oil was available in virtually unlimited quantities and at relatively low prices, and covered most of the new demand which arose. This was particularly true so far as the Community was concerned, which reaped the benefits of the active competition in the oil market. The result was that the price of oil was the level of reference for the prices of other types of energy with which it is likely to compete.

Natural gas, an indigenous and expanding source of energy supply, shared in the growth in energy demand, and even captured certain markets from oil products.

Community coal, hampered by higher production costs, continued to decline. There are sectors, electricity generation and coking, in which coal can still make a particularly important contribution to the fulfilment of energy requirements, but even in these sectors it has only been able to maintain its position by virtue of public financial support. Imported coal contributes only relatively modestly to the total volume of energy needs, but it is nevertheless of a certain importance to those who consume it, notably the steel industry.

The progress of nuclear energy was hindered both by the low price of "conventional" energy and by the inertia which affects the general adoption and application of new techniques.

Difficulties in the markets for certain types of energy have occurred from time to time during this period, caused by market forces or by political events. Examples of this were coking coal in 1969-70 and oil in 1967 and 1970-71. In general, however, the Community was able during the ten-year period to obtain its energy supplies under very favourable conditions.

Since 1970 the structure of the market has tended to change under the influence of a number of factors.

While petroleum has established a lasting domination of energy supplies, the conditions of supply are becoming more restrictive than in the past. World demand forecasts show that the Community will have to compete with other buyers—principally with two other great industrial powers: Japan and the United States—both in its dealings with traditional suppliers and in establishing supplies from new sources. Also, the oil-producing countries have become aware of the advantages they would gain in a sellers' market. By fiscal measures they have secured a proportion of the income from petroleum and are now seeking to intervene more directly in the management of their natural resources.

Thus all the indications are that the easy supply situation of the 60s has little chance of being maintained. It is therefore appropriate to examine the long-term trends of energy demand and supply and in doing so to consider the Community in the wider context of

the international market. In this way it will be possible to define the problems which energy policy will have to resolve.

The year 1985 has been chosen as the "horizon" of the study, not as a firm date by which one would expect to see a definite situation, but rather as a point of reference for evaluating market conditions during the period 1980-90. This choice of "horizon" allows both the evolution of currently known factors and certain possible hypotheses on longer term structural changes to be taken into account. [1]

2. Prospects for world energy demand in 1985

The Community already depends on imports for a high proportion of its energy supplies. Even more so than in the past, development of demand in the other economic zones of the world will in future be a constraint to be allowed for by energy policy.

Though the outlook for the evolution of energy needs varies according to the degree and type of economic development of each country, it is certain that demand, at the world level, will considerably increase in future.

Forecasts of world energy demand in 1985

('000 000 tce)

	Actual 1970					Forecasts 1985				
	Solid fuel	Liquid fuel	Natural gas	Primary elec.	Total energy	Solid fuel	Liquid fuel	Natural gas	Primary elec.	Total energy
Industrialized countries with free-market economies	1 110	1 910	820	280	4 120	1 100	4 430	2 050	1 770	9 350
Including			88							
EEC (10)	363	685	680	83	1 219	255	1 410	345	345	2 355
US	480	1 050	5	80	2 290	670	1 700	1 130	700	4 200
Japan	90	290		25	410	105	760	10	175	1 050
Countries with planned and centralized economies	1 180	445	325	65	2 015	1 870	1 520	1 150	260	4 800
Developing countries	125	330	70	40	565	230	1 100	250	220	1 800
World	2 415	2 685	1 215	385	6 700	3 200	7 050	3 450	2 250	15 950
(Total in '000,000 tpe)	1 690	1 880	850	270	4 690	2 240	4 935	2 415	1 575	11 165

[1] For the significance of medium- and long-term timescales in energy forecasts, see 'Outlook for primary energy demand in the Community 1975-80-85' (Doc. XVII/153/72-F), p. 4.

The estimates which follow are necessarily based on less searching studies than those used for the determination of Community energy needs. In spite of their margins of uncertainty, they give a satisfactory idea—at least in their order of magnitude—of the problems of world energy supply which must be solved in the near future.

The annual average rate of increase in world energy consumption from 1960 to 1970 was over 4.5 %. From 1970 to 1985 the rate could be over 6 %. The present world energy demand is some 16 000 million tce.

The needs of industrialized countries with free-market economies will reach a little more than double the present levels in fifteen years. Most of them will be able only partially, and to a greater or lesser extent, to cover their needs from indigenous resources. They will therefore be buying increasing quantities in the world market.

This applies especially to oil (about 3 500 million tce will have to be imported), but for this fuel the present and future circumstances of the three principal economic zones (EEC, USA, Japan) exhibit differences which are worth emphasizing:

(i) while in the United States oil will become slightly less important proportionately (from 45 to 40 %) over the next 15 years, the converse will apply in both the Community and Japan (from 55 to 60 % and from 70 to 72 %);

(ii) in the structure of the consumption of oil products in the US, the supply of products for "motor fuel uses" is predominant (some 60 %); refining is orientated towards meeting this demand (residual fuel oil represents only 13 %) and has had no major difficulties in taking expensive crudes because of the high market value of the principal products. The situation is quite different in the Community and Japan, where fuel oils (heavy and light) for domestic and industrial heating purposes are the principal products (all fuel oils, 65 % and 75 % respectively); consequently, any increase in the price of the crude oil affects the price of these products and diminishes competitiveness in international markets.

In view of the foregoing, it would seem that the traditional clients (Europe and Japan) in the world oil market and the newcomers, the United States, probably requiring a quarter of their energy consumption from imported oil, may not be able to take the same attitude to the market in the future.

Countries with planned and centralized economies will consume in 1985 two and a half times as much energy as in 1970, and the structure of their consumption will probably undergo important changes.

Solid fuels now satisfy more than 55 % of the need: in 1985, the same proportion will be covered by all the hydrocarbon fuels. This tendency towards a closer approach to the "industrialized free-market economy" structure will nevertheless leave a substantial margin for the expansion of solid fuels.

The increasing hydrocarbons requirement envisaged for these countries casts doubt on the generally accepted hypothesis of total self-sufficiency for this economic zone. Compelling considerations of a regional nature or of economic policy could incline these countries towards greater participation in world energy markets.

The consumption of energy in the developing countries will probably treble during the period 1970-85, but should still be less than one-eight of world energy needs.

Fundamental structural differences exist among the developing countries as a whole, from one zone or one country to another, relative to the degree of economic development and to energy needs and resources or the lack of them. The increase in energy needs will not, therefore, be of a uniform nature in all developing countries and in each case the rate of increase will be determined in large measures by the expansion or otherwise of the development of the economy.

Although some of the countries in question possess the greater part of the world's energy resources, their own additional energy needs will have only a minor effect on availability of energy in the world market from now to 1985.

In spite of the higher rate of increase of energy needs in the developing countries, the margin which separates them from the industrialized countries is most unlikely to narrow to any great extent. In 1985, the average consumption of energy per head of population should be 10 900 kg ce in the industrialized countries, 3 300 kg ce in countries with planned economies, and 700 kg ce in developing countries. Thus more than half the world's population will be using only one-tenth of the available energy.

Whatever the uncertainties surrounding the development of energy demand in certain countries or in certain types of countries, and without understating the role of the other energy sources, it is clear that the problems of world energy supply during the next fifteen years will essentially concern hydrocarbon fuels, which have to cover two-thirds of the total needs.

3. Community's energy needs [1]

Any estimate of future energy needs must be based on an assumption of economic growth. In this respect it seems reasonable to count on an average rate of growth in the Community comparable to that achieved over the last 20 years—about 5 %. Essentially, this hypothesis is based on the prospect of an improvement in productivity, which, particularly in view of the foreseeable labour supply situation, can only be achieved by an increased degree of mechanization, which in turn implies increasing energy consumption. Certainly one should not overlook the possibility of technical advances bringing about reductions in the specific consumption of fuels. However, apart from the fact that in certain sectors— for example, conventional power stations and blast furnaces—the possibilities for improving performance are growing progressively less, other factors will make for growth in energy demand—for example, the increase in consumption which may be expected to result from measures to protect the environment.

[1] Doc. XVII/153/72, 'Outlook for primary energy demand in the Community 1975-80-85' describes the methods by which energy demand has been estimated and gives detailed information for each sector of consumption.

A further argument in favour of the adoption of a growth hypothesis is that it would be imprudent to base energy policy options on an assumption of a slower rate of economic growth than in the past; such a slowing-down would, in present conditions, be of a purely speculative nature.

It is in fact already certain that more than half of the energy requirement will have to be covered by imports. It is therefore best, while always bearing in mind the margins of uncertainty which beset all estimates of future demand, to avoid understating the quantities of energy which the Community will have to obtain in the world market.

On these bases energy demand should be expected to increase by 5.2 % a year on average, a slightly less rapid rate of increase than was observed between 1960 and 1970 (+ 6.2 %). The Community's total energy needs would increase in this way from 973 million tce in 1970 to 2 000 million tce (1 400 million tpe) in 1985; nine-tenths of this would be for internal consumption. [1]

These forecasts should be considered in a long-term context since they do not take account of fluctuations in the business trend which will tend to be approximately self-cancelling. For example, one might reasonably suppose that the slackening of economic activity observed in 1971 and 1972 can be compensated by subsequent movements. The figure of 2 000 million tce therefore represents the probable magnitude of demand and makes it possible to outline the size and nature of the main energy supply problems of the Community towards 1985.

A certain proportion of energy needs may be called "specific" in the sense that, with present technology and because of the limitations and inertia of investment patterns, they can only be satisfied by a particular type or source of energy. To these needs should also be added those covered by certain energy types which are available in any case, whether because of technical considerations, because of the commercial conditions of supply, or because the development of the energy types in question will be brought about by exigencies of a technological nature.

The remaining portion of energy requirements, within which competition among different energy sources is possible, represents about 65 % of total needs. Thus in 1985, 1 100-1 200 million tce (770-840 million tpe) would represent the quantity of Community demand for which competition could take place and also the principal potential sphere of influence for policy. This is really, however, a maximum figure because, even for this section of demand, there are factors of inertia which militate against complete fluidity of the market.

Competition among substitutable energy sources will be in conditions different from those experienced in the recent past, because the choice criteria applied by consumers, individually and collectively, will tend to change. The two traditional criteria of quality and price will continue to exercise a decisive influence but may become broader in scope.

[1] Total needs include exports and deliveries to bunkers as well as internal consumption. The estimates for these additional items, about 185 million tce (130 million tpe), are subject to a greater degree of uncertainty than the estimates of internal consumption. It is nevertheless desirable to take them into account in order to obtain an idea of the total quantities necessary for the internal working of an economic entity and for the maintenance of its external relations.

To the concept of intrinsic quality of the product and of the service which it provides will be added that of its effects on the environment, and the criterion of the lowest possible price will also be increasingly seen in the same context. Moreover, the future commercial conditions of energy supply and new requirements for the protection of the environment will add urgency to the necessity of using energy in as rational a way as possible. Lastly, as "First Outlines" have already emphasized, equal weight must be attached to security of supply as an objective closely bound up with that of low cost.

II — PROSPECTS FOR ENERGY AVAILABILITY

While it is possible to sketch the outlines of future energy demand in the Community, it is most difficult to study the commercial conditions which will apply to energy supply. Apart from the evolution of technical and economic factors, political situations which are difficult to foresee may also affect the conditions of supply.

The present study is limited to the main supply tendencies for the energy types which can compete in meeting the needs, described as "substitutable": oil, natural gas, coal and nuclear energy. These are also the energy sources whose supply problems must be examined in a world-wide context.

1. Oil [1]

The extensive world reserves of oil are generally considered to be sufficient to cover demand until nuclear power is able to take over completely from fossil fuels. However, much uncertainty surrounds the conditions under which oil will be made available to consumers, particularly in the Community, which will depend on imports for 95 % of its crude oil requirements. Even if in future an increasing proportion of these imports comes from sources which are relatively close at hand (North Sea), the Community will still depend on remote supply sources for the greater part of its needs.

In 1970 and 1971 pronounced changes took place in the oil market. The pressure on both demand for crude and the freight market created conditions favourable to substantial price increases. The scope of these increases should not, however, be exaggerated in those cases where their purpose was to compensate for monetary depreciation and the erosion of the producing countries' income. The agreements recently concluded between the producing countries and the major oil companies make it possible to forecast with some degree of precision the commercial conditions of crude oil supply up to 1975.

The average delivered cost [2] of a North African crude increased from $ 11/tonne at the beginning of 1970 to $ 18/tonne at the end of 1971. This increase stems solely from the application of new tax liabilities, $ 7/tonne more for the Mediterranean basin and $ 3.5/tonne for the Persian Gulf. Up to 1975, expected increases should, taking into account the recent devaluation of the US dollar, [3] amount to $ 3/tonne for Mediterranean and $ 2.5/tonne for Middle East crude. These cost increases will be reflected in prices, particularly of light and heavy fuel oil which are price reference points for other forms of energy. Heavy fuel oil is generally quoted $ 3-4/tonne below the crude price.

As far as transport costs are concerned, medium-term prospects are relatively favourable; so long as available capacity exceeds demand, only modest increases may be expected.

[1] For a more detailed survey see "Medium-term forecasts and guidelines for the oil sector".
[2] Excluding companies' profit margins.
[3] Geneva agreement, February 1972.

Trend of supply cost of a Saudi-Arabian crude 1970-75 (example)

$/tonne

	Before Teheran-Tripoli	After Teheran-Tripoli	1975
Produced cost including levies and taxes	$ 7.5/t	$ 11/t	$ 13.5/t
Transport to Rotterdam and companies' profits	$ 9.3/t	$ 9.3/t	$ 9.3/t
Total	$ 17/t ($ 12/tce)	$ 20/t ($ 14/tce)	$ 23/t ($ 16/tce)

In the longer term, it is difficult to predict the conditions which will apply to the transportation of the 3 000 million tonnes of oil which will be exported in 1985; there is no reason, however, to expect substantial increases in freight rates while economies of scale can still be achieved.

Nevertheless, beyond 1975 uncertainty surrounds many of the factors affecting oil costs, and a number of potentially inflationary elements can be discerned:

(i) the development of higher-production-cost deposits could lead to eventual cost increases;

(ii) the policy of producing countries, which for many years was aimed at increasing profit by increasing the volume of sales, may in some cases shift the main emphasis to increasing proceeds per unit. The producing countries are exercising a growing degree of control over their petroleum resources, either directly or by fiscal measures, in order to exert an upward pressure on prices, particularly in view of the strengthening world demand;

(iii) the quantities of oil available are closely linked to the flow of investment funds to exploration, which can only intensify as demand increases. Whether within the present business structure or in the context of greater participation by producing countries, the maintenance of low-cost diversified oil resources depends on the maintenance of sufficient investment capability.

Other factors could tend to balance the effect of those mentioned above:

(i) the interests of the various producing regions will not necessarily coincide; economic or other necessities peculiar to some of them could contribute to the maintenance of a degree of competition between crudes of different origins;

(ii) diversification of supply sources will reduce the importance of certain producing regions. From this point of view the discovery of new resources, including the North Sea fields, will attract particular attention.

The known resources in the North Sea do not justify the hope that they might make a major contribution to the needs of the Community of Six. In the enlarged Community,

however, they will have a favourable effect on the balance of oil imports. In any case, they will tend to reduce the demand on other producing regions.

In this respect it should be noted that Japan, like the Community, depends entirely on imports for her oil requirements, which could reach 500-600 million tonnes in 1985. The United States, until recently self-sufficient, will import increasing quantities of oil, and some forecasts put the imported proportion of US consumption at 30-50 % from 1980 onwards. It is the Middle East, the principal present and future supplier of the Community, which will also be called upon to supply a large proportion of the needs of those other two zones of consumption.

These various contradictory factors are sufficient indication of the long-term uncertainties attaching to the cost of crude oil supplies.

2. Natural gas [1]

If natural gas were available in sufficient quantities it could cover almost one-third of energy needs. However, from the known reserves in the territory of the Community or on the Continental Shelf, availability in 1985 cannot be expected to exceed 240 000 million m^3. [2]

Increasing quantities of gas will have to be imported in excess of indigenous availability to meet demand. On present information these imports could reach 23 000 million m^3 a year before 1980.

Natural gas is a relatively rare form of energy which costs less to produce than crude oil; its price tends to come into line with those of oil products which it can replace (principally medium and light fuel oils).

In general, free-at-frontier prices of imported gas are higher than those of indigenous gas. This applies particularly to liquified gas, which needs a high degree of supporting capital investment and involves a complex technology. Transportation by pipeline is simpler but also requires large amounts of capital.

As an indication, prices in long-term contracts were as follows in 1970 (in $ per tce):

— Dutch gas (free at frontier)	9.1/11.2
— North African gas (cif plus regasification)	11.9/14
— USSR gas (free at frontier)	9.8/11.6

The outlook for Community production beyond 1980 depends on the size of any new discoveries which are made, particularly on the Continental Shelf.

So far as imports are concerned, the considerable reserves in North Africa, the USSR and the Middle East offer possibilities for major expansion. The international natural gas market does not escape the effects of some of the difficulties which affect the oil

[1] See "Medium-term forecasts and guidelines for Community gas supplies".
[2] At 8 400 kcal per m^3.

market, due in particular to the increasing demand trends which are emerging. As in the case of oil, Japan and the United States will be seeking to buy gas from some of the main potential suppliers of the Community.

Already a rising trend in natural gas prices can be observed. For Dutch gas, representing over half of the Community's internal production, the price link with fuel oil has recently been reinforced. The most recent contracts for Algerian LNG, covering gas deliveries starting between 1975 and 1980, have been concluded at fob prices which are about one-third above present levels. Taking into account the increasing costs of methane tankers, the delivered price is thus increased by $ 2.8-4.9 per tce.

These prices are comparable to the 1975 oil price levels which will result from the Teheran and Tripoli agreements.

In present circumstances there is thus every reason to believe that prices of natural gas will continue to be influenced by those of the oil products which it can replace. One cannot rule out the possibility of natural gas prices being forced above this parity if demand should significantly exceed availability.

3. Coal [1]

The contraction of Community coal production will no doubt be at a slower rate than that which would be dictated by the underlying economics of supply alone; it will be mainly determined by the political decisions which are taken on production.

Taking into account coking coal requirements and the decline in the consumption of steam coal, and on the basis of present price levels (average revenue of the coal industry in 1971: app. $ 20 per tce; price of fuel oil net of tax: $ 12-14 per tce), the hypothesis can be advanced that coal production in 1985 will not significantly exceed 100 million tonnes. This hypothesis is based on prospects of rationalization and productivity improvements on the one hand and increasing costs on the other, these factors tending to neutralize each other.

The Community coal industry would in the first instance ensure the satisfaction of coking coal requirements. [1] Quantities of steam coal produced alongside this product could be sold to power stations if they were offered at competitive prices and assuming the availability of the necessary coal-fired or dual-fired capacity. On this point it should be noted that the Community's coal contribution to the flexibility of power station supply patterns is limited by the structure of the equipment.

Taking into account the decisive role of fuel oil prices, coal imported at similar price levels could play an increasing part in covering power station requirements. This could happen provided that imported coal meets the quality criteria which will result from the need to protect the environment, and that sufficient price stability is offered to compensate for diminished flexibility of utilization.

[1] Coking coal is a special case to the extent that it covers specific requirements outside the field of competition among energy types. The commercial conditions for imports are therefore not dealt with here.

However, the possibility of increased imports of steam coal acting as a price regulator should not be overstated. Even if in certain cases favourable production and transportation costs secure a competitive position for steam coal in the Community's coastal power stations, the price of oil per calorie remains the rule for fixing the price of imported coal. Nevertheless, should the delivered price of imported coal fall below the price of fuel oil to the consumer, the former will have a restraining influence on the latter.

World trade in steam coal has until now been relatively limited, but will tend to increase because of the exploitation of new reserves, notably in Australia, Canada, South Africa and Poland. The expansion of supplies depends on the creation of mining, land transport and port capacities. It is difficult to give any indications concerning the prices at which these coals might be offered.

The volume of world coal reserves might make it possible to obtain larger quantities of imported steam coal than the 30-40 million tce which represent a reasonable hypothesis for 1985. However, a significant increase in steam coal imports could not be attained without price increases. Moreover, if a higher level of imports were required in 1985 the necessary action would have to be taken at relatively short notice.

4. Nuclear Energy [1]

Nuclear energy can reduce the dependence of the Community on imported fossil fuels, particularly oil. It is thus not only a diversification factor capable of increasing security of energy supply; it can also exert pressure on the prices of competing energy types since it will henceforth always, at the load diagram base, be the cheapest means of generating electricity.

From the point of view of security of supply uranium has certain advantages in that it can be treated as an indigenous energy source, although Community reserves, while not negligible, are scarcely extensive. Uranium reserves are widely distributed throughout the world; deposits are abundant and generally located in regions where continuity of supply is sufficiently assured. Uranium's energy potential per unit of weight is considerable, reducing transport problems and costs and facilitating storage.

At present, world availability of natural uranium far exceeds demand, and between now and 1985 there should be no problem in obtaining supplies sufficient for Community requirements.

The Community is at present entirely dependent on imports, and in practice on a single source, for its supplies of enriched uranium. Although the short-term availability prospects are satisfactory, this will not apply beyond the present decade. A comparison of cumulative world requirements with the cumulative production from enrichment plants now working or planned—mainly in North America—shows that after a period around 1980 production will be insufficient to meet demand.

[1] See "Second illustrative nuclear programme".

A solution to this problem will have to be found before 1974 so that utilities ordering nuclear power stations for the time in question can be assured of sufficient fuel supplies. The creation of an enrichment capacity within the Community would make a fundamental contribution to achieving the objectives envisaged for nuclear production, and would allow Community industry to carry on all activities associated with the fuel cycle.

Until about 1980 supplies of plutonium will be limited, but thereafter progressively larger quantities will be obtainable, which could be recycled in light-water reactors and reduce the requirement for enriched uranium, provided that non-member countries with energy shortages do not bid for Community plutonium and divert it from this application.

Electricity can already be produced from nuclear energy at a lower cost than from a conventional thermal station working in comparable conditions. Unlike electricity generated from fossil fuels, however, most of the cost of nuclear electricity is due to capital investment. In the longer term, the experience acquired by European construction concerns should bring about a relative reduction in capital costs; however, if the reduction is to be significant, it is necessary to achieve both a greater degree of standardization in the range of reactor types offered, and to spread the orders for each type more, since the effects of series production are enhanced by widening the market.

Investment decisions taken up to the present time have determined the nuclear capacity which will be in service towards 1977 if all the stations which have been planned are set up and working at that time. Thereafter, the scale of application of nuclear energy [1] should increase to a level of 130 GWe in 1985. Taking into account the stations which will be operational by 1977, a total of 150 GWe could therefore be based on nuclear capacity in 1985.

In view of the foreseeable pattern of development, the second illustrative programme has set a target of a minimum installed capacity of 100 GWe by 1985.

The Community's industrial capacity is such that this amount can be considerably exceeded, since even at this stage the components manufacturers' production capacity is far from being absorbed. A margin of flexibility therefore exists which would permit the industry to respond to any speeding-up of the nuclear plant construction programme.

[1] This scale of application corresponds to the increase in the total number of power stations which are termed "competitive", i.e., for which investment choices are based on the costs (including investment) of the different energy types available. Excluded from this "competitive" range are hydro-electric stations, "peaklopping" stations and stations using fuels with special characteristcs (lignite, derived gases, etc.).

III — PROBLEMS OF ENERGY POLICY

1. Structure of demand

The prospects for the development of demand as described in Chapter 1 suggest a pattern for the future division of the market between the different kinds of primary energy. This pattern appears likely in view of the structural changes which will take place in the main sectors of consumption. It is based on the assumption that the lowest average cost will be sought in the competitive sector, having regard to the rigidities and restrictions affecting certain sectors of demand. It is also assumed that the relationships between the prices of the different competing forms of energy will not change radically from what they are at present.

In 1985, total needs [1] (2 000 million tce) will be met as follows: 2 % by lignite, 7 % by coal, 11 % by electricity, 15 % by natural gas and 65 % by oil.

A conservative estimate of the relative position of indigenous fuel in this set-up suggests that the Community's degree of dependence on energy supplies will continue to rise over the next ten years and will have increased from 67 % in 1970 to 70 % in 1980. No change in this trend can be hoped for until around 1985, when, through the attainment of the target set for nuclear energy by the "Second Illustrative Programme", the degree of dependence may begin to diminish.

Breakdown of demand by source of energy (1970-85)

	Actuals 1970			Prospects 1985		
	'000 000 tce	%	'000 000 tpe	'000 000 tce	%	'000 000 tpe
Coal	199	20	139	137	7	96
Lignite	34	3	24	37	2	26
Natural gas	73	8	51	295	15	207
Hydro-electric energy	46	5	32	47	2	33
Nuclear energy	4	—	3	175	9	123
Oil	617	64	432	1 304	65	912
Total needs	973	100	681	1 995	100	1 397

While stress must be laid on the risks inherent in depending on external sources for energy supplies, autarchy must be ruled out as an objective for energy policy. For energy, as for all other forms of economic activity, the Community can only plan its

[1] The demand for energy for purposes other than electricity generation and as a source material will rise to 155 million tce in 1985 and is included in total energy needs.

policies in terms of an expansion of international trade. The only restrictions that can be imposed on this policy are those dictated by considerations of security, necessitated to a greater or a lesser extent by external circumstances as observed at the present time.

2. Oil: the key element in supplies

Even in the field in which different sources of energy are competing, the market has only limited flexibility. The labour force and the equipment in use in each energy sector impose limits on the short-term changes that can be made.

This characteristic seems likely to persist in the foreseeable future. An increase in the cost of oil supplies will not, therefore, entail a corresponding decrease in consumption and, whatever happens, this source of energy will probably still have to meet more than half the total energy needs between now and 1985 and at 900 million tons of crude oil (65 % of total energy requirements) will still be the most prominent feature of energy supplies to the Community at that date.

All the same, it should be emphasized that, in spite of the considerable increase in the volume of demand, this situation will itself constitute an improvement, or at least a levelling-out, in comparison with the situation in the next five to ten years, which looks like being a period which will have to be weathered before the Community can gradually break free from its excessive dependence on imported oil. This stabilization will be based, firstly on oil supplies from "reliable" areas, and then on the relative amount of natural gas produced within the Community or imported from non-member countries. These imports, whilst not reducing dependence on outside sources, will have the advantage of spreading the risks involved. The other factor of stabilization will be nuclear energy, which will not start to make its weight felt until after 1980.

For the Community, therefore, the basic energy policy question to be solved between now and 1985 is that of coming through this period of transition, i.e., obtaining its supplies of oil on the best terms possible, since in any event oil will have to cover the greater part of the Community's energy needs.

Thus, without minimizing the importance of particular problems in the other fields of energy, or of the policies necessary to solve these problems, it seems clear that oil policy is the key issue as regards energy policy in the Community. In the following pages the problems relating to other sources of energy will therefore only be considered to the extent that they have a bearing on the oil question.

3. Two possible lines of development in the oil market

In view of the uncertainties affecting oil supply conditions, consideration must be given to the situations to which different patterns of development may lead. The many hypotheses that can be built up on the basis of the factors at work can be reduced in practical terms to two cases; on one hand, a stable market with a certain surplus of

availabilities and, on the other hand, a market in which prices will rise appreciably as supplies become short.

(i) *First case: A stable market*

The first case to be considered is that in which competition continues between oil from different sources as at present. The price of oil would follow approximately the same lines as the general movement of world prices, with adjustments, where necessary, to increases in costs and allowance for the relative depreciation of the royalties and taxes levied by the producer countries.

In these circumstances the price of crude oil in 1985 could be in line with the trend triggered off by the Teheran and Tripoli agreements. In view of the foreseeable increases in costs, the relationship between the prices of other forms of energy and those of competing oil products would be of the same order as they are at present and oil would maintain its role as a guide to average energy prices.

Demand would break down in accordance with the scheme shown above, which in particular would lead to the achievement of the nuclear energy target of 100 GWe installed capacity in 1985, the persistence of a certain contraction in the Community coal industry—which nevertheless would be unable to do without government subsidies—and a moderate increase in imports of coal from non-member countries. The exploitation of present known reserves of natural gas in the Community would have levelled off and the only imports would be those under contracts and declarations of intent which have been concluded at the time of writing.

It has been suggested above that oil would retain its leading part in determining the level of prices of competitive forms of energy, which would show variations from the price of oil of the same order that they do now. The general scheme of prices would therefore follow the same pattern as oil, namely one of moderate increases. However, if one takes the price of oil as a constant in order to calculate the average supply cost it seems that the price structure in 1985 might be more favourable than in 1970, through a decline in the proportion of coal and the increasing importance of nuclear energy.

(ii) *Second case: Large increases in oil prices*

Another possibility is one in which factors making for rigidities in the availability of oil supplies become preponderant, leading to sharper price rises. This would be the case, for example, if production were deliberately restricted or if investment in oil prospecting were not maintained at an adequate level.

Such an escalation in prices could profoundly modify the structure of energy demand in the Community if it reached the stage of changing the relationship between the price of oil and the costs of competing forms of energy:

(a) at the worst, oil consumption would be concentrated mainly on specific uses, i.e., for motor fuel and for certain applications as a raw material. Consumption of liquid fuels would be limited roughly to the amount inevitably produced as a by-product of refining the oil used for such specific purposes. The volume and

structure of demand for crude oil would therefore be appreciably different from the first case we discussed;

(b) prospects for the development of nuclear energy would be more favourable. It might meet a larger proportion of electricity demand and even be extended to other uses;

(c) some reserves of natural gas in the Community which are at present considered not commercially exploitable might become exploitable and the search for hydrocarbons in the Community (including the new member states' territories and the Continental Shelf) would be stimulated. Imports of gas from non-member countries might reach a very high level; even natural gas located in remote regions would have a lower delivered price than the oil reference price;

(d) the competitiveness of the Community coal industry would be improved, and the additional revenue which it would obtain would make at least part, if not all, production and sales subsidies unnecessary but would not lighten its charges incurred in the past. In this context production would not be much more than 100 million tons, but it would remain to be seen whether inevitable increases in the costs of production would not cancel out the increases in revenue. In any case a coal output of the same order as at present could not be maintained without subsidizing a proportion of coal production;

(e) demand for coal from non-member countries could expand markedly. Account must be taken of the relatively long period required for supplies to become available and of the price increases which would be bound to result, particularly in a situation in which the new aspect of the oil market might give rise to a world shortage of energy.

There are limits, however, to possible increases in the price of oil.

On the one hand, North America possesses substantial reserves of bituminous shales and sands from which considerable quantities of oil could be obtained. The cost of exploiting these shales and sands is about twice (per ton of oil produced) the present price of Middle East crude delivered US. This figure sets a ceiling which oil prices could not exceed, at least for that element of consumption where there is no substitute for oil, i.e., motor fuels and the minimum quantity of products involved in refining.

Furthermore, the possibility of recourse to imports of steam coal sets another limit to rises in oil prices. Steam coal is already available in some Community countries at prices lower than those of fuel oil, including taxes.

These two potential competitors (oil from shale and sands, and steam coal) would not have an immediate restraining effect on the rise in oil prices. Time would be required to make the investments needed to create an adequate supply.

But if the possibility of a sharp increase in oil prices linked with diminished flexibility of supply were to become real, it is certain that oil consumption would rapidly cease to expand and might even decrease to a large extent after a few years as large consumers changed to other sources of energy. Such a development would not be in the interests

of either the consuming or the producing countries. The former would be obliged to pay more for energy that they cannot do without. The latter would risk losing a large part of their market and thus depriving themselves, perhaps once and for all, of the financial resources they most need to launch their economic development.

4. Restrictions on security of supply

Even if the second possibility considered has some exaggerated characteristics, it underlines the risks inherent in changes that are taking place in the structure of the world oil market. If competition between oil from different sources were no longer to be possible, powerful disturbances could affect the whole energy market, if not the world economy.

There are good reasons for hoping that these structural changes will take place in an ordered way without entailing such serious consequences. But there are reasons for concern until a genuine long-term stability is achieved, because the changes that are taking place involve the danger of tensions in varying degrees that might even result in the temporary interruption of some supplies. Some of or all the oil suppliers might be tempted by economic conditions to make and enforce fresh demands.

We are therefore confronted with two aspects of the problem presented by security of supply, as regards not only oil but also other forms of imported energy.

On the one hand, with a market less flexible than in the past, efforts must be made to invest it with more flexibility so as to ensure long-term supply conditions which are favourable from the point of view of both price and stability while paying due regard to the legitimate interests of the countries possessing the resources to kindle the demand. It is therefore necessary to act in such a way that in 1985 the situation will resemble as closely as possible the first case examined in the preceding paragraph (C 1.).

Furthermore, it is necessary to guarantee regular and sufficient supplies whatever the structure of the market. Various measures can be put in hand to reduce the risk of interruptions in supply or to limit their effects: diversification of sources of supply, the creation of emergency stocks, keeping reserves of production and transport facilities, etc. Arrangements need to be made on these lines which will operate permanently as long as the market is seen not to be sufficiently stable. The expenses involved must be considered as a part of the costs of imported energy and must be adjusted in proportion to the risks involved.

IV — MEANS OF ACTION

Long-term security of supply could be improved by various means, among which policy choices will have to be made.

(i) Under any circumstances, *more rational utilization of energy* would make it possible to reduce demand and thus avoid accentuating the pressure on the market which will result from the growth in world needs. However, for several categories of use, technical constraints severely limit the improvements which can be made. Moreover, there is the problem of deciding what measures can be taken to encourage more rational use of energy without impeding the consumer's ability to obtain the fuel which best suits his own needs.

(ii) Primary energy *stockpiling* not only provides a remedy for the direct effects of temporary interruptions in petroleum supply, but can also, to a certain extent, contribute to a longer-term easing of the situation. The existence of substantial stocks would make it possible, for example, to accept deliberately and for a fairly long period the severance of certain channels of supply in the event of highly disadvantageous price conditions suddenly being attached to them. The underground storage of a further month's consumption would cost $ 0.2-0.3 per tonne of oil consumed, a fairly modest cost compared with the price increases which could be expected.

However, some time would elapse before stocks could be built up appreciably above the 90 days' consumption objective which the Commission proposes for 1975, partly because of the substantial investment required and partly because of the need to try to obtain the necessary quantities of oil under favourable conditions.

(iii) *The diversification of sources of supply* increases both short- and long-term security, the former by increasing the number of options available, the latter by reducing the danger that individual producers might succeed in dominating the market.

In this context, North Sea oil production, although relatively modest on present information (100-150 million tonnes a year towards 1985) will appreciably increase the proportion of "reliable" oil within the total supplies.

(iv) The level of Community coal production for "thermal" applications will depend essentially on the extent of which support is provided by public authorities, taking into account expected increases in costs, particularly wages. Clear guidelines in this sphere would allow consumers, and in particular the electricity producers, to adapt their plant and fuel supply policies accordingly. But short of a complete reversal of the price relationship with the reference fuel—precisely the situation which it is sought to avoid—it is not to be expected that present levels of production will be maintained in the long term. Having regard to its special characteristics, coal production would make only a limited contribution to long-term security of supply for power stations.

(v) *Imports of steam coal* have so far been limited in quantity. World reserves are very large and several countries are potentially in a position to export coal to Europe, but transport costs will prevent these coals from being competitive with oil and natural gas.

(vi) There is always the possibility that this situation might change with the development of new production and transport equipment in the producing countries, and provided that increases in production and transport costs do not match the rate at which oil prices rise.

With an appropriate policy, the use or additional quantities of imported steam coal in power stations would reduce demand for oil.

(vii) Community *natural gas* production will certainly contribute to reduce dependence on oil, but in future a policy more attuned to resource conservation will become necessary and, all other things being equal, only a limited increase can be expected in the rate of extraction from known indigenous reserves. What can be extracted from the North Sea is mostly likely to be used by the new members of the Community. But, looking further ahead, an increase in exploration in the Community might perhaps produce an increase in the contribution of natural gas from internal sources. Large quantities of natural gas are available in the Soviet Union, North Africa and the Middle East. Community importers have already contracted supplies from the first two of these regions, which over the next few years will also be supplying gas to even more distant destinations, such as Japan and the United States.

The procurement of increased supplies from these external sources would require considerable capital investment in processing and transport equipment (liquefaction installations, tankers, pipelines, etc.).

Replacement of oil by natural gas from non-member countries would doubtless not reduce dependence on imported energy, but it would afford the advantage of greater diversification of supply sources.

(viii) The *nuclear* industry's objective for 1985 is an installed power station capacity of 100 GWe. Achieving a substantially higher figure woud make it possible to reduce, as early as 1980, fuel oil requirements for electricity production.

This speeding-up of the nuclear equipment programme would have an effect that would subsequently mean an even more rapid reduction in oil requirements.

In any case, the rate of development of nuclear energy will depend on the extent to which certain conditions are satisfied:

(a) liberalization of markets, restructuring of the construction industry and harmonization of standards and of construction specifications;

(b) speeding the procedure for authorizing the construction and use of plants;

(c) reserving sites, strengthening the links for the pooling of reserves;

(d) guarantees of availability of fuel, particularly enriched uranium, present plans for the supply of which are based on the minimum objective mentioned above.

B - Necessary progress in community energy policy

(Communication from the Commission to the Council forwarded on 13 October 1972)

INTRODUCTION

On 18 December 1968, the Commission submitted the "First Guidelines for a Community Energy Policy" to the other organs and institutions of the European Communities and to the various interested parties among the general public. It thus provided a framework, still valid, for action on energy policy.

Since then, and despite all difficulties, there has been a progressive implementation of the Community energy policy has been effected. This has been made possible by cooperation with Parliament, the Council and the Community advisory bodies, and by continuous discussion with all the business and social sectors concerned. This progress has been reflected in specific Council decisions. At the same time numerous information and consultation procedures have been established which have been equally effective in facilitating the necessary control over developments in the energy field.

Since 1969, however, the energy policy context has altered considerably. The following are just the main factors in this highly complex process:

— The changing attitude of the energy-exporting countries, as clearly evidenced by the Teheran and Tripoli Agreements in early 1970.

— The current debate in all the industrial countries on how to improve the quality of life, which has found its first practical and effective expression in efforts to achieve adequate environmental protection.

— The clear emergence of a sellers' market for most energy products, resulting in changed cost and price conceptions among all concerned.

— The imminent enlargement of the Community, which will have the effect of altering both the pattern of the energy sector and ideas on energy policy.

— The working-out and rapid implementation in the large extra-Community consumer regions of a supply strategy which, moreover, is closely related to the foreign policies of the countries concerned.

In the other industrial nations too a lively discussion is in progress on the long-term satisfaction of energy needs, which is generally admitted to be an urgent problem. In the USA, Japan, and also Eastern Europe, decisions have been made on this matter which the Community will have to take into account one way or another. Energy supply problems are today so largely world problems that attempts to solve them at the national level appear doomed in advance. But in order to protect our own interests effectively, even Community-level decisions require constant attention to what is happening in other countries.

An analysis of the factors outlined above, which have dominated developments in the recent past as they will those in the years ahead, provides in the first place remarkable confirmation of the basic arguments in "First Guidelines".

At the same time, new trends in the energy economy will inevitably lead to shifts of emphases in energy policy. To this extent "First Guidelines" need to be updated and amplified.

In the first place, it should be clearly realised that the role of the public authorities on the Community energy market needs to be strengthened, albeit without endangering the unity of the market. The growing economic strength of a few undertakings and the widely perceptible trends towards horizontal and vertical integration, call for increased vigilance on the part of the Commission, since a balanced and competitive industrial structure is now, as ever, in the interests of a large consumer region such as the Community. Nor can basic problems of adequate investment in the energy sector be solved by the operation of market forces alone. This applies both to the satisfaction of the vast capital requirements (and hence, inter alia, to the shaping of the prices of the various energy products) and to the increasingly difficult problems of siting major plants for the production, processing and distribution of energy.

Similarly the improvement of environmental protection is an objective which will oblige public authorities at national and Community level to intervene increasingly in the market process, either by laying down standards laws or by taxation measures. It will be particularly important in this field, however, to avoid theoretical preconceptions, and to advance in cooperation with all concerned towards the goals of adequate energy supplies and a high-quality environment.

Secondly, in framing the commercial, economic and cooperative aspects of its foreign policy the Community will have to pay more regard than hitherto to its increasing dependence on energy imports. The primary problem here is the supply of hydrocarbons and uranium, but one should not forget the capital transfers concerned, the size of which may affect both balances of payments in Western Europe and the future development of our capital market.

The guiding principle of the Community's foreign policy should be to regularize relationships as far as possible and secure maximum cooperation with all States and regions which have an interest in it. The aim must be through responsible cooperation on equal terms to create a climate of security for existing economic activities and freedom and encouragement for new ventures.

The prospects for primary energy requirements, the Second Illustrative Nuclear Energy Programme, and the medium-term forecasts and guidelines for the oil and gas sectors must also be seen against this political background. These were envisaged in "First Guidelines" and can now be presented. They will form an essential basis for the progressive implementation of a Community energy policy.

The forecasts and guidelines refer in general to the period up to 1985. They cannot take into account all the changes which will occur and which may already be having important effects during the reference period.

On the other hand, the characteristics of the energy sector, and in particular the medium-term investment structure, are such that decisions have continually to be taken the economic and social effects of which will often become apparent only after more than then years have elapsed, i.e., at a time on which the forward analysis cannot focus clearly.

These specific difficulties were for a long time the cause of a political vacuum in the energy sector. The unsatisfactory nature of this situation is now generally acknowledged.

But it would also be irresponsible to ignore the need for and possibilities offered by a medium-term energy policy because of the long-term risks inherent in exponential growth. Only such a policy can promote a strategy of balanced growth, environmental improvement and technological progress.

Against this background the Commission is presenting to the Council, the other institutions and organs of the European Communities, and those sectors of public opinion concerned the following communication, together with the document "The Problems and Resources of the Energy Policy for the Period 1975-85". Without prejudice to the special powers assigned to it under the Treaties, the Commission will from time to time make individual proposals to the Council, as recommended in this communication or already proposed in "First Guidelines", which continues to be the basis of the Community energy policy. The preparatory work on some of these proposals has already been started or completed; the proposals in question will shortly be presented to the Council.

The Commission hopes that in this way the implementation of the Community energy policy, i.e., essentially a supply policy, will proceed rapidly after the enlargement of the Community. This will entail the joint definition of a supply strategy and of all the requisite Community instruments.

The Commission is convinced that the Conference of Heads of State and Government could give a decisive stimulus to these efforts.

I — GENERAL PROPOSALS

The main problem for the Community in the field of energy lies in maintaining a regular, stable supply which will meet the demand in terms of both quality and quantity. In the future this problem will remain of major importance in the medium and long term.

The Community itself possesses only a relatively small percentage of the energy it consumes and participates only to a very small degree in the exploitation of energy resources elsewhere in the world. To a very large extent, therefore, it is dependent for its supplies on non-member countries and hence on the world market.

Whereas during the period 1960-70 there was a relative surplus of energy, the market in the future will be subject to more difficult conditions which would lead to major problems of supply at certain times and in certain areas. While various energy sources have for a long time been reserved for specific applications, it is now also probable that in the near future technical and economic requirements will favour an acceleration of substitution processes between various energy sources. This phenomenon will become evident throughout the world, where we shall witness new orientations and even sudden and radical changes in supply lines.

The energy market—both in the Community and world-wide—will therefore become more insecure than it has been in the past. The most difficult period may well be the next 10-15 years. In particular, additional petroleum imports required by the three great consumers—the USA, Japan and Western Europe—will in 1980 run to 1 300 million tons compared with 1970; this figure is so high that the question inevitably arises as to whether and how the available geological reserves can be discovered and exploited in time.

The Community's dependence on non-member countries will further increase in the near future. Imports of petroleum especially will be approximately 900 million tons in 1985, covering 65 % of total requirements.

In the short run there is little likelihood of this situation improving. However, an increase in natural gas and coal imports from non-member countries, combined with a certain speeding-up in the use of nuclear energy, could reduce the Community's oil requirements by about 5 % as from 1980; if other major oil consumers were to take similar action, the world market might become more flexible. Later, and particularly if a clear-cut decision to develop nuclear energy is taken, the reduction in oil requirements could be considerably larger and might increase rapidly.

Such strategy aimed at decreasing dependence on oil could, however, lessen the flexibility of the other energy sources, for which there would then be an increased demand. But these sources are subject to different supply conditions from oil, and even if the importation of coal and natural gas does not reduce dependence on imports as such, the nature of this dependence will nonetheless be changed for the better. As far as nuclear energy is concerned, its security of supply and its price characteristics make every possible acceleration of its development desirable. If the proportion of imports, which

are bound to continue to rise in absolute value at least unil the end of the century, can be levelled off as from 1980-85, the main credit will be due to nuclear energy.

Thus the future trend of Community energy supplies is subject to such risks and uncertainties as to call for great vigilance, and where necessary guidance, at Community level.

The Commission will periodically update, by supplementing them, scrutinizing them and adjusting them to the circumstances created by the enlargement of the Community, the forecasts and recommendations contained in "First Guidelines".

In order to improve knowledge of facts and problems and provide more accurate information about them, the Commission will also improve the information media at its disposal by forming closer and more direct relations with interested parties in the various sectors of energy both inside and outside the Community.

Public authorities have recently exerted an increasing influence on the energy sectors activities. In addition to the existing taxation laws and the direct and indirect measures dictated by the consumer countries' interests, there is the fact that the exporting countries are now increasingly taking over control by way of participation or nationalization.

The Community energy industry is dominated by public undertakings and large firms of international class whose capital is entirely or in part privately owned and whose decision-making centres usually lie outside the Community.

Furthermore a few large firms have for some time been expanding their activities; after originally operating mainly in the oil sector, they have turned to natural gas, and at the same time are acquiring interests in coal and nuclear energy. Some firms are therefore now emerging as "energy companies".

This widening of their activities naturally increases their influence and responsibility, and raises the question whether their way of regulating competition as between the various energy sources is really as much in the public interest as it might be. The energy firms are gigantic in size and few in number, and increasing intervention by the public authorities is gradually transforming this oligopolistic set-up. The private interest motive will therefore have very little scope in future, and will be unable to play its regulatory role as in the past.

The Commission takes the view that in addition to keeping a watch on conditions of competition the Community must be able to influence competitiveness necessary, while complying with the relevant Treaty provisions. The Commission has compiled a schedule of the Member States' provisions concerning the shaping of mineral oil prices, which will make it possible to detect and remedy distortions. It will prepare similar schedules for the other energy forms. It has also devised a procedure for the regular collection of information concerning the prices actually applied for the various energy forms, based on voluntary cooperation from firms at the various stages of production, marketing and consumption.

The next few years are expected to be difficult ones; weathering this period and finding long-term solutions will call for very considerable investments. The availability of very large amounts of capital is therefore a basic condition for a successful energy supply policy.

The Commission emphasizes the special relevance to the Community energy supply problem of adopting the legal form of "European Company", [1] and also of the proposals concerning the application of Joint Undertakings Status, [2] which would provide a suitable framework for the indispensable regrouping of activities. It again draws attention to the urgent need for a favourable decision on these proposals.

Independently of these general considerations, various developments give rise to particular concern and call for appropriate energy policy measures.

1. Environmental Protection

The desire to improve the quality of life finds expression in the energy sector in preoccupation with problems of pollution and environmental protection. While "First Guidelines" made it clear that a secure energy source is at the same time a cheap energy source, it is now perceived that the energy sources which are best from these standpoints —natural gas and nuclear energy— also entail the least threat to the environment.

But there are also immediate problems, particularly atmospheric pollution by sulphur compounds and vehicle emissions, temperature rises in watercourses or lakes due to coolant-water discharge from power plants, nuclear power plant safety and the storage of radio-active wastes.

These urgent problems must be solved in the general context of the environmental protection measures specified by the Commission in the principles and proposals set out in its communications to the Council dated 22 March 1972. [3]

The Commission considers that the following action is necessary:

Speedy solutions to the following specific environmental problems must be sought by laws or regulations, and by concerted action at Community level:

— Sulphur dioxide in emissions from fixed combustion plants.

— Vehicle emissions.

— Thermal discharge from power plants into surface waters.

— Possible environmental damage from the increasing number of nuclear power plants, both in the normal course of operation and in the event of accidents.

— The optimum conditions for the permanent storage of radio-active wastes.

Intensification of research on the combating of pollution and other nuisances associated with the use of particular energy sources.

[1] OJ C 124/1 of 10.10.1970.
[2] OJ C 106/2 of 23.10.1971, OJ C 107/15 25.10.1971.
[3] Communication from the Commission to the Council concerning an environmental protection for the European Communities (OJ C 52/1 of 26.5.1972).

2. Rational Use of Energy

The expected rise in costs will stimulate progress in the rational use of energy and thus play an appreciable part in alleviating problems of energy supply and environmental protection. The rational use of energy helps to conserve resources. This should be encouraged without relying on cost increases, especially the social cost of energy, to be included in consumer prices.

The Commission considers the following action necessary:

To promote the following aims in the Community by all appropriate measures and as speedily as possible:

— Recovery of residual heat produced by thermal conversion in district heating plants.

— Premature renewal of old thermal plants with a low utilization factor.

— Improved insulation of industrial furnaces.

— Thermal insulation of buildings or individual houses.

— Limitation of vehicle fuel consumption by appropriate techniques.

3. Scientific and technical research

Technical innovation could improve the energy supply position. For the next 10-15 years new techniques will be only one factor among others, but in the long run they will play a decisive part in easing market pressures and ensuring a better regional balance between demand and supply.

The scale of energy research in the US underlines its importance. Expenditure in this field will this year total $ 750 million and thus far exceed the corresponding European outlays; in this vital sector, therefore, the technological gap could widen even further.

In the Community, two forms of research must be intensified:

— Research leading to a better utilization factor in the production, conversion, transport, storage or use of energy.

— Research directed to discovering new energy sources, new deposits or new uses for already known deposits.

The Commission is of the opinion that the success of a common energy policy calls for concerted efforts by the Community in the field of scientific research. From a practical standpoint and subject to more detailed studies, certain areas seem to call for priority.

In Europe's present energy situation, nuclear energy is the form which must be encouraged. At present it is used mainly for the generation of electricity; it is therefore advisable first of all to look for new uses for electrical energy, e.g., the electric car. Nuclear energy can also be used for other purposes than electricity generation; consideration should be given, for example, to developing a new energy vector such as hydrogen. If nuclear energy is to become the dominant and perhaps in the long run the

almost exclusive energy source, then it is necessary to give attention to the supply of fissionable materials. Development of the fast-breeder technique and also study of the practical possibilities of achieving controlled thermonuclear fusion are therefore of particular importance.

Reference has already been made to the problem of permanent storage of radioactive wastes, which will be produced in considerable quantities when nuclerar energy is used on a large scale. Apart from the need for a concerted short-term policy in order to ensure that such storage is performed in the best possible technical and economic conditions, research on the improvement of the currently envisaged solutions is required.

Despite the use of nuclear energy, the search for new energy sources must continue, and it appears that as regards both uranium and hydrocarbons or other minerals, remote detection by aircraft or satellites could be a very promising technique.

Developments in the coal industry are leading to very large energy deposits remaining in the ground, particularly in the Community. It would therefore be very desirable to develop techniques for their exploitation in a form acceptable to the existing distribution and consumption structures.

The Commission considers the following action necessary:

A review of current research in the Community energy industry, followed by a study of the possibilities of cooperation with other countries.

In addition, as regards each of the foregoing subjects the following would be necessary:

— To evalute techniques as regards chances of succes, effort required and effects on the energy situation.

— To prepare, where appropriate, specific research programmes on the basis of the results of these pilot studies.

4. Relationships between the importing countries

Some inter-relationships exist between the importing countries as regards their energy supplies, as became evident during the tension on the coking coal market in 1970 due to the rapid increase in Japanese imports. These links will in future become much stronger, particularly if the US makes heavier demands on the world oil and natural gas markets. The massive influence of this very large consumer may be still further reinforced by the consequences of the decisions taken by the developing countries on economic and energy policy.

The Community's efforts to improve its supply structure will scarcely make any impression on the world market unless backed by similar measures in the other large consumer regions. Energy supplies are thus already a worldwide problem, and in future will be even more so. No country and no group of countries, however great its geographical, economic or political importance, can solve this problem alone.

The Commission considers the following action necessary:

To supplement the talks on energy questions which are to take place regularly in future with the United States by similar talks with Japan and other interested countries or groups of countries.

To improve the existing OECD procedure in order to provide better reciprocal information concerning both problems and proposed solutions, and to work out joint decisions on security and stockbuilding, which can also be applied by those countries outside the European area of the OECD.

5. The relations between exporting and importing countries

The Commission is of the opinion that the economies of the developing countries must be helped to get on their feet. This process will assume different forms in the various countries and depends in particular on the development of their natural resources and advantages.

The oil-exporting countries are well placed in this respect and have also recently become more conscious of their power to influence the market and thus acquire the resources they need for their economic and social development.

Europe is the main market for the most important of these countries' exportable products; these products are also of primary importance for Europe, so that we thus have a situation of mutual dependence. This complementarity of interests extends beyond the energy field.

The exporting countries are trying to diversify their economic activities in order to escape from exclusive dependence upon a single export. Furthermore, most of the large oil-producing countries are situated in areas relatively near to the Community—the Mediterranean and the Middle East; they should therefore have an interest in utilising Europe's economic capacities in the fields of commerce, economic cooperation, manpower, know-how, the capital market and tourism.

Economic and social cooperation between these two groups of countries in all areas of common interest, based on mutual advantage, could facilitate the industrial and economic development of the oil-producing areas and the attainment of a stable relationship between equal partners—a desirable goal.

Nor need this policy be limited to the oil-exporting countries; it also holds good for other products. In addition, some countries which possess considerable reserves of various energy sources appear capable of increasing their output and making an important contribution to the diversification of the Community's supplies, given financial or technical support. The areas concerned are primarily Eastern Europe, Central Africa and South America.

The increasing importance of the oil industry to the exporting and importing countries has prompted public authorities on both sides to assume greater responsibilities in this

field. The Commission is of the opinion, however, that the essential problem is to create a political framework in which industrial initiatives can develop satisfactorily.

The Commission considers the following action necessary:

To create a consultative procedure with the exporting countries permitting better reciprocal information and discussion; the Joint Committee provided for in the agreements between the Community and some of these countries could be used for this purpose.

At the same time to stimulate the sending of groups of industrialists from the Community to the exporting countries and vice-versa, in order to determine practical ways of economic cooperation.

To negotiate cooperation agreements which incorporate in particular the following points:

— An undertaking by the Community to promote the economic and social development of the exporting countries by the provision of technical and, where appropriate, financial assistance, and also by opening up markets for the industrial and agricultural products of these countries.

— An undertaking by the exporting countries and the Community to apply rules and guarantees yet to be worked out, to their enterprises commercial transactions and industrial investments.

II — PROPOSALS FOR THE INDIVIDUAL SECTORS

1. Oil

a) *General Problems*

The fundamental problem lies in the important part played by oil in energy supplies, and the related dependence of the Community and the whole of Western Europe on imports.

Admittedly there appears to be no danger of exhausting the world's geological reserves, even assuming continued rapid growth over the next twenty years. But the necessary resources must be discovered and tapped, and this calls for greatly increased investment. Since the political and economic structures of the exporting countries are changing rapidly, and average investment costs are tending steadily upwards, it is not certain that investments will be forthcoming on the scale which is essential to ensure the necessary export availabilities.

Apart from such investment problems, the present situation and the expected trend raise the question of security of supply, ie., regularity of deliveries. In the future even more than in the past, these will be threatened by more or less widespread interruptions, and these do not, of course, rule out local breakdowns. The position will depend upon the attitude of the exporting countries, who may, for example, decide to exploit the situation by limiting output and raising prices until such time as the development of other energy sources reduces the role of oil.

These circumstances are making the public authorities in the importing countries increasingly aware of their responsibilities, and call for a Community supply policy which must make it possible to ascertain by suitable procedures whether the attainment of the aims of the energy policy [1] is adequately ensured. Concern for long-term security must be given priority over a desire to make a quick profit from a favourable market.

b) *Specific Problems*

i) Reciprocal information

The two regulations approved by the Council concerning the notification of investment projects and hydrocarbons imports [2] will serve to provide information on the oil market. In addition, the information already available on current prices will be further expanded by regular and comprehensive surveys.

The importance which will be assumed by oil exploration on the continental shelf of the enlarged Community makes it essential for the Community to receive specific and more detailed information about the size of the reserves discovered (measured, indicated and inferred) and the technical and financial prospects for their exploitation.

[1] See "First Guidelines", page 35.
[2] Regulations (EEC) 1056/72, and 1055/72, 18.5.1972, OJ L 120/3 pp, 25.5.1972.

The Commission considers the following action necessary:

To provide for the regular dissemination in accordance with uniform criteria, of information on oil prospecting and exploitation in the Community.

ii) Unity of the Market

The implementation of a common oil supply policy calls for the greatest possible unification of the markets. Although their aims are not necessarily divergent, the Member States apply regulations in various fields which result in disparities. It is therefore important, over and above the application of the Treaty rules, to introduce by progressive stages uniform procedures for the whole Community.

The Commission, together with experts from the Member States, is studying national laws on the pipeline transport, refining and distribution of fuel. This work is preparatory to the implementation of the harmonization principles set out in "First Guidelines".

The Commission again draws attention to the directive which it proposed to the Council on 5 August 1968 [1] for the harmonization of safety rules governing oil transport by pipeline; it hopes that work on this directive may be resumed and speedily completed.

The Commission considers the following action necessary:

On the basis of the programme for removing technical barriers to trade, to harmonize in order of priority:

— Technical specifications for oil products.

— Safety rules and construction regulations for refineries and storage plants.

— Safety rules and construction regulations for filling stations.

To draw up Community rules for:

— Pipeline transport, with the aim of making it compulsory for pipelines of general interest from a Community standpoint to transport fuel on behalf of outsiders at non-discriminatory prices and on non-discriminatory conditions. [2]

— The constructions of filling stations, particularly on motor roads.

iii) Measures in the event of supply difficulties

The Community must take immediate measures to combat the damaging effects of interruptions of certain supply flows.

The Commission is of the opinion that measures in this field must be planned in the dual context of a stockbuilding policy and of general regulations.

The Commission considered the following action necessary:

To develop the Community stockbuilding policy further by:

[1] OJ C 123/6 of 26.11.1968.
[2] Proposal.

— Harmonization of the stockbuilding policies of the Member States (particularly their financial aspects) at Community level.

— Formation of Joint Undertakings for stockbuilding projects of Community interest, particularly in respect of underground storage.

— Study of the technical and financial problems inherent in a subsequent raising of the compulsory stocks level to 120 days.

To adopt, pursuant to Article 103 of the EEC Treaty, a directive obliging the Member States to pass laws and regulations enabling the entire Community to act jointly to cope with possible supply difficulties. [1]

iv) Investment and financing

These are very important problems, the solution of which is mainly a matter for the oil companies. Community action can nonetheless be helpful.

The first necessity is to introduce a common system of guarantees against economic and political risks for investment by Community undertakings in non-member countries.

Secondly, it is necessary to utilize the possibilities offered by Joint Undertaking statute [2] in order to introduce various measures (tax reliefs, granting by the Community of subsidies, investment guarantees and interest rebates) to encourage forms of investment which contribute to security of supplies.

The Commission also draws attention to its proposal (now under discussion) concerning the world profit principle, [3] the acceptance of which would be of particular benefit to the oil industry.

The Council regulation concerning the notification of investment projects should at last make it possible to facilitate cohesion of investment, and to avoid global or regional over- or under-investment in the fields of intra-Community transport, processing, storage and distribution of oil products. A similar procedure is required concerning investment in oil port installations, on which there should be prior consultation at Community level.

The Commission considers the following action necessary:

The creation of a suitable framework for ensuring cohesion at Community level of investments in oil-port installations.

v) Search for new supply sources

It is already apparent that the oil companies are directing some of their activities to areas in which, while there are few political uncertainties, prospecting is substantially more expensive than in the traditional production areas. Everything possible must be done to encourage this trend, which is in line with the aims of security and dispersion of supply sources.

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[1] Proposed directive.
[2] Proposed regulation OJ C 106/2 of 23.10.1971.
[3] OJ C 39/7 of 22.3.1969.

The Commission considers the following action necessary:

To stimulate major prospecting projects, particularly on the Continental shelf and in deep-sea waters, in particular by means of Joint Undertaking status.

The introduction of a Community system which, in return for an undertaking to produce and market for the benefit of the Community whatever oil may be discovered, embodies:

— Provisions for speeding up and securing widespread adoption of the granting of prospecting licences in areas of interest to the Community.

— Improvement of conditions for the granting of concessions in the context of harmonization at Community level.

— Adaptation of the taxation system in order to ensure neutrality or even advantages by comparison with tax laws in exporting countries.

— Abolition of the obligation to maintain emergency stocks.

vi) Common import system

One factor in a general supply policy must be an import policy reconciling as far as possible supply security requirements and low costs.

Such an import policy must take into account both the need to ensure dispersion of sources and the need to establish stable relationships with the non-member countries from which the Community obtains much of its oil supplies.

The Council regulation concerning hydrocarbon imports will make it possible to create a flexible procedure for consultation with the Member States and undertakings concerned, and hence to ensure the desired diversification of Community supply sources.

A common import policy will, however, also need to be based on other measures, particularly of commercial policy, in order to gradually attain the efficacity and coherence which it still lacks at Community level.

The Commission considers the following action necessary:

To liberalize imports of crude oil and oil products. [1] This Community system will be based on the general procedures [2] already approved by the Council, but will adapt them to the aims of oil supply policy.

To define common principles in order to ensure satisfactory coherence of the preferential trade agreements and the generalised preferences relating to oil products.

The Commission desires to emphasize that the implementation of a supply policy for hydrocarbons in accordance with the aims laid down in "First Guidelines" and the present communication to the Council will inevitably involve procedures for joint consultation with the Member States and the companies concerned so as to facilitate, where appropriate, the guidance of hydrocarbon supply policy at Community level.

[1] Proposed regulation.
[2] Regulation (EEC) 1025/70 of 25.5.1970, OJ L 124/6 of 8.6.1970.

The Commission intends to study this question and to draw up the requisite proposals as soon as possible.

2. Natural gas

a) *General Problems*

Natural gas has the advantage of being easy to use for a wide range of heating purposes, and also of causing little pollution. Thus it is being better suited than oil to the requirements of environmental protection.

It represents a dependable source of energy for the enlarged Community, with extensive reserves whcih will probably continue to increase over the next few years. The abundance of these reserves has produced a rapid increase in demand, which is causing some concern. If deliveries are based initially on Community reserves, the part played by natural gas in the Community's overall energy supply system will remain limited, but if large quantities are imported, then natural gas can make a larger contribution and bring about a corresponding reduction in dependence on oil products.

As with oil, so in the case of natural gas a joint policy must be viewed against the wider background of energy and industrial policies.

b) *Specific Problems*

i) Reciprocal information

The regulations concerning the notification of investment projects and hydrocarbon imports will ensure the provision of information on the natural gas market. It is also necessary to obtain accurate information concerning the Community's gas reserves (measured, indicated and inferred), intra-Community exchanges of natural gas, the import agreements concluded with non-member countries and also investment in prospecting.

The Commission considers the following action necessary:

To arrange for regular communication, in accordance with uniform criteria, of information concerning the natural gas industry.

ii) Unity of the market

In addition to the removal of any discrimination it is essential that the prospecting, transport and marketing of natural gas should not suffer from any technical or legal impediments.

The Commission considers the following action necessary:

To harmonize the safety and constructional standards for natural gas pipelines in accordance with the programme for the removal of technical barriers to trade.

To introduce Community regulations for gas-pipeline transport with the aim of making it compulsory for pipelines of general interest from a Community standpoint to be used to transport gas on behalf of outsiders at non-discriminatory prices and on non-discriminatory conditions. [1]

To replace, in respect of gas produced in the Community, without prejudice to the application of Article 34 of the EEC Treaty, the existing national pre-emption rights by a Community pre-emption right.

iii) Supply policy

The Community's foremost aim continues to be encourage prospecting activity on its territory and to ensure that the best use is made of intra-Community resources.

The application of Joint Undertaking status, the harmonization of concession arrangements and, possibly, the introduction of specific taxation measures can make prospecting in the Community more attractive. In addition, consideration could be given to the rational alignment of natural gas prices with those of other competitive energy sources.

A further aim is to encourage the development of those imports which will be required by the Community market on the likely assumption that intra-Community natural gas supplies prove insufficient. These imports are at present still marginal, and can be developed without engendering a comparable dependence to that on oil. For this purpose the gas undertakings would have to make long-term agreements concerning their requirements for the next fifteen or twenty years, under a procedure coordinated at Community level.

On top of this, advantage must be taken of the fact that natural gas is still an expanding industry in the Community to create coherent structures in the transport and storage fields so as to ensure flexibility of Community supplies.

The realisation of these aims presupposes an interchange of information between Community prospecting, transport and distribution undertakings. The Commission believes that a European association of these undertakings could facilitate this indispensable exhange of information.

The Commission considers the following action necessary:

To create a procedure for systematic back-up of prospecting in the Community.

To improve, in the context of a harmonization at Community level, the conditions governing the granting of concessions.

3. Coal

a) *General Problems*

Even taking a very long-term and worldwide view, there is no problem as regards physical availabilities. However, although some regions of the world may still be

[1] Proposal.

able to count on further development of their coal production and consumption, extracting conditions in the Community are such that coal can scarcely contribute to covering future increases in energy requirements.

The development of pit coal production in the Community continues to be conditioned by the decisions of the Member States and the Community institutions. These decisions not only derive from social and regional considerations, but also take into account the importance of this form of production for Community energy supplies. In these circumstances it is important to form a clear picture of the part which coal—Community and imported—will play in the Community's energy supplies.

The Commission considers the following action necessary:

To prepare medium-term guidelines for the coal sector.

b) *Specific Problems*

i) Aid policy

In view of its competitive position as compared with imported coal and other energy sources, Community coal will be unable to dispense with aid in the foreseeable future. Forms of aid differ in the various Member States, and it is necessary to achieve a better coordination of the national aid systems over and above the provisions of Decision 3/71/ECSC. [1]

In addition to the regional aspects underlying Decision 3/71/ECSC, considerations of energy policy and supply stability may prompt the maintenance of a higher production level, which of course will necessitate higher aid per ton. This applies in particular to coking coal, where the regularity and qualitative consistency of deliveries from Community sources are important factors in the Community steel industry's supply system.

The Commission considers the following action necessary:

To introduce as from 1 January 1973 a new aid system for the supply of coking coal and coke to the Community steel industry. [2]

To carry out at the appropriate time the necessary improvements to the general body of measures in favour of the coal industry.

ii) Storage

The Community's coal production is scarcely capable of following market fluctuations in demand; it is not flexible enough to be able to offset the effects of possible supply difficulties on the world energy market. Article 8 of Decision 3/71/ECSC already authorizes the granting of aid by the Member States to assist the formation and maintenance of pit-head stocks, and thus increase the elasticity of Community coal supplies. It would be advisable to make these provisions more general in character.

The Commission considers the following action necessary:

[1] OJ L 3/7 of 5.1.1971.
[2] Proposal.

To determine, within the scope of Decision 3/71/ECSC, specific joint provisions for the maintenance of Community coal stocks.

iii) Imports

The volume of coal imports depends essentially upon the cost of competitive forms of energy. In addition, the expansion of external coal purchases depends upon the availability of adequate quantities of the required qualities. It might also be necessary for Community importers, particularly the coking coal consumers, to participate financially in both exploitation and transport of the external resources.

Coal imports are still subject to restrictions in several Member States. The Commission is of the opinion that a coordinated import policy, coupled with measures for ensuring regular supplies, should make it possible to abolish these restrictions.

The Commission considers the following action necessary:

To set up by stages a coordinated coal import policy by concerting national policies and programmes in conjunction with the removal of the outstanding import restrictions.

To introduce for coal imports provisions on emergency stocks similar to those obtaining in the mineral oil sectors.

4. Electricity

a) *General problems*

The electricity sector is one of the most important primary energy consumers and secondary energy producers, and will play an increasing part in covering end-consumption. In addition, large quantities of capital are tied up for long periods in this sector.

In order to be able to meet the rapidly increasing demand in favourable economic conditions, it is necessary to commission ever-larger production units, thus leading to a progressive increase in reserve capacities, particularly where nuclear power plants are concerned, their reliability not yet being comparable with that of conventional power plants.

In addition, the present structures of the electricity economy in the Community limit the possibilities of installing and operating large units. In order to make the best use of investment, the interconnection between existing networks would have to be strenghtened, and the boundaries between them reviewed, in order to create more rational supply areas irrespective of the boundaries between Member States.

An effort must also be made to create conditions propitious to the optimum siting of production units, special regard being paid to consumption structures and also to the requirements of environmental protection.

The Commission considers the following action necessary:

To investigate the possibilities of improving the coordination of national policies and programmes for the development of the electricity economy, and to work out appropriate measures, particularly concerning the choice of sites and the interconnection of networks.

b) *Specific Problems*

i) The unity of the market

One basic condition for the harmonious development of the electricity industry is the establishment of the common market in equipment. The liberalization of markets and the intensification of trade within the Community call for the removal of technical barriers, which are due mainly to the differences in technical or safety regulations and standards, and also for harmonization of national regulations and administrative procedures concerning the siting, construction and operation of plants.

In all Member States there are undertakings which produce electricity for their own consumption and deliver their surpluses to the grid. It is advisable to harmonize the regulations concerning in the Member States so as to put an end to differences in the treatment of consumers supplying their own needs in comparable situations and to the resulting distortions of competition.

The price of electricity influences the choice of site and the competitive situation of undertakings with a high electricity consumption. The Commisison is of the opinion that the creation of a supply system governed by common rules would contribute to the optimum siting of these undertakings and the removal of distortions of competition.

The Commission considers the following action necessary:

To harmonize safety criteria and technical standards by pooling experience gained.

To harmonize national regulations and administrative procedures in the following fields:

— The siting, construction and operation of production and transport installations.

— The granting of concessions for the production, transport and distribution of electricity.

To draw up common regulations governing supply conditions for industrial consumers.

ii) Fuel supplies

The supply of fuel to thermal power plants ensures regular deliveries of electricity, and it would therefore be advisable to cushion cyclical or random fluctuations in supplies by the maintenance of stocks at power plants.

All energy sources can be used for electricity production, and the choices made in respect of power plants thus have their effects on the entire energy sector. A problem arises concerning natural gas, the use of which in power plants is liable, owing to the limited supplies available, to prejudice the development of applications better suited to its particular characteristics. Another problem is whether it is advisable to maintain, or under certain circumstances to develop, a coal consumption capacity in power plants.

The Commission considers the following action necessary:

To develop a policy for the building-up of fuel stocks at conventional thermal power plants.

To prepare guidelines for power plant's fuel supplies, and in this connection to examine under what conditions it would be possible to maintain or develop a coal consumption capacity.

5. Nuclear Energy

a) *General Problems*

It is generally recognized today that from the medium-term standpoint nuclear energy is one of the most important means of reducing dependence on imported oil; from a long-term standpoint it is the only genuine alternative to the fossil fuels. It is already a comparatively cheap and clean method of electricity production. In addition, it is an important factor in the diversification of supplies, as between both primary sources and their geographical origins. It is therefore important for the European industry to be able to construct reactors and carry out the fuel-cycle operations under favourable conditions. At the present moment, however, there are too many undertakings engaged in too many activities in the Community nuclear industry, with hardly any links between them. They have a low profitability factor, and depend in some measure on US light-water reactor technology.

In view of the prospects for the nuclear energy market, it is essential to make the Community industry competitive and put it in a position to cover demand by perfecting its own technology and developing advanced-reactor series.

The electricity producers, and the governments also where they are concerned, are determined to enable nuclear energy to develop as rapidly as possible. The aims of the Second Nuclear Energy Illustrative Programme spell this out for the Community.

One of the difficulties facing such development consists in the additional investments required for nuclear power plants as compared with conventional plants. The public authorities can temporarily facilitate financing, in anticipation that this problem loses significance through the growing reliability of the nuclear plants combined with the effects of a certain degree of standardization.

The existence of a volume of orders sufficient to permit the emergence of large undertakings, together with series manufacture and its associated advantages in the nuclear industry, presupposes the stimulation of export capacities by the offer of credit facilities comparable to those enjoyed by the US industry.

The Commission draws attention to its proposal to apply Article 172 (4) of the Euratom Treaty [1] and emphasizes the need to speed up discussion of this subject.

[1] OJ C 106/5 of 23.10.1971.

The Commission considers the following action necessary:

To make use of the Treaty provisions in order to stimulate the introduction of nuclear energy, and especially to increase the part played by the European Investment Bank, with the following aims:

— To facilitate the financing of the additional investments required for nuclear as compared with conventional power plants.

— To facilitate the financing of plants, especially in the field of electricity transport, the construction of which would further the switching of very-large-capacity nuclear power plants to the grid.

— To make it possible, by granting export credits on favourable terms, for the European equipment industry to develop its export potential.

b) *Specific Problems*

i) Unity of the market

To achieve the desired aim of opening up the market for electro-nuclear equipment, it will be necessary to supplement the proposals already made in connection with the electricity industry in order to remove certain impediments deriving in particular from the specific criteria and standards governing the design, construction and operation of nuclear power plants. These criteria and standards, which affect industrial safety, public health and environmental protection, would be identical in all Member States.

The Commission considers the following action necessary:

To secure better integration of the existing national and Community provisions into a common policy on nuclear power plant safety.

To determine, in cooperation with experts from the sectors concerned, the fields in which, in the light of technical progress, it is possible to harmonize the specific criteria and standards applying to the construction and operation of nuclear power plants and fuel cycle installations, and also the administrative procedure for granting permits and authorizations.

ii) Nuclear fuel supplies

Despite the rapid increase in demand, there is no likelihood of a worldwide shortage of uranium in the foreseeable future. Demand having hitherto been slight, research has lacked system and depth. There are good reasons for believing that new uranium-bearing areas, and deposits as yet untapped, will make it possible to meet the medium and long-term increase in demand at costs little higher than those prevailing at present. The Community will not, however, be able to cover its requirements from its indigenous reserves, and will have to enter world market.

In order to ensure a continuous supply of fuel for nuclear power plants, it will be necessary to take measures comparable with those proposed for the oil sector, so as to foster the development of Community natural uranium production as well as of the most reliable external sources.

As regards the supply of enriched uranium, the Commission draws attention to its proposal to the Council concerning the creation of enrichment capacities within the Community. [1] It would also be advisable for the Community to diversify its external sources and to improve supply conditions.

As regards the use of the plutonium produced in nuclear power plants, a concerted recycling policy would create more favourable economic conditions for the development of a plutonium industry and of a market for plutonium-containing fuel elements; it would help to avoid a technically and economically undesirable dispersion of small quantities of plutonium over too many recycling plants, each having different requirements.

Furthermore, the building-up of stocks of natural and enriched uranium would serve to ensure regular supplies and iron out market fluctuations.

The Commission considers the following action necessary:

To keep track of the development of natural uranium reserves and resources in the Community, and throughout the world, in relation to demand, and to examine what measures are necessary in order to ensure the development of new resources.

To give Community undertakings incentives to prospect for and produce natural uranium, particularly by encouraging the formation of Joint Undertakings, within the meaning of the Euratom Treaty, in which the Member States' uranium-mining undertakings would be merged.

To take, where necessary, the measures provided for in Articles 68 and 69 of the Euratom Treaty with regard to pricing practices.

To assist, particularly by means of financial help, the conclusion of an agreement between electricity producers so that certain reactors specialize in plutonium recycling, in order to speed up the development of this technique.

To build up within the Community commercial stocks of natural and enriched uranium.

[1] Document COM(72) 693 final of 23.6.1972.

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