

# COMMISSION OF THE EUROPEAN COMMUNITIES

COM(78) 613 final

Brussels, 16 November 1978

## ENERGY OBJECTIVES FOR 1990 AND PROGRAMMES OF THE MEMBER STATES

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(Communication from the Commission to the Council)

## S U M M A R Y

The examination of Member states' energy programmes shows that it is possible to achieve the energy policy objectives for 1985 which the Council laid down in December 1974. Nevertheless in certain sectors these objectives will not be able to be achieved without intensified efforts by Member states and the Community.

The prospects for the evolution of the world market up to 1990 indicate that it would be to the Community's advantage to follow a strategy designed to bring about the minimum of dependance on imported energy.

The assumptions which can be made today about the nature of the energy balance in 1990 show areas of weakness which must be remedied, and offer certain margins of flexibility which should be exploited.

Amongst the sectors in which it is possible to take action to improve the 1990 energy situation or to avoid increasing energy dependance and its economic and social consequences, the most critical - and hence those which must be considered priorities and on which the greatest effort must be brought to bear - are those of energy saving and of primary energy used for electricity production, i.e. coal and nuclear.

The Council is invited to consider these analyses and prospects. In the light of this discussion, the Commission will later submit formal proposals for the formulation of new energy policy objectives for 1990.

## INTRODUCTION

In its resolution of 17 December 1974 (1) on 1985 energy policy objectives, the Council approved the objective of reducing to 50 % the Community's dependence on imported energy and in particular stressed the greater utilization to be made of secure energy sources, the efforts which should be made to save energy and intensive recourse to Community energy resources.

The Council asked:

- the Member States to take account of these Community targets in drawing up their energy policies;
- the Commission to report periodically on progress made towards their achievement.

So far, the Commission has presented - in 1976 and 1977 - two reports analysing the energy programmes of the Member States, stressing, in particular, the shortcomings of these programmes as regards the pursuit of Community objectives.

The European Council held in Bremen on 6 and 7 July 1978 reaffirmed the Community's main energy objectives, namely: restriction of dependence on imported energy to 50 %, reduction of oil imports, optimum utilization of Community energy sources and stepping up of energy saving. Stress was also placed on the need to coordinate national energy programmes at Community level.

Four years after the setting of targets for 1985 and in the light of the information acquired since what has become known as the 1973 energy crisis, it is necessary to set new targets for 1990, taking account of the specific conditions applying in the various Member States, of economic prospects and of structural development.

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<sup>1</sup>OJ C 153 of 9 July 1975.

This communication has a twofold purpose. It is a third report to the Council on the implementation of the 1985 energy policy objectives. It also considers the aims which should be pursued between now and 1990. These will later be the subject of proposals to be made in the light of the discussions in the Council on this communication.

It is based on the forward figures and programmes which the Member States sent to the Commission in mid-1978 and which are the subject of a detailed analysis contained in a working paper, which the Commission will submit separately to the Council. Graphs 1-9 show for the Community and for each Member state an overall view of the period 1970-1990, according to these national programmes and forecasts.

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The following matters are covered:

- the present situation
- the implementation of the targets and current forecasts for 1985
- world prospects
- the problems of 1990
- the margins of uncertainty and choice in the 1990 balance
- the political options
- priorities for action.

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The Council is requested to:

discuss the analysis contained in this communication with a view to fixing specific targets for Community energy policy for 1990, for which the Commission will make proposals.

### The present situation

1. The review of the 1973-77 period looks fairly satisfactory (leaving aside the economic context) from the point of view of the energy policy targets for 1985 set by the Commission in the aftermath of the 1973 crisis: consumption is practically at the same level as in 1973, although economic activity has increased by 7%; the proportion of oil in overall consumption has fallen from 59 to 54% and dependence on imported energy from 63 to 56%.

2. However, there are certain negative features. For example, the production of some energy sources is not progressing as desired (continuing decline in coal, falling behind of nuclear programmes). As regards the level of consumption, the low level of economic activity exerted an influence at least equal to that of energy-saving measures.

3. The relative abundance of energy in the world at present gives misleading signals/ to the market since the long-term threats to supplies could be overlooked. The experience of the last few years shows that today, as in 1974, the Community must set itself long-term energy policy guidelines to give the market greater stability.

In aiming at the highest reasonable and possible degree of security of supply at the lowest reasonable and possible cost, such guidelines provide a foundation for economic policy (growth, employment, balance of payments, inflation). They will also have to fit in with the requirements of environmental protection.

### Attainment of targets and present forecasts for 1985

4. Generally speaking, the consumption and energy production levels initially forecast for 1985 will be reached only towards 1990. This lag is mainly due to lower economic growth forecasts than those used in 1974.

5. If we compare the present forecasts of the Member States for 1985 with those made in 1977, the following points stand out (see Table I and graph n° 10 in the Annex) :

- a 4% lower gross consumption figure (1.237 million toe as against 1.282 million), reflecting less favourable forecasts of economic activity and more optimistic prospects for energy saving;
- a slight decline in the output of natural gas (139/149 million toe as against 143/158 million);
- an appreciable reduction in the output of electricity by nuclear power stations (113 million toe as against 140 million, a figure which the Commission had already said last year was an optimistic forecast);
- a slight increase in other items (coal output + 3 million toe; oil output + 5 million toe; hydro-electricity, etc. + 3 million toe; oil imports + 3 million toe) which makes it possible to put oil imports in the 528/468 million toe bracket as against 550/485 million toe.

6. It is therefore possible:

- to attain a consumption level appreciably below that set as a target in 1974: the Member States' forecasts are based on a ratio of 0.85 between the average rate of growth of energy consumption and that of GDP;
- to diversify, though in a fairly limited manner (see Table II), external supply: the proportion of imports other than oil would rise from 5% in 1977 to 10% in 1985\*;
- that net imports of oil in 1985 will not exceed 500 million toe, provided the contributions made by coal and nuclear power attain the levels envisaged;
- that the rate of dependence on imported energy can be brought down to 50% (48/53%)\*.

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(\* ) For the purposes of this paper, nuclear energy is treated as wholly indigenous.

7. However, we feel bound to underline the fragility of some of the assumptions enabling us to reach these conclusions:

- Some Member States will experience a big increase in their oil consumption as compared with the present level: Ireland (+ 77% over the 1977-85 period), Netherlands (+ 70%), Italy (+ 38%) and Belgium (+ 21%).
- It is by no means certain that energy-saving measures in all Member states will be equal to the intentions declared and the aim pursued. At Community level, the forecast efforts in this field would mean a reduction of energy consumption per unit of GDP (at the 1976 prices and exchange rates) falling from index of 100 in 1977 to 95 in 1985. However, there would be a rise in Italy (101 in 1985), in the Netherlands (103), in Belgium (104) and in Ireland (118). (see Table III). In the cases of Italy and Ireland, it should be noted that the present level of consumption per head is the lowest in the Community and will remain so in spite of considerable progress. (See table III a)

Yet these are precisely the countries whose dependence on imported oil will increase and - with the exception of the Netherlands - whose programmes for public financing of energy saving are the weakest.

The countries which foresee a major reduction in energy consumption per unit of GDP, on the other hand, are those which are allocating the largest amounts of public money to energy-saving programmes: the Federal Republic of Germany, the United Kingdom, France and Denmark.

- It is unlikely that the capacities for coal consumption will be sufficient to absorb all the expected supplies - this mainly because of the unpromising prospects for the Community's iron and steel industry. Besides, a large proportion of the Community's coal output is likely to remain uncompetitive.
- The seven years which remain will probably not allow certain countries to make up the lag in the implementation of their nuclear programmes. The previous report on the attainment of the 1985 targets<sup>\*</sup> had already stressed that the figures given by the Member States would not be met. On 1 October 1978, a total of 72 GWe were in operation or under construction in the Community. Realism obliges us, therefore, to estimate that a maximum of 78 GWe (instead of the 85 GWe announced) will be available in 1985.

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\*COM/78/395 final.

- There is still uncertainty about the level which hydrocarbon production in the Community will reach.

Graph No. 10 in the Annex illustrates the development of each member state's programme up to 1985. It shows the difference in percentage terms between the programmes and forecasts of 1978 and 1977, for each of the main primary energy sources and for the whole.

In the future, in the process of examination aimed at assuring the achievement of Community objectives, it will be important to study such discrepancies.

### World prospects

8. World demand for energy (including Russia and China) was 6.2 billion tons of petrol equivalent (t.o.e.) in 1977, and is likely to increase to between 9.2 and 10.6 billion t.o.e. by 1990. This would represent an average annual growth of 3 to 4% for the period 1975 - 1990, compared with actual growth of 4.8% in the period 1960 - 1975.

Even assuming strong policies and large investment, the non-oil energy sources (solid fuels, gas, nuclear energy and renewable sources) are unlikely to contribute more than some 5.5 to 6.5 billion t.o.e., which represents a massive increase over the present level of about 3.5 billion t.o.e.

It would be unrealistic to assume a high level of growth and investment in non-oil sources at the same time as low economic growth. Therefore, if the estimates are correct, the demand for oil could increase to as much as 5 billion tons per year (100 m.b/d) compared with the present demand of 2.75 billion.

9. To meet a total demand of 5 billion tons, the OPEC countries would be asked to produce some 2.1 to 2.75 billion tons or 42/55 m.b/d (depending on the success in increasing oil production elsewhere). Present OPEC production is 1.6 billion tons (32 m.b/d) and it is prudent to assume that OPEC countries might not wish to increase this to more than 1.8 to 1.9 billion tons (36/38 m.b/d) by 1990. These figures indicate the risks of tension and of price increase which threaten the world oil market in the medium term.

A further important point is that most of the OPEC production increase suggested above would be required by the developing countries (including OPEC) themselves.



Under these circumstances, Community energy planning should be based on the assumption that we might not be able to purchase more than 450 to 475 million tons of OPEC oil in 1990 without exacerbating upward pressure on prices and some risk of insecurity of supply. To this can be added some 50 million tons from non-OPEC sources. It therefore appears prudent to retain a ceiling of 500 million tons as the Community objective for oil imports in 1990, recognising that this figure will have to be kept under review as the economic and energy situation develops.

10. Oil reserves, which had quadrupled in the previous 20 years, have not varied much since 1974. There have been some new discoveries recently (e.g. Mexico) but it is still not possible to estimate their extent precisely. For the longer term it will be necessary to take into account non-traditional oil resources (tar sands and bituminous shales, etc), but it is known that bringing them into production will be costly and take a long time.

11. It is true that, by contrast with the factors likely to create tension on the oil market in the long term, there are others which might lead to a more plentiful supply. But any assumption of a relaxed supply situation at the end of the 1980's is too uncertain to serve as a policy base for countries which, for years to come, will remain largely dependent on imported oil. The cost of adopting a cautious attitude must not of course imperil the achievement of broader economic social and environmental objectives, nor the maintenance of the competitive position of the Community. But it is certain that a rash optimism could easily lead to undesirable consequences in these various fields.

#### The problems in 1990

12. According to the Member States' forecasts, the energy balance for 1990 shows that the proportion covered by oil will be reduced to approximately 47% (52% in 1985) whilst that covered by oil imported from non-member countries will drop to 35-40% (1985 : 38-43%). The proportion accounted for by natural gas will be slightly lower than in 1985 (17%) whilst that covered by coal will remain unchanged (18%); but the share of nuclear (production of which will have almost doubled compared with 1985) will increase to 15% (see Table IV).

Dependence on net imports will remain unchanged as compared with 1985 (48 - 53% of gross consumption).

13. There has been a slight increase in the energy industries' investment programmes compared with forecasts for last year, but it is too slight to be significant (1.6% of GDP compared with 1.5% previously), and the total is still below the level forecast in 1976<sup>1</sup>.

There is evidence of redistribution between sectors, the share covered by the nuclear industry having increased from 24 to 27% (see Table V and Figure 11). The almost total absence of information on investment plans directed towards saving energy should be mentioned.

14. Several questions arise in connection with these prospects :

(a) Level of demand

Making more efficient use of energy and placing the accent on efforts to save energy could compensate for any deficit in supplies; this would often cost less than stimulating supply.

The above comments on energy consumption per unit of GDP in 1985 remain valid for 1990 although there is some indication that the situation in Italy should improve slightly (see Table III and paragraph 7).

(b) Supply structure

It is debatable whether it is possible to complete the ambitious nuclear programmes which were to increase nuclear capacity from 85 to 155 GWe between 1985 and 1990, when already it seems that the figure for 1985 will be difficult to achieve. This particularly concerns the large French, German and, above all, Italian programmes.

There is also the question of the Belgian programme reaching its ceiling after 1985 and the actual implementation of nuclear programmes in Ireland, Denmark and the Netherlands. All this emphasises the urgent need for action, at the level of the Member States and of the Community, to resolve the problems relating to the end of the fuel cycle (waste etc.) and to public information.

In general it must be stressed that what is involved by all the uncertainty over the nuclear programmes is the danger of higher oil consumption. Alternative solutions should be envisaged, e.g. improving the interconnections between systems, increased use of solid fuels.

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(1) 1.8% of GDP for the period 1976-85. Se Doc. COM(77) 395 final.

This raises the problem of coal production; its fixed nature in the short and medium term means that Community coal cannot be regarded as a factor making for flexibility. Decisions as to the level of production therefore have to be taken without delay; this implies further decisions by consumers (increase in the number of power stations, long-term contracts) and measures to make the coal industry competitive.

The supply of coal from non-member countries is generally more flexible. Nevertheless, substantial increases of imports from this source would not be possible without Community consumers making long-term commitments because, like our own industry, the coal industries of non-member countries have to take investment decisions with a relatively long lead time.

(c) Demand structure

The increasing proportion of consumption covered by electricity helps to reduce dependence on imported oil as long as the power is coal - or nuclear-based. However, there seems to be the greatest uncertainty over the development of these two sources of energy. The share of electricity should be increased only to the extent that construction of power stations is based on coal or nuclear. Oil-fired power stations with a total capacity of 24 GWe are due to come into production in the next two years; the decisions to build them were taken before the entry into force of the Directive limiting the use of oil in power stations<sup>1</sup>. Of this total capacity, 18 GWe will burn oil only, with an annual consumption of some 15 m toe a year. Strict application of the Council Directives limiting the use of hydrocarbons in power stations is essential.

The planned increase in oil consumption in power stations between 1977 and 1990 gives cause for concern, particularly in the case of Belgium (+ 21%), the Netherlands (+825%)<sup>2</sup>, Italy (+28%) and Ireland (+34%). The Netherlands is a special case because a large proportion of the additional oil burned in power stations will be replacing natural gas; otherwise, this country is planning an increased use of coal for electricity production.

Another important aspect of demand, which is not within the scope of energy policy, is the level and structure of industrial consumption : measures reinforcing the weight of the energy intensive sectors should be avoided.

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(1) OJ L 178/26 of 9 July 1975.

(2) From 0.8 m.toe in 1977 to 7.4 m.toe in 1990.

### Margins of uncertainty and choice

15. An attempt has been made to put a figure to the available margins of choice and the slippage that might occur from the Member States' forecasts. The figures below give an order of magnitude for each form of energy purely to show that, overall, there is a considerable degree of uncertainty and a sizeable margin for manoeuvre in respect of the balance for 1990.

#### (a) Energy supplies

It is relatively easy to identify the factors likely to cause the energy supply to fluctuate around the amount forecast in the Member States' programmes.

- In the case of coal, the forecast development of domestic and external supply implies, as already emphasised, long term commitments on the part of consumers; it implies in addition supplementary measures to improve the competitive position of some Community output.

Owing to the unfavourable prospects for the Community steel industry, a larger part of Community coal production must find other outlets particularly in power stations. The achievement of the national programmes would therefore imply an increase in the thermal uses of coal or, in the longer term, a development of new uses (gasification/and liquefaction). In the absence of a stronger coal policy, it is probable that the total possible outlets for coal will be 37 m.toe lower than member states' forecasts.

In power station use alone the shortfall could be 13 m. toe, owing partly to the uncompetitiveness of Community coal. Moreover, several decisions on the siting of power stations remain to be taken in the next few years with a view to attaining the coal consumption levels forecast by member states. The achievement of national programmes in this sector thus depends on two conditions : supplementary aid to non-competitive Community coal and the taking of decisions on time to increase coal burning power station capacity.

Some measures to help new techniques for coal use could form another possible element. By a package of strengthened policy measures the global shortfall in coal outlets in 1990 (37 m.toe) could be reduced to about 20 m.toe.

- As already stressed, where nuclear energy is concerned there is the possibility of a deficit arising out of difficulties in completing programmes. It could be of the order of 10 m.toe in 1985 and 30 m.toe in 1990.

- As any additional capacity in hydroelectric power that might be commissioned is at most equivalent to the variations in annual water supply, this item does not have to be taken into consideration.
- Even a very vigorous policy for developing renewable sources of energy would not make it possible to provide a major additional contribution by 1990\*.
- Where oil is concerned, by means of a policy combining incentives to prospecting and the spreading of production over a period, it should be possible in 1990 to maintain the 1985 domestic production level of 140 m toe which at present seems achievable (middle of the range in the programmes). This would give a margin of some 15 m toe in 1990.
- With natural gas several factors have to be taken into consideration - the possibility of further discoveries in the Community, the rate of production of existing sources, price levels, general economic activity, etc. Different combinations of various hypotheses as to domestic production and imports all lead to the same conclusion, namely that approximately 30 additional m toe could be available in 1990.

Taken as a whole, this analysis shows that even for 1990 the flexibility in internal supply is quite limited. So far as imports are concerned, coal and natural gas offer some room for manoeuvre which should be exploited.

#### (b) Energy demand

- The question of the economic growth rate is a major contributory factor to the general uncertainty. The average Community growth rate of 3.8% per year for the period 1978-1990, which is the result of the combined assumptions used as the bases for the energy programmes of the member States, is questionable. This rate is certainly modest from the point of view of the need to re-establish a

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\* The result would be different for the year 2 000, although even then most of the studies on the subject indicate that the proportion covered by new sources will not exceed 5% of total consumption at the end of the century, on present investment plans.

satisfactory level of employment. But the possibility of a lower growth rate, which could not fail to affect the level of demand for energy, should not be excluded.

A 1% variation in GDP either way in the period 1978-1990 would result in some 100 m toe more or less being consumed in the Community as a whole. The sensitivity of energy consumption to economic activity shows marked variations, from one member State to another, as shown in the graphs inset in the diagram tracing developments between 1970 and 1990 in each country. This sensitivity seems particularly great in countries such as Italy, Ireland and much less marked for Denmark.

- To aim deliberately for a lower rate of economic growth is not an acceptable way of obtaining energy savings. The problem is therefore one of decoupling growth in demand for energy from GDP growth as far as possible. Using existing technology it is certainly possible to save more energy than forecast in member States. The question to examine what is attainable in practice is one of making these additional savings acceptable from the social point of view (in as far as this would mean some changes in habits), from the economic point of view (in as far as this would imply a particular pricing and investments policy as well as in important restructuring of industry) and from the institutional point of view. Additional savings of the order of 100 m toe would not be unrealistic and would limit the growth in energy imports towards the end of the 1980s and beyond.

16. If we disregard the possibility of actual GDP being different from that in the basic assumptions, the balance of the positive and negative factors set out above comes to <sup>about</sup> 200 m.t.o.e., or 14% of the demand forecast for 1990 (see Table VI).

This figure breaks down into 10% attributable to the positive factors (7% energy savings, 3% additional supply) and 4% to the negative factors (shortfall in domestic production) likely to increase energy dependence.

17. As might be expected, the margin of manoeuvre for 1985 (2% more; 4% less) is of the same magnitude as a forecasting error. On the other hand, for 1990 appropriate measures might have a significant influence on the energy balance.

It seems that it is in the field of energy savings that there is the greatest scope for manoeuvre; they will help offset any shortfalls in supply and will not (like some forms of indigenous production) lose their competitiveness as a result of unforeseen events. Even if, contrary to all expectations, world oil prices fall in the long run, energy savings will still pay, because they will reduce the cost of imports and internal production. They will also have a positive effect on economic activities and employment, as well as on environmental matters, through a reduction in pollution.

#### Policy options

18. It is no longer feasible to base energy policy on the long-term assumption of abundant supplies at low prices. The political and economic risks which exist make security a central policy issue. However, on present assumptions, in fifteen years' time at least 50 % of Community energy consumption is still expected to be covered by imports from non-member countries. The future of the world market is therefore one of the key factors in Community energy policy.
  
19. An initial set of objectives for 1990 can be set in the light of the above factors. Externally, they will consist of:
  - (a) maintaining an overall limit on imports in view of the effects this will have on the Community's economic balance, and on the outlook on the energy market;
  - (b) further diversifying external supplies, in respect both of types of energy sources and of the geographical areas from which they are drawn. This raises the question of whether gas infrastructures should be developed to prevent delays in import programmes and what measures should be taken to guarantee security of nuclear fuel supplies from non-member countries);
  - (c) increasing stability of supply by intensifying the system of relations with energy-exporting countries and other importers, on the basis of a world approach enabling the Community to exert its full weight on world trade.
  - (d) contributing to the solution of world energy problems by cooperation with the developing countries within the framework of a global strategy.

20 . Internally, energy policy is a factor in balancing the Community's economy. Both economic growth and stability will be fostered by reducing dependence on imported energy by means of investment in production or by energy savings.

Some countries (e.g. Ireland and Italy) will have to invest heavily without seeing any appreciable reduction in their imports; they will have to invest in both energy and in the export sector in order to reduce the effect of energy imports on their balance of payments (see Table VII).

Energy investments in Belgium and Luxembourg and - to a lesser degree - in France are expected to be less than the Community average, while the cost of energy imports by these countries will remain high. The case of the Netherlands, where investment will also be below the Community average, is different in that its natural gas exports will partly offset the increase in oil imports; however, the pressure of net energy imports on the Dutch economy will increase sharply between now and 1990.

Denmark is noteworthy in that it plans only a small volume of investment in energy production but it hopes to keep energy imports below the Community average by means of a large-scale energy conservation programme. The United Kingdom is investing - and will continue to invest - heavily but will be rewarded by increasing internal production up to 1985. After 1985, the problem for the United Kingdom will be to continue to invest in order to maintain the level of production reached in 1985 and also no doubt to diversify, by making a greater call on nuclear energy.

The lack of detailed information on the investment plans of the Federal Republic of Germany makes a comparison with the other Member States impossible.

These differences in situation and policy, regarding energy investments and energy imports, constitute a factor for the imbalance of the Community economy overall. This can only be dealt with by closer coordination of national policies and by the greater and wider use of Community measures of investment support, e.g. ECSC and Euratom loans, the new Community loan facility, etc.



In addition the problem of differences between Member States may be eased by building up intra Community energy trade, and establishing the necessary infrastructure. Yet it seems so far as a distinction can be drawn from national forecasts between imports from third countries and from other Community countries - that, in several Member States, imports from other members as a part of total imports will decline.

#### Priorities for action

21. The present assessment of the main problems of Community energy supply, based on Member State's programmes for 1985 and 1990, highlights the need to decide priorities in the energy policy field.

In drawing up these priorities, it should be borne in mind that a large part of energy policy can be efficiently conducted at the national level given the necessary coordination.

In other cases, Community action will be necessary to reinforce or supplement national action, to put it in a common framework, and to ensure its coherence, as well as to strengthen the common market. In this respect, it should be emphasised that a common energy policy cannot be set up in one fell swoop but must be built up step by step through the adoption of specific measures. Work on Community energy policy should therefore concentrate during the coming months on the fields indicated in the paragraphs below. In this context, certain proposals awaiting Council decision (e.g. modification to the oil storage scheme, support for coal stocks) can no longer claim the same degree of priority as before.

22. Amongst the measures of sectoral nature which could be applied in order to improve the 1990 energy situation or to prevent increased dependence and its concomitant economic and social consequences, the priority areas are energy saving and primary energy sources used for electricity generation (i.e. coal and nuclear energy), as well as the development of conventional and new energy sources.

(a) Energy savings

- An essential element of energy saving policy is gradually to bring prices to conform with long term market trends;
- The intensification of effort especially in the industrial sector, including the combined production of heat and power, and in the building sector;
- Intensified efforts on more efficient energy use in transport;
- Development of statistical methods enabling an evaluation of measures to be introduced and the assessment of the effectiveness of established programmes.

(b) Solid fuels

- Increased efforts to promote their use in power stations and in industry;
- Measures to promote coal production.

(c) Nuclear

- Recovery of the slippage in the implementation of the nuclear construction programmes;
- Acceleration of efforts to solve the problem of nuclear waste;
- Vigorous pursuit of work on nuclear safety (reactors and fuel cycle, including transport) in order to facilitate authorisation procedures;
- Further work to keep open the fast breeder option.

(d) Development of new and conventional energy sources

- Maximum encouragement to prospecting (strategic exploration) and the development of new reserves;
- The use of new sources and new ways of using conventional fuels should be promoted so that they can, at the appropriate time and on satisfactory economic terms, replace conventional energies. Specific objectives should be fixed in the most promising sectors, e.g. domestic heating.

23. In addition, measures of a more general or "horizontal" nature should accompany the priority actions mentioned above :

(a) Research and development

- Greater co-ordination of Member States' R & D programmes and adoption of common programmes chosen with reference to the criteria in the Commission's communication "Common policy in the field of science and technology" (\*)

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(\*) COM(77)283 final

(b) Investment

- A strong effort to stimulate energy investment contributing to the achievement of common objectives, by helping their profitability and in ensuring their security within and outside the Community; in addition in reinforcing and expanding the use of Community measures for the support and promotion of investments.

(c) Environmental protection and public information

- Strengthened measures to improve public safety and environmental protection in the production conversion transport and utilisation of energy;
- More public information on the impact of energy options, to ensure democratic decision making processes.

(d) Coordination

- Continuation of annual examinations of Member States' energy programmes with regard to Community objectives and the adoption of arrangements to check their coherence.

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TABLE I. ENERGY BALANCE SHEET 1985

(m toe)

	Targets December 1974 <sup>1</sup>				National programmes 1977 <sup>2</sup>				National programmes 1978 <sup>3</sup>			
	Production	Net imports	Consumption m toe	%	Production	Net imports m	Consumption m toe	%	Production	Net imports	Consumption m toe	%
Solid fuels	210	40	250	17	183	38	220	17	186	41	224	18
Oil	180	515	695	49	111/161	556/491	665/650	52/51	115/165	528/468	641/631	52/51
Natural gas	175	95	270	18	143/158	80	222/237	17/18	139/149	83	221/231	18/19
Nuclear energy	190	-	190	13	140	-	140	11	113	-	113	9
Hydro and other	45	-	45	3	32	3	35	3	35	3	38	3
TOTAL m toe	800	650	1450	100	609/674	677/612	1282	100	588/648	655/595	1237	100
(%)	(55%)	(45%)	(100%)		(48/53%)	(52/47%)	(100%)		(47/52%)	(53/48%)	(100%)	

\* Gross consumption (including bunkers) = Production + Imports ± Stock movements

<sup>1</sup> Council Resolution of 17 December 1974 concerning Community energy policy objectives for 1985 (OJ No C 153 of 9 July 1975).

<sup>2</sup> Second report on the achievement of Community policy energy objectives for 1985 (COM(77)395 final).

<sup>3</sup> Summary of replies by the Member States to a Commission questionnaire, July 1978.

<sup>4</sup> Rounded up to 50% in the Resolution of 17 December 1974.

Table II. Share of energy imports in gross consumption

	1973	1977	%		
			targets <sup>1</sup> 1974	1985	
				national program <sup>2</sup> as 1977	national program <sup>3</sup> as 1978
Coal	2	3	3	3	3
Oil	60	51	43/38	43/38	43/38
Natural gas	.	2	6	7	7
Electricity	.	.	.	.	.
<b>Total net imports (= degree of dependence)</b>	<b>63</b>	<b>56</b>	<b>45</b>	<b>52/47</b>	<b>53/48</b>

<sup>1</sup>See table I, footnote 1.

<sup>2</sup>See table I, footnote 2.

<sup>3</sup>See table I, footnote 3.

. nil or negligible

Table III. Gross energy consumption per unit of GDP

	1977		1980		1985		1990	
	kg oe/'000 EUA	index	kg oe/'000 EUA	index	kg oe/'000 EUA	index	kg oe/'000 EUA	index
B	750	100	720	96	780	104	770	103
D	600	100	620	103	570	95	530	83
DK	560	100	500	93	430	77	410	73
F	610	100	600	98	560	92	530	87
I	980	100	980	102	970	101	940	98
IRL	1 000	100	1 160	109	1 250	118	1 310	124
L	2 140	100	2 050	96	1 960	92	1 900	89
N	870	100	900	103	900	103	880	101
UK	1 120	100	1 120	100	1 040	93	990	88
COMMUNITY	750	100	760	101	710	95	680	91

Kg.oe = Kilogram of oil equivalent

TABEAU 117b: CONSOMMATION BRUTE D'ENERGIE PAR HABITANT (kg ep per hab)

	1977	1980	1985	1990
BELGIQUE	4815	5062	6259	7192
DEUTSCHLAND	4277	5047	5713	6301
DANEMARK	3954	3907	3939	4430
FRANCE	3446	3834	4347	4969
ITALIE	2479	2804	3366	3962
IRLANDE	2346	3058	3955	5047
LUXEMBOURG	12111	12876	13671	15178
NEDERLAND	5474	6295	7193	7592
ROYAUME-UNI	9606	4143	4415	4742
COMMUNAUTE	3679	4137	4676	5215

kg ep = kilogramme équivalent pétrole



Table IV. The energy balance-sheet for 1990  
 (according to the estimates of the Member States -  
 national programmes for 1978)

Energy sources	Production	Net imports	Total *	
	m toe	m toe	m toe	%
Solid fuels	193	55	248	18
Oil	87/147	580/505	667/652	46/46
Natural gas	116/131	122	238/252	16/16
Nuclear	208		208	15
Hydro, etc	39	4	43	3
TOTAL, m toe	643/718	761/686	1404	100
%	(46/51)	(53/48)	(100)	

\* including variations in stocks.

Table V. Energy investments 1976-1985

	Investments 1976-1985			
	NP 77 <sup>1</sup>		NP 78 <sup>2</sup>	
	(1 000 million EUA)	%	(1 000 million EUA)	%
Solid fuels	13	6	15	6
Hydrocarbons	83	36	82	35
Nuclear	56	24	64	27
Non-nuclear	20	9	22	9
Transport and distribu- tion of electricity	56	25	55	23
Total (value as % of GDP)	228	100 (1.5)	238	100 (1.6)

Prices and exchange rates as at 31 December 1978.

<sup>1</sup>National programmes for 1977: see Table I, note 2.

<sup>2</sup>National programmes for 1978: see Table I, note 3.

Table VI. Margins of uncertainty and flexibility

	(m toe)	
	1985	1990
Additional energy savings	+ 20 (*)	+ 100 (*)
Surplus (+) or deficit (-) in supply	+ 2	- 37 to - 17
coal (**)	- 18	
oil		+ 15
natural gas	+ 30	+ 30
nuclear energy	- 10	- 30
Total negative factors	- 28	- 67 to - 47
Total positive factors	+ 52	+145
Grand total	80	210

(\*) Indication of additional savings which could be technically feasible.

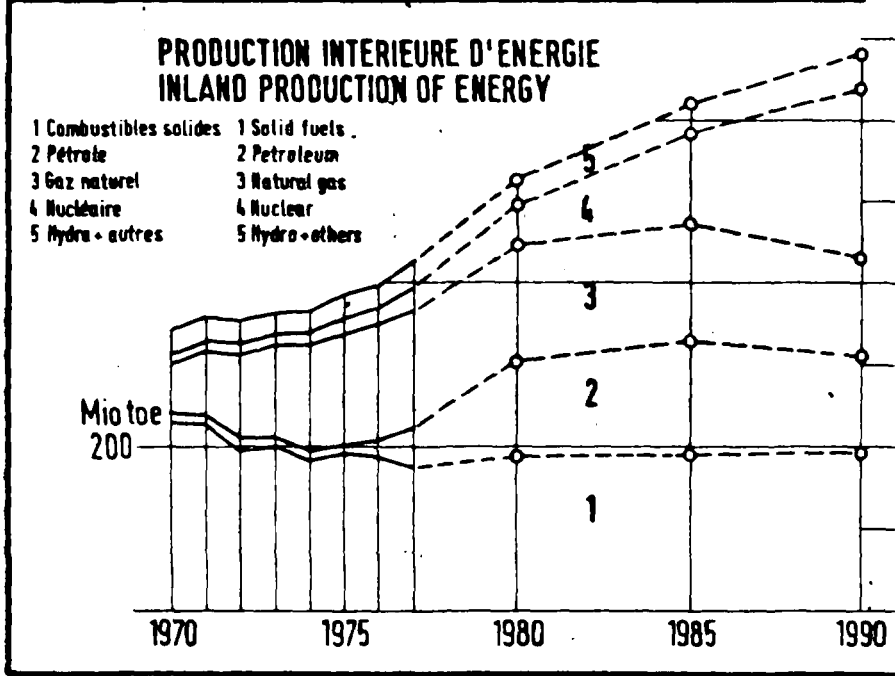
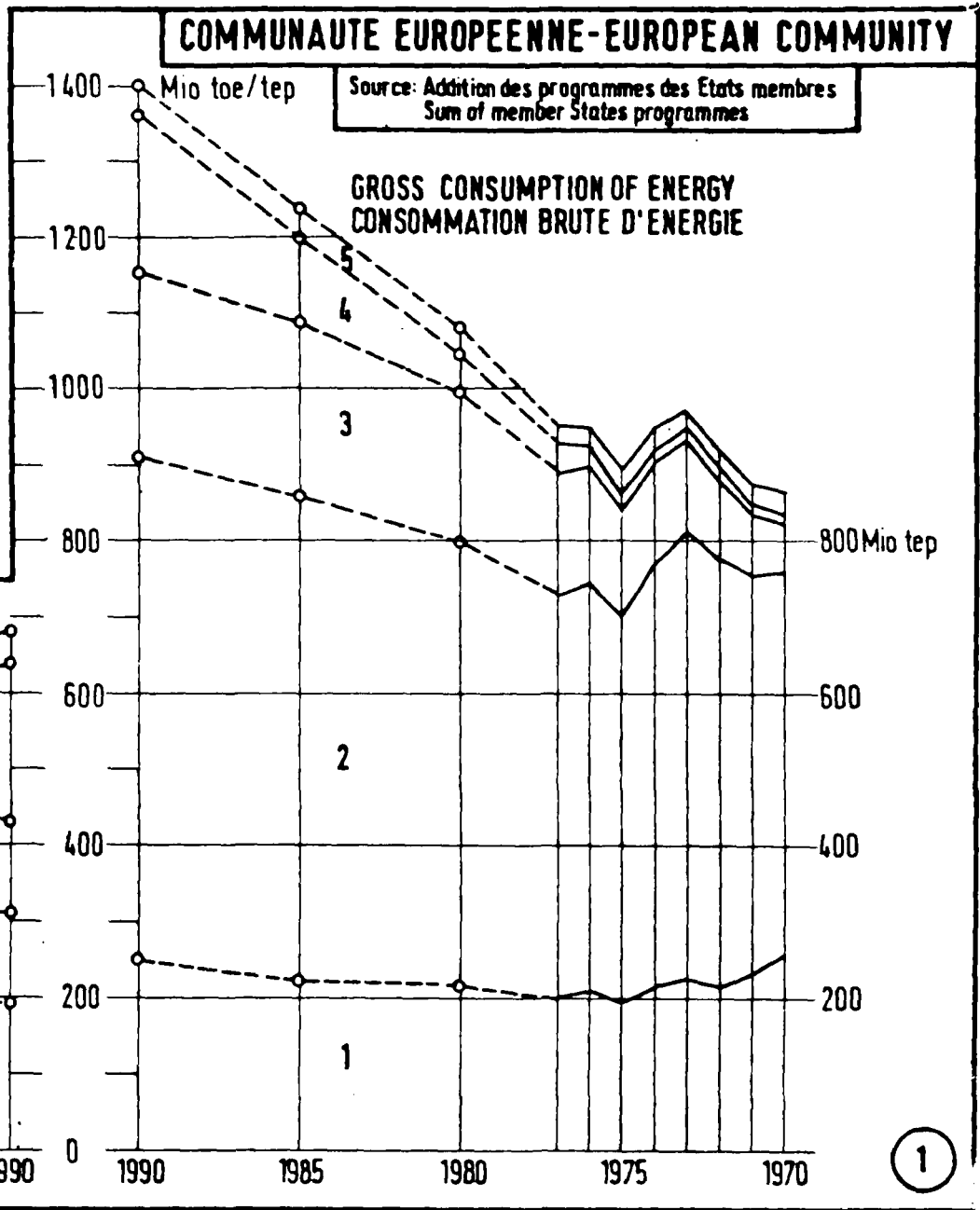
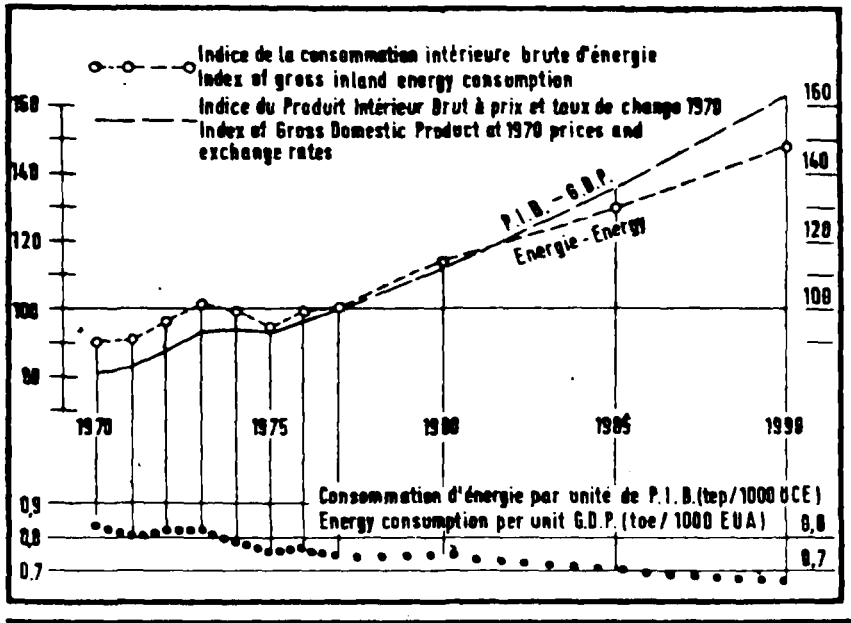
(\*\*) Lack of outlets owing to competitiveness of coal or lack of consumption capacity; lack of coal support policy.

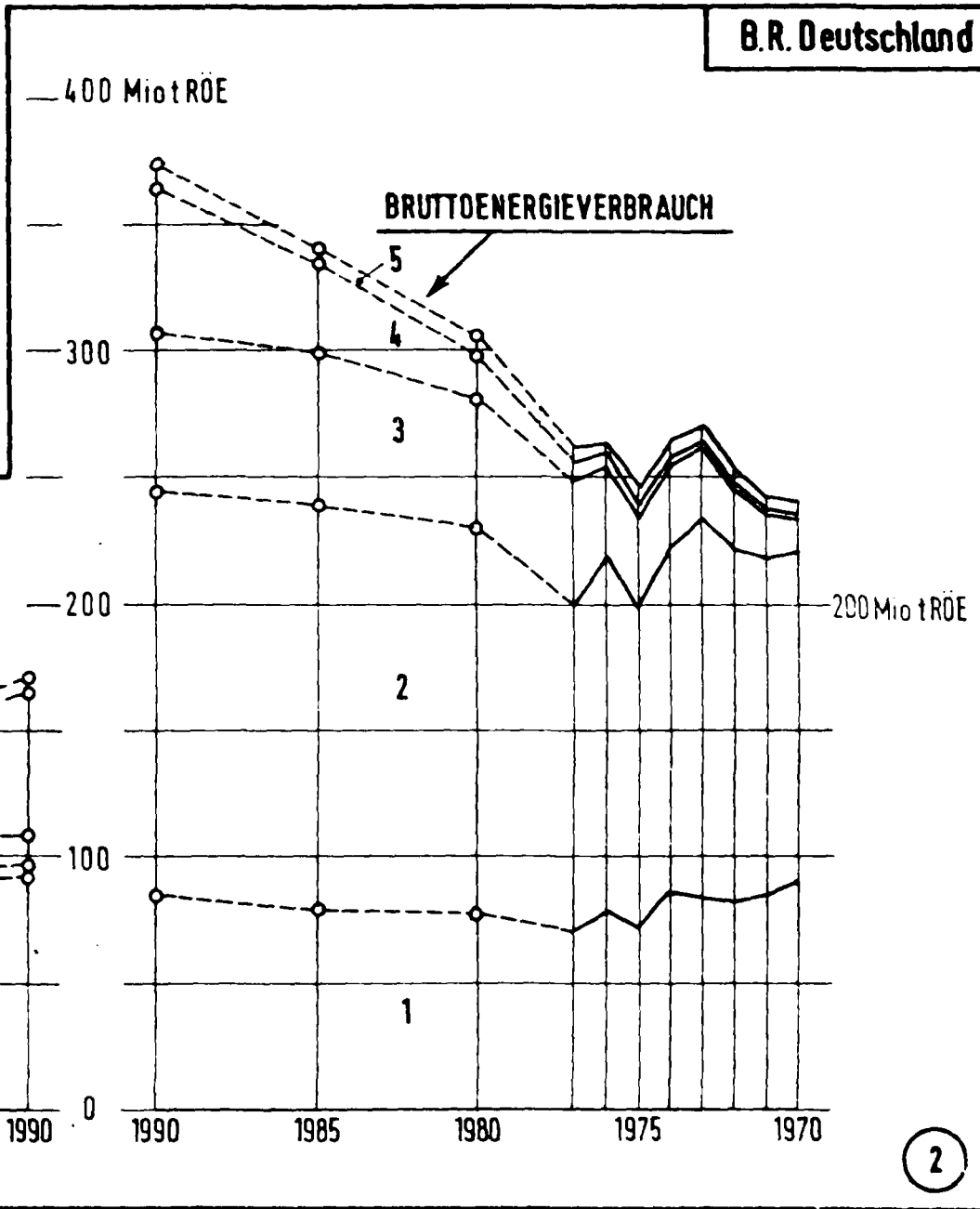
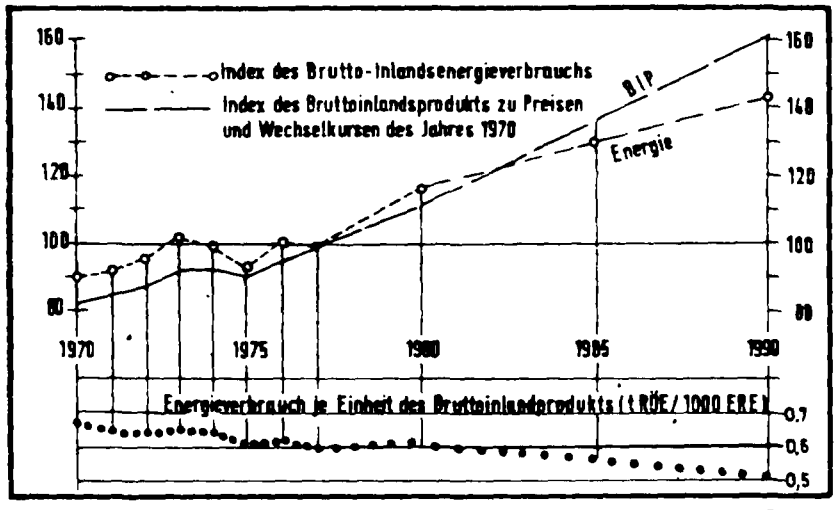
TABLE VII. GDP and energy supplies

%	Community	D	1976 - 1980								
			F	I	NL	B	L	UK	IRL	DK	
<u>Energy investments</u> GDP	1.65	1.57*	1.42	1.43	1.61	1.18*	0.82	2.77	1.89*	0.73	
<u>Net imports</u> <sup>1</sup> GDP	3.49	2.97	3.94	6.79	0.21	5.28	17.59	1.88	7.36	4.25	
<u>Energy investments + net imports</u> GDP	5.14	4.54*	5.36	8.22	1.82	6.46*	18.41	4.65	9.25	4.98	
			1981 - 1985								
	Community	D	F	I	NL	B	L	UK	IRL	DK	
<u>Energy investments</u> GDP	1.60	1.48*	1.27	2.14	1.48	1.03*	0.53	2.36	N.D.	0.84	
<u>Net imports</u> GDP	3.11	2.82	3.5	6.77	1.68	5.24	16.62	-0.31	8.	2.98	
<u>Energy investments + net imports</u> GDP	4.71	4.3*	4.77	8.91	3.16	6.27*	17.15	2.05	N.D.	3.82	
			1986 - 1990								
	Community	D	F	I	NL	B	L	UK	IRL	DK	
<u>Energy investments</u> GDP	N.D.	N.D.	1.11	N.D.	1.07	1.07*	0.47	2.45	N.D.	N.D.	
<u>Net imports</u> GDP	2.97	2.52	3.01	5.98	3.15	5.33	16.02	0.17	8.73	2.35	
<u>Energy investments + net imports</u> GDP	N.D.	N.D.	4.12	N.D.	4.22	6.4*	16.49	2.62	N.D.	N.D.	

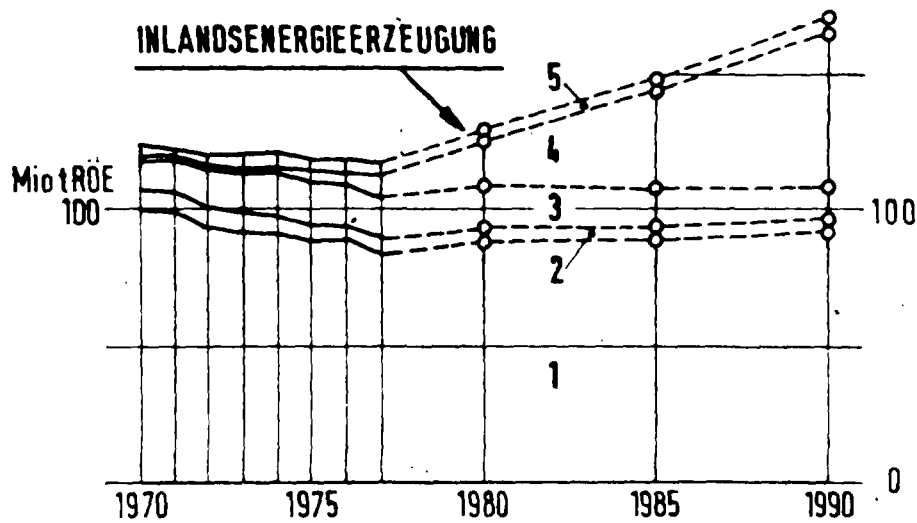
\* Estimates.

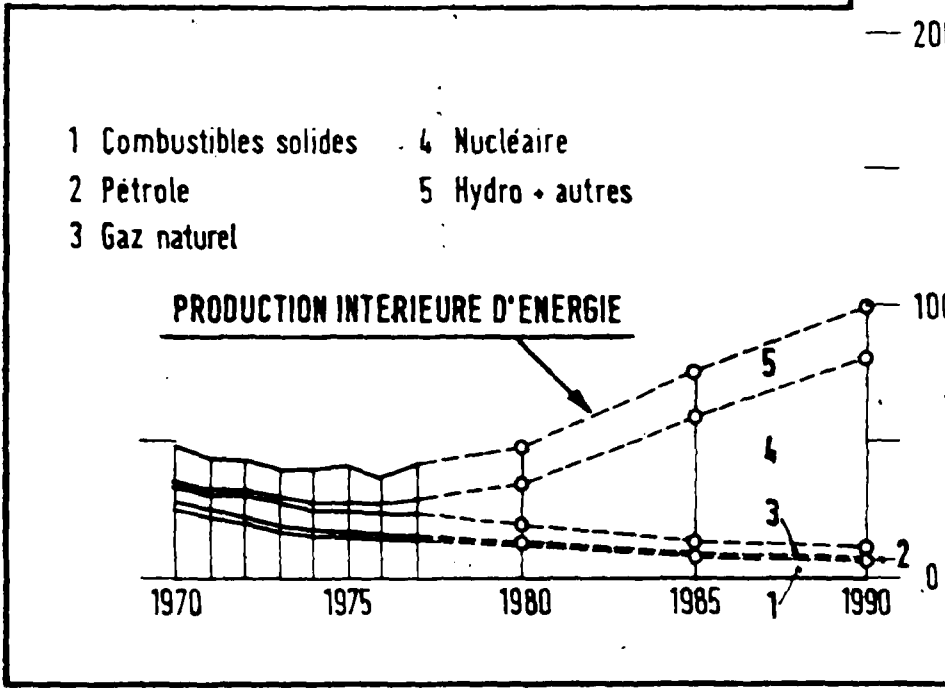
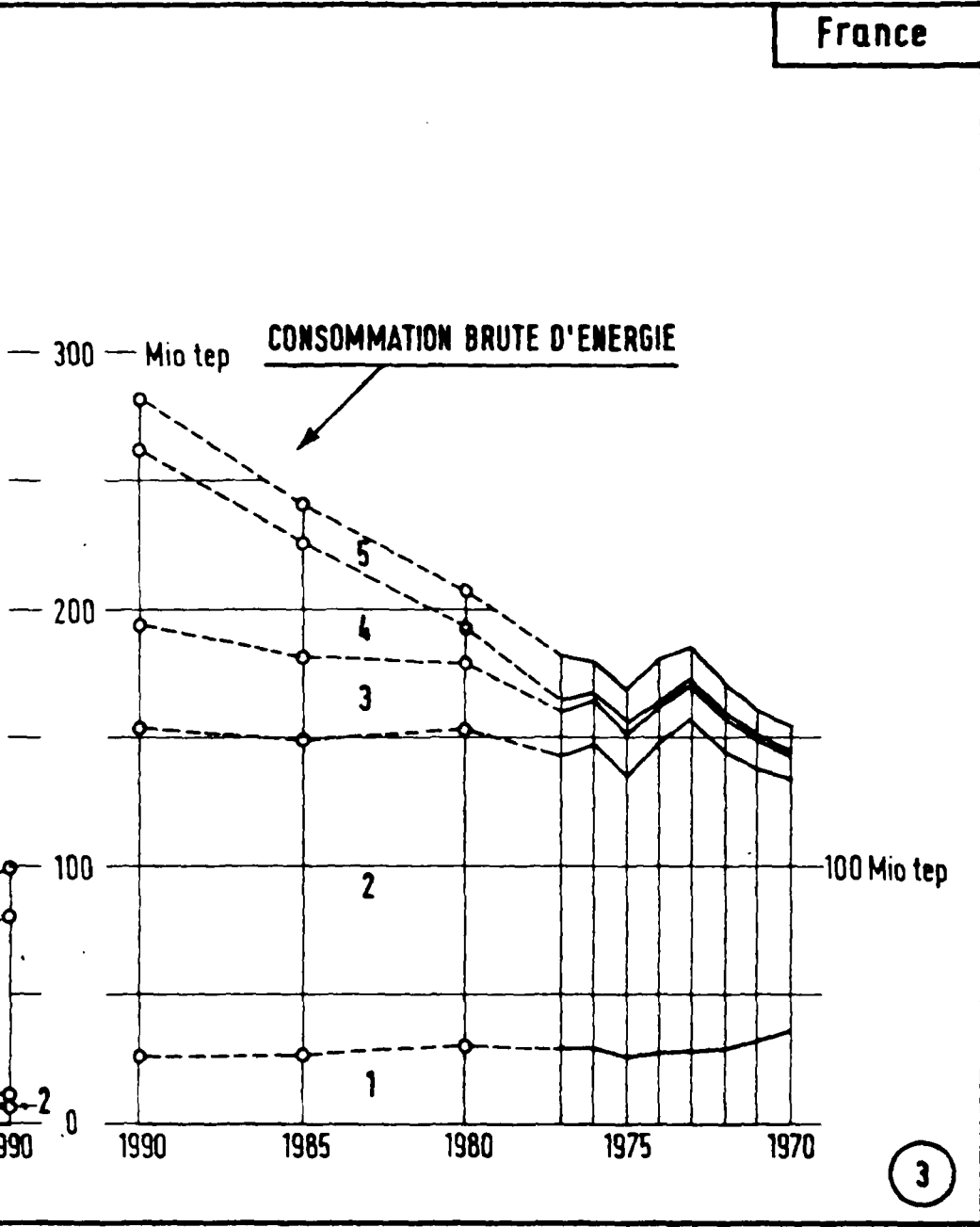
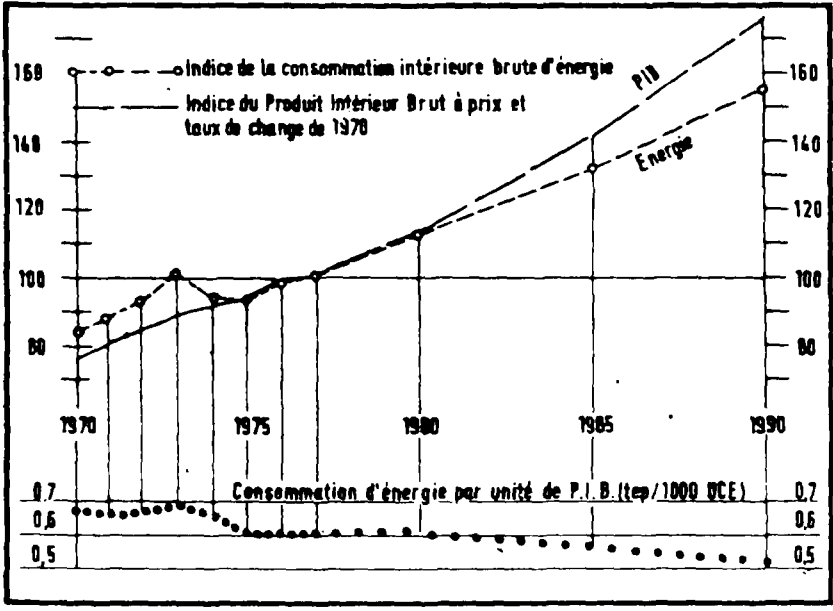
<sup>1</sup> Imports calculated at December 1976 prices, i.e. \$ (constant) 95/toe.

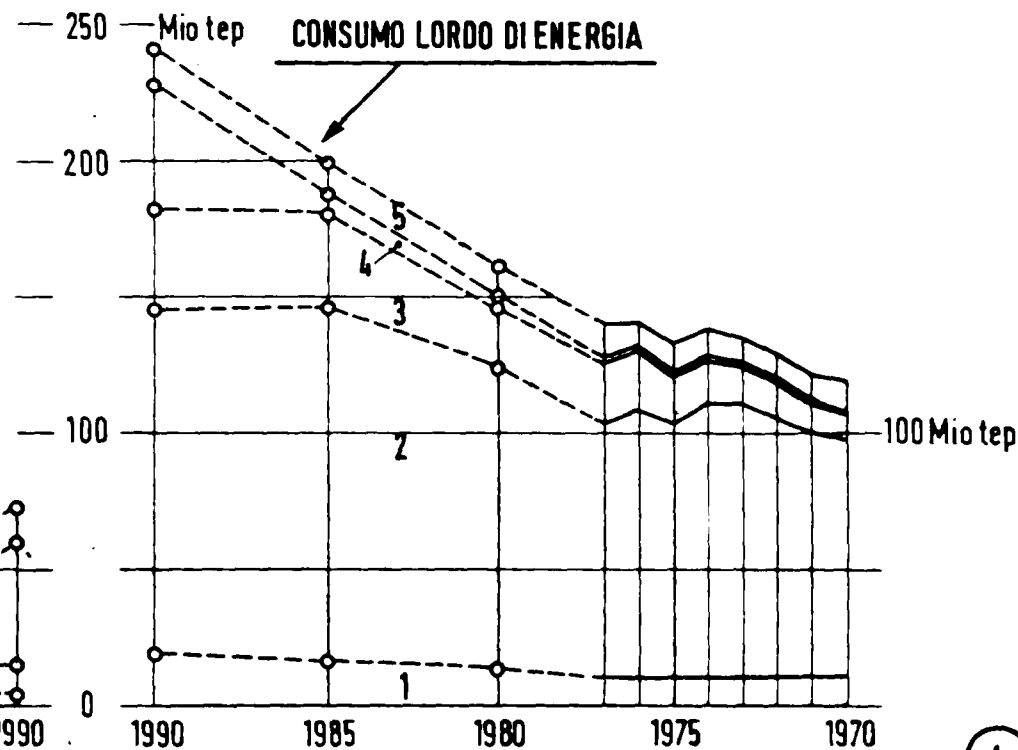
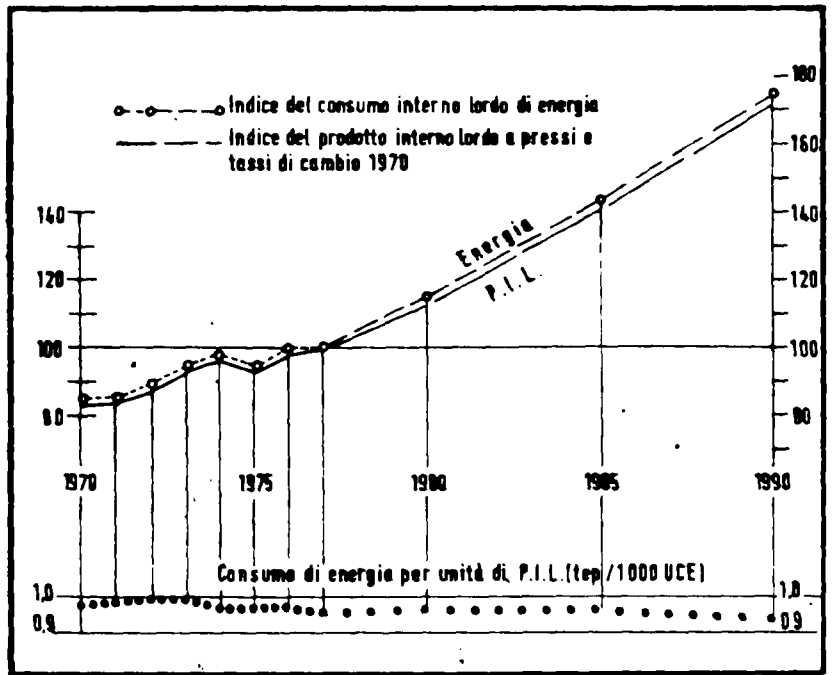




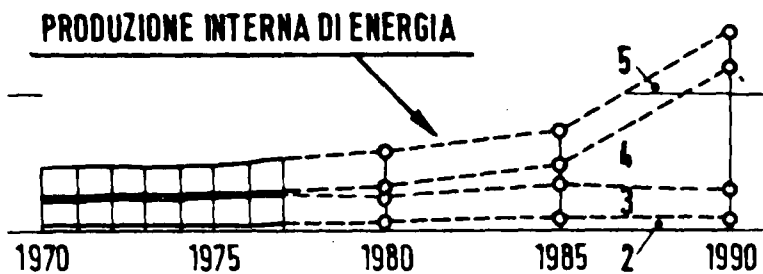
- 1. Feste Brennstoffe
- 2. Erdöl
- 3. Naturgas
- 4. Kernenergie
- 5. Wasserkraft+Sonstige



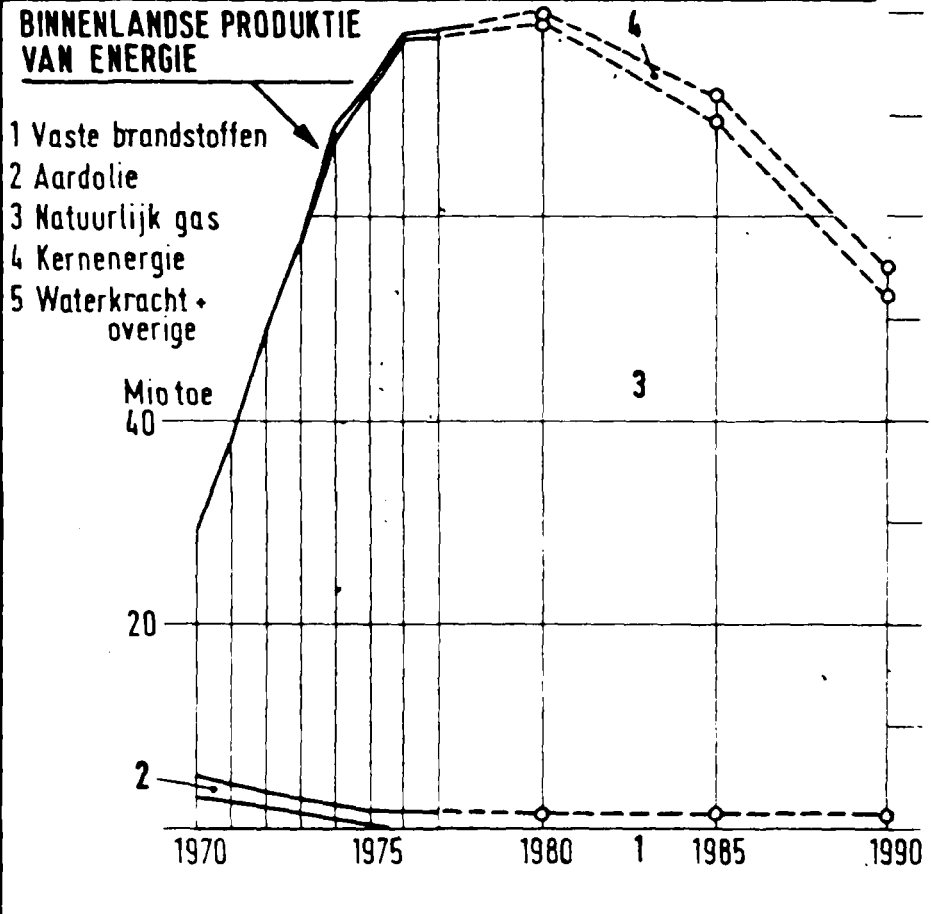
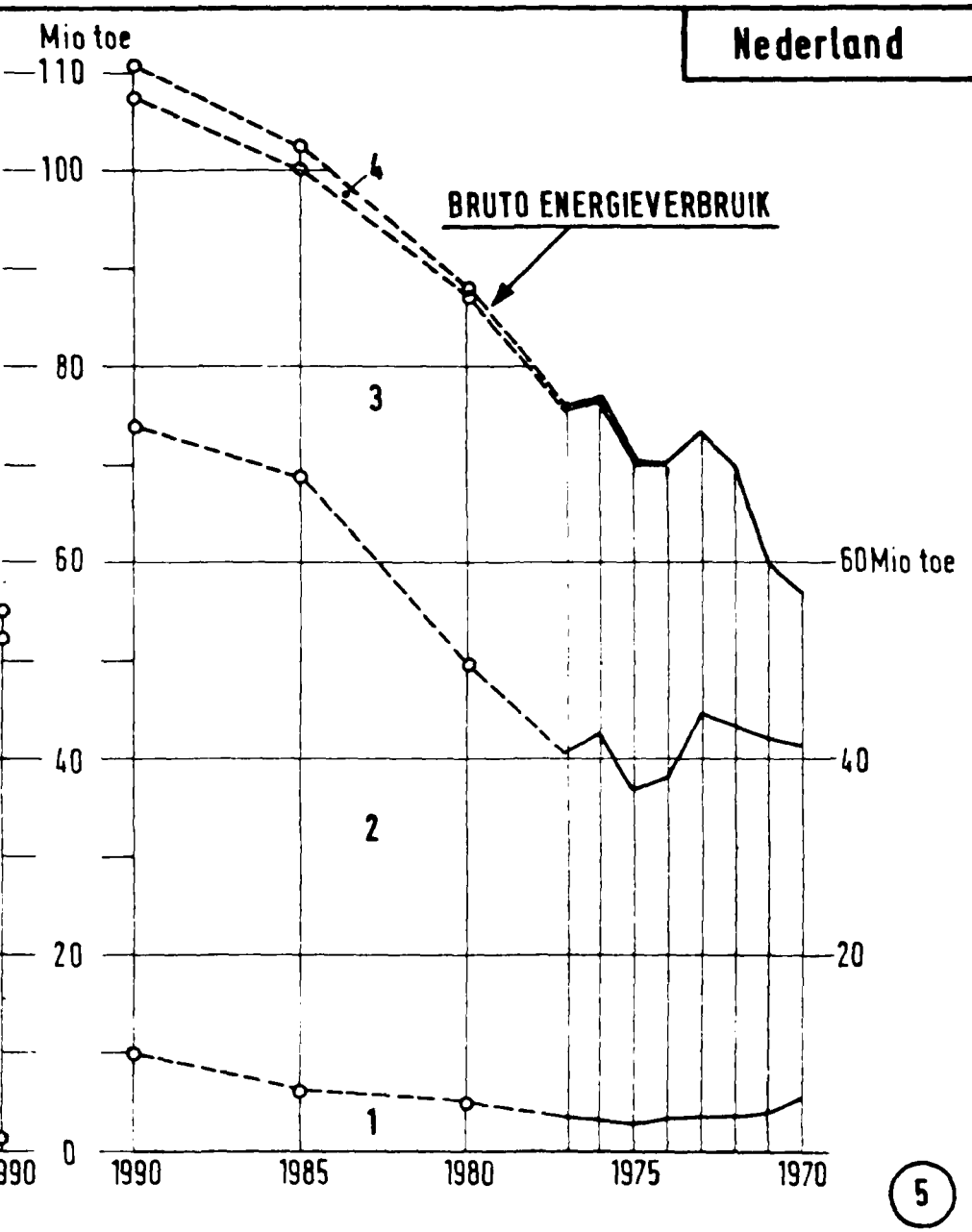
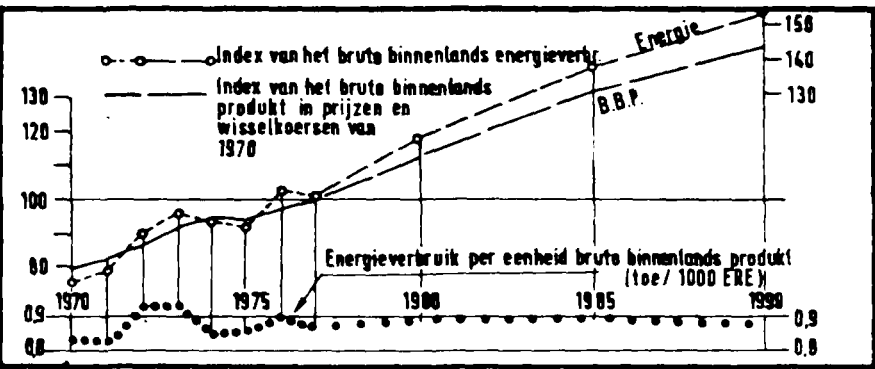


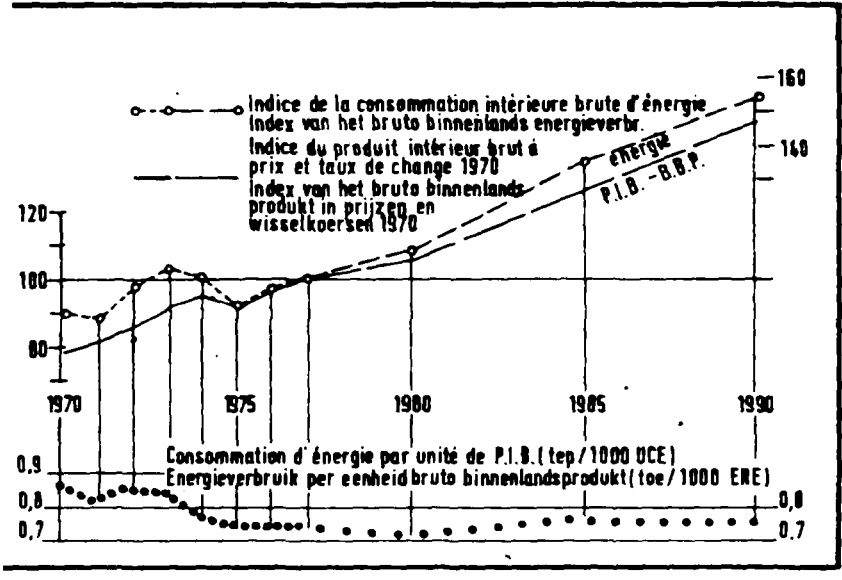


- 1 Combustibili solidi
- 2 Petrolio
- 3 Gas naturale
- 4 Nucleare
- 5 Idroelettrica+altri



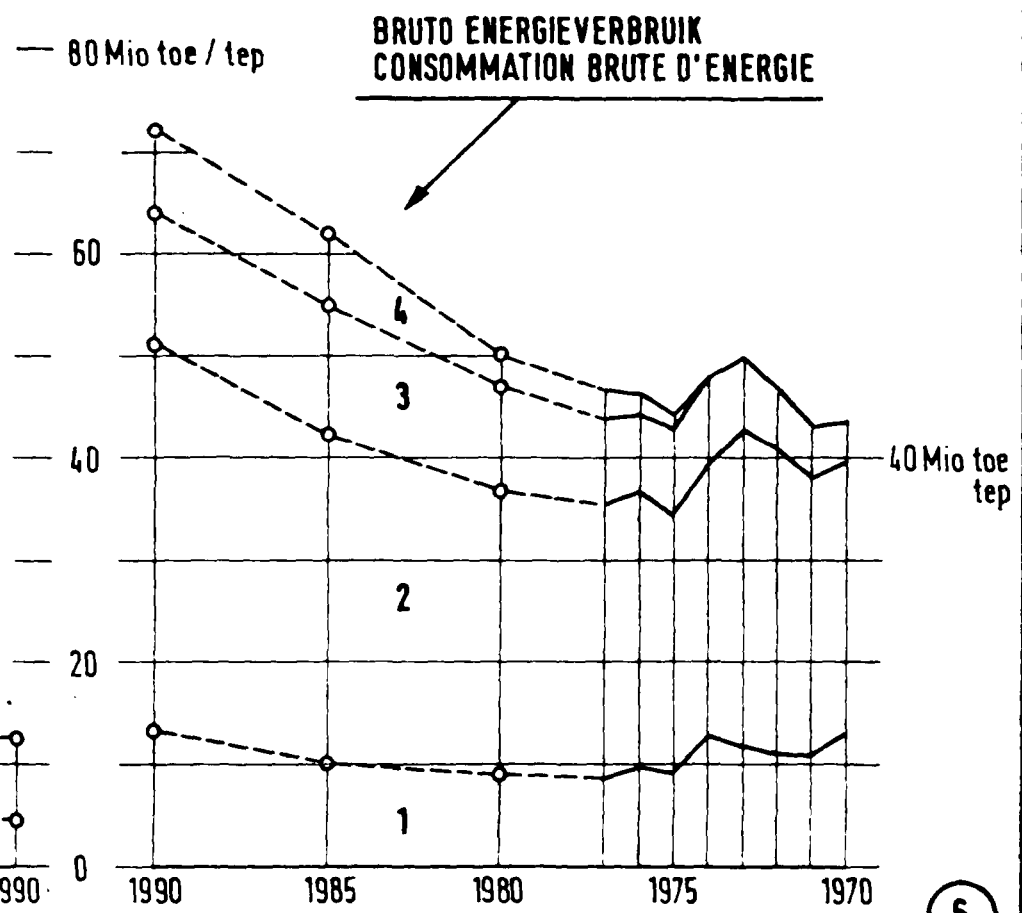
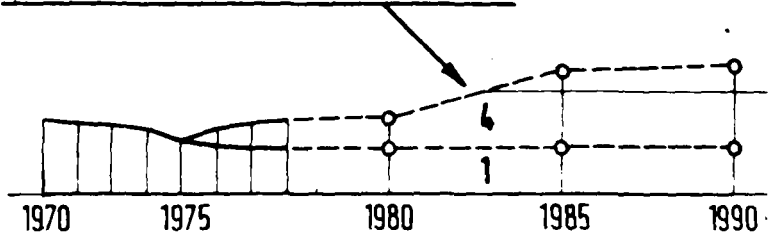




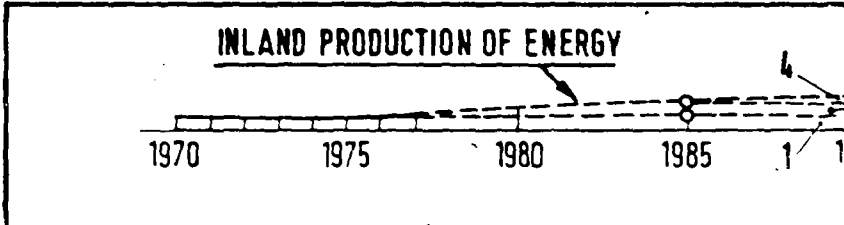
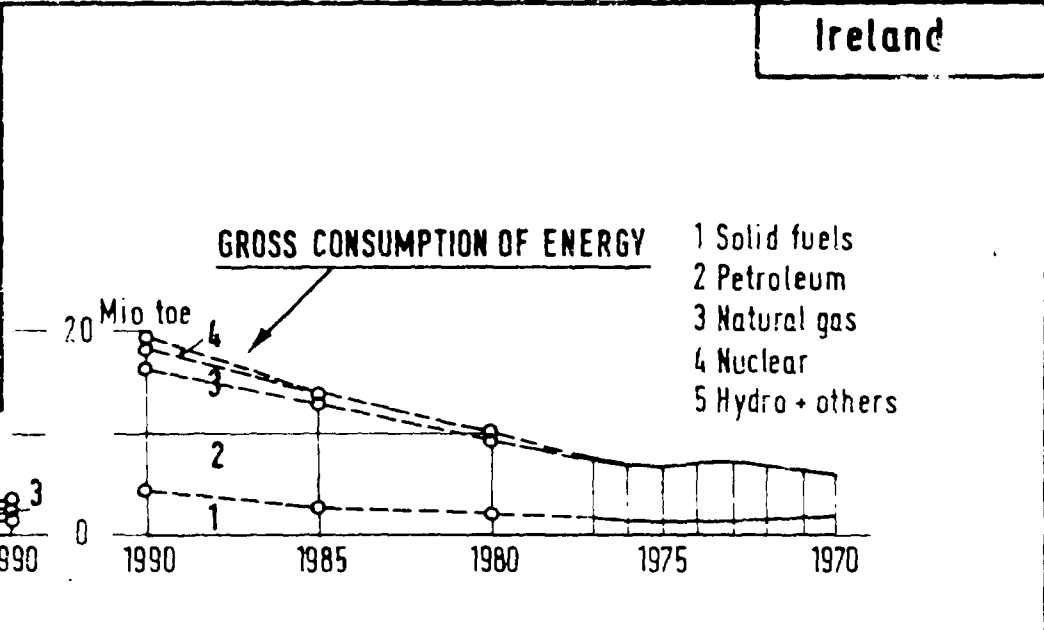
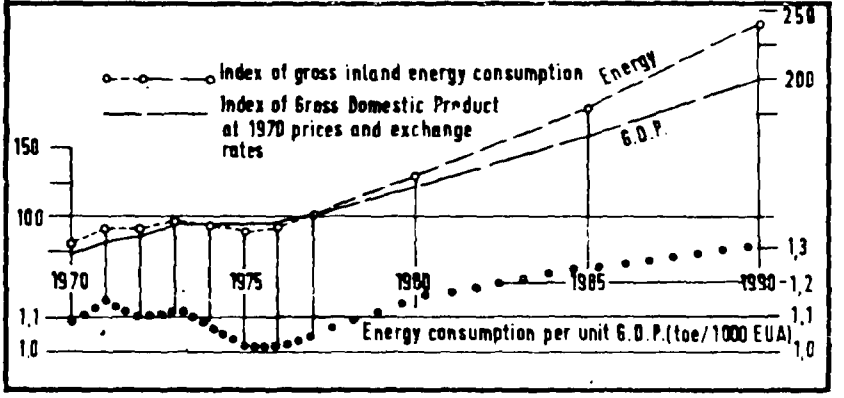


- 1 Combustible solides - Vaste brandstoffen
- 2 Pétrole - Aardolie
- 3 Gaz naturel - Natuurlijk gas
- 4 Nucléaire - Kernenergie
- 5 Hydro+ autres - Waterkracht+overige

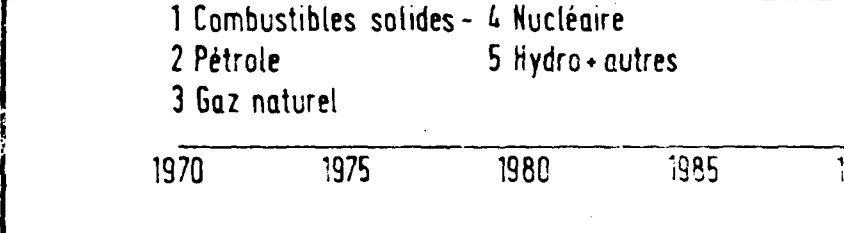
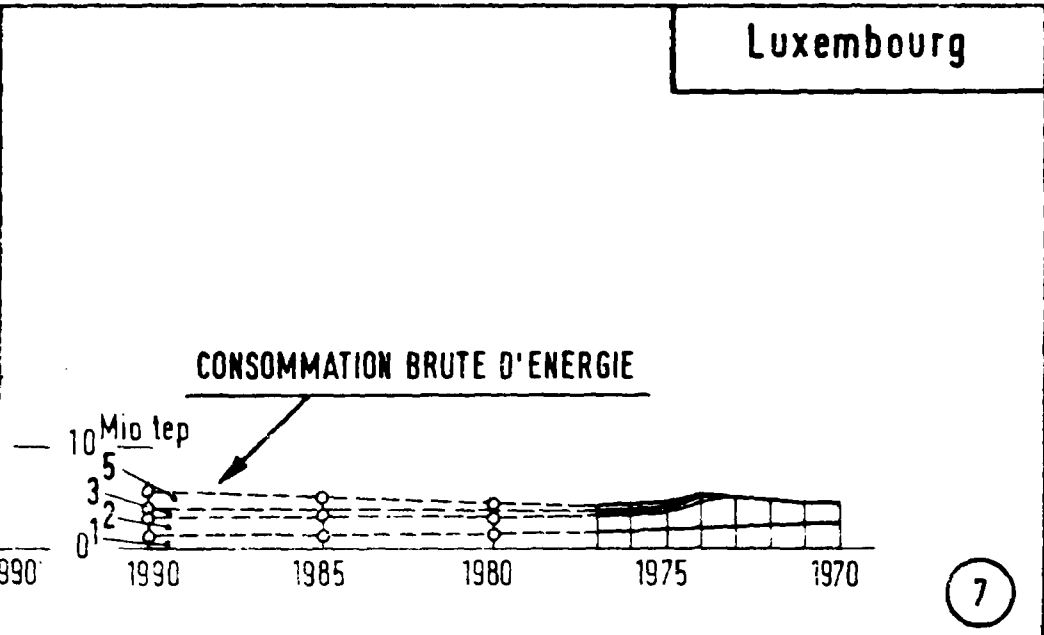
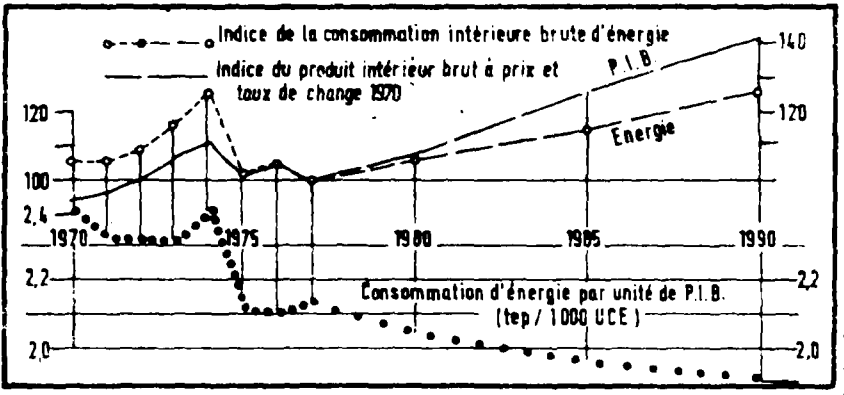
**BINNENLANDSE PRODUKTIE VAN ENERGIE**  
**PRODUCTION INTERIEURE D'ENERGIE**



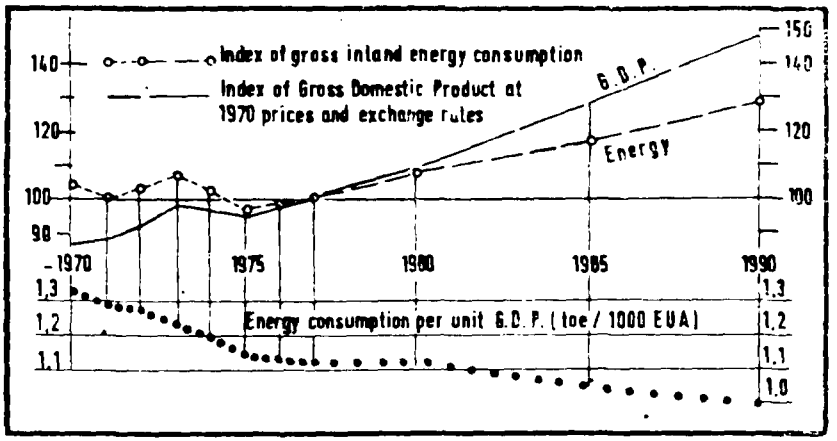
# Ireland



# Luxembourg



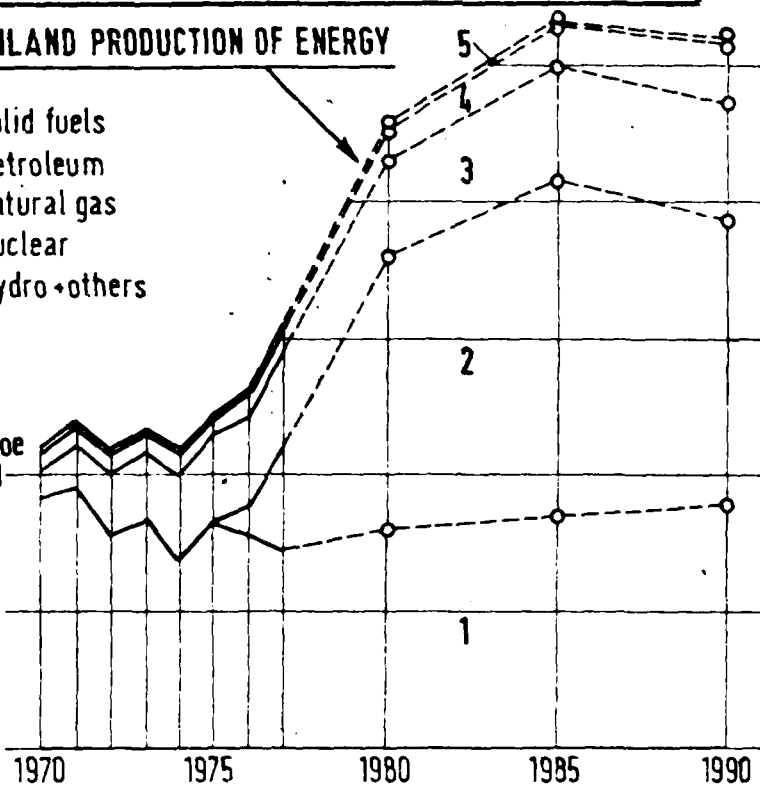
# United Kingdom



## INLAND PRODUCTION OF ENERGY

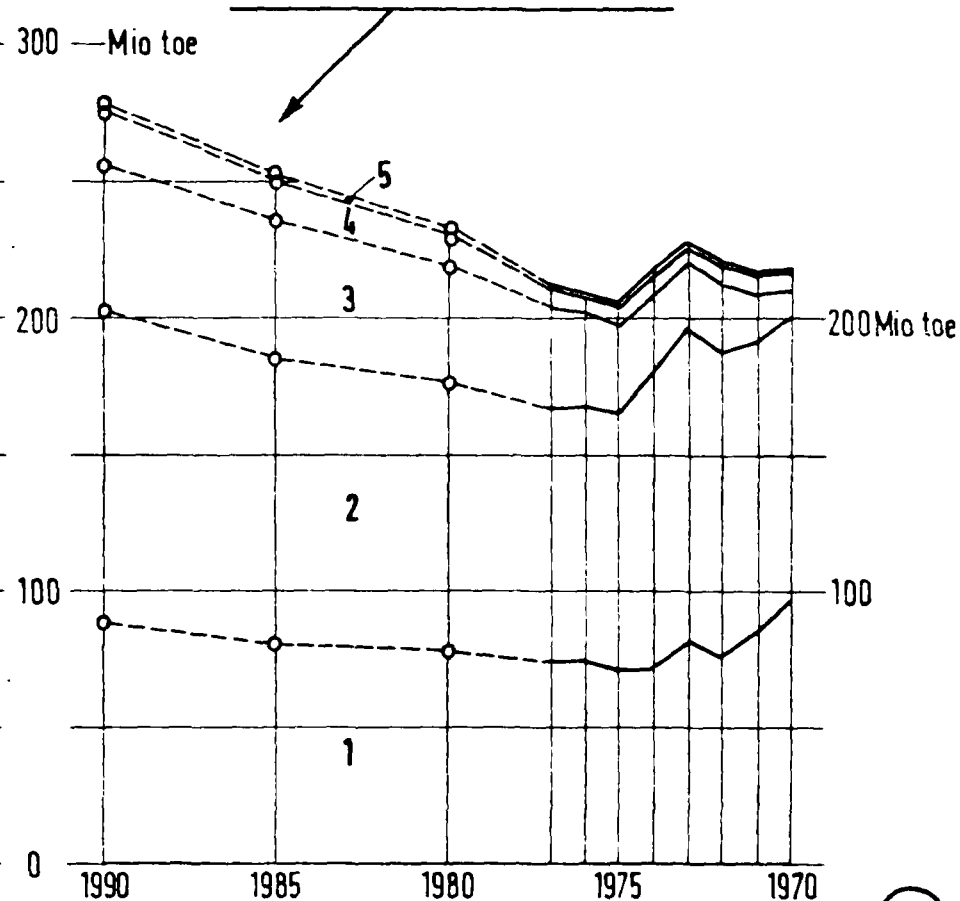
- 1 Solid fuels
- 2 Petroleum
- 3 Natural gas
- 4 Nuclear
- 5 Hydro-others

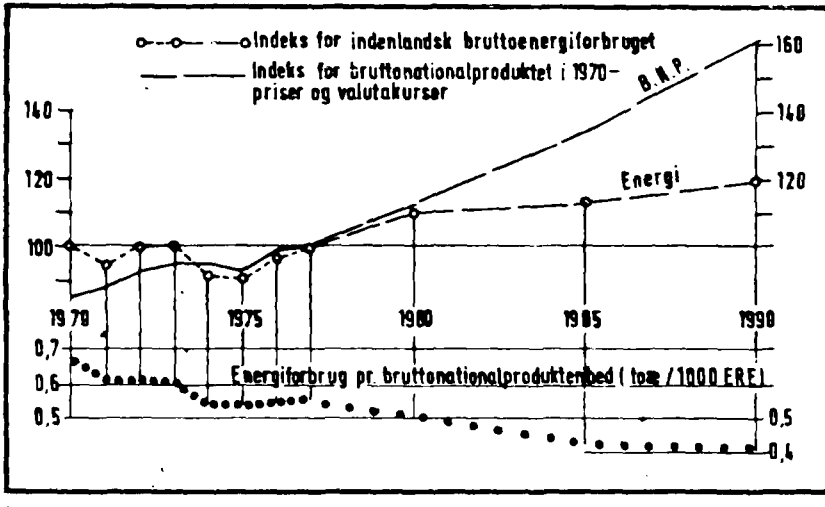
Mio toe  
100



## GROSS CONSUMPTION OF ENERGY

300 Mio toe

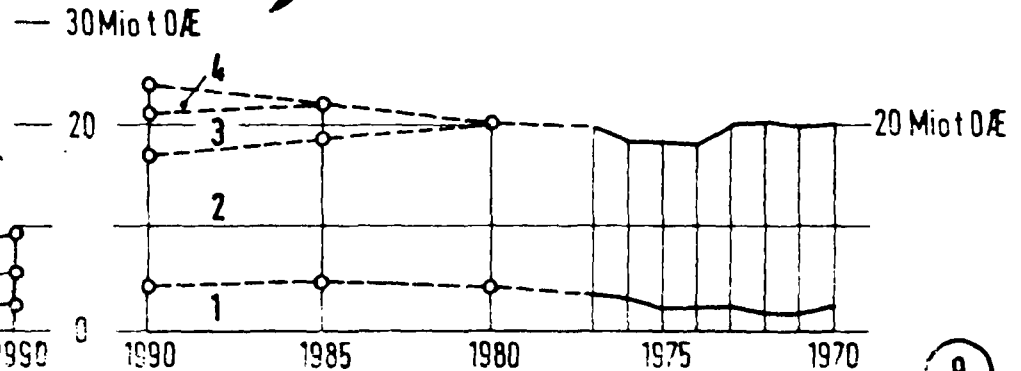
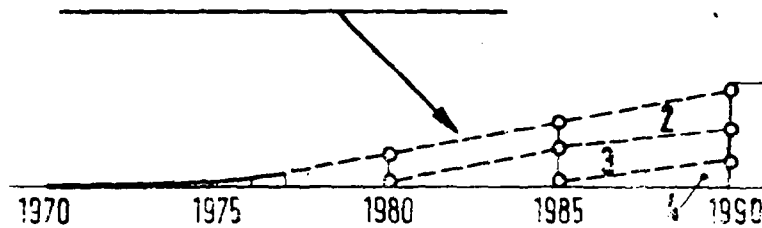




**BRUTTOENERGIFORBRUG**

- 1 Fast brændsel
- 2 Mineralolie
- 3 Naturgas
- 4 Kernekraft
- 5 Vandkraft + Øvrige

**INDENLANDSK ENERGIPRODUKTION**

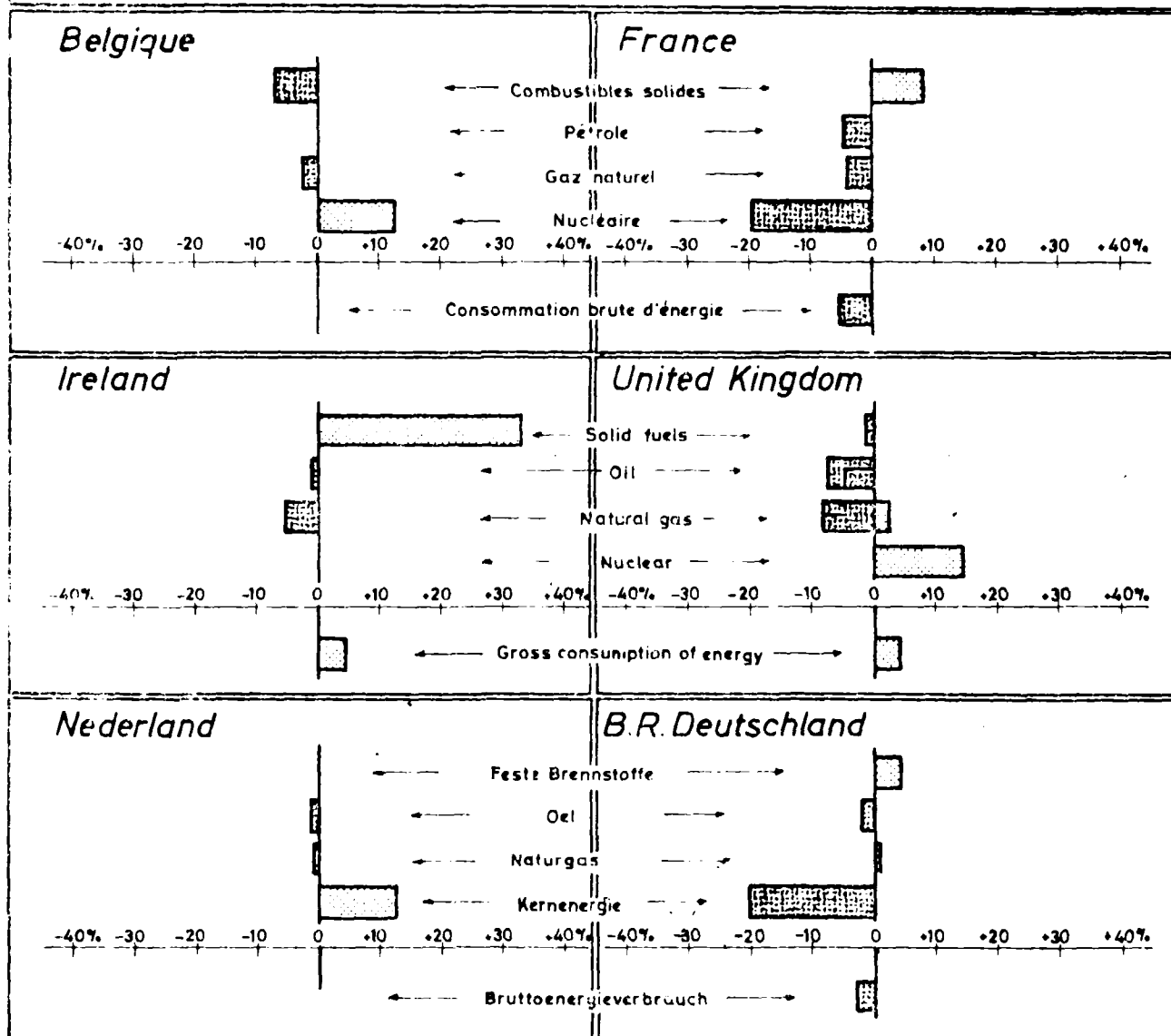


## CONSOMMATION D'ENERGIE EN 1985

Comparaison entre les programmes communiqués par les Etats membres en 1978 (PN 1978) et ceux de 1977 (COM 77-395 ou PN 1977)

## ENERGY CONSUMPTION IN 1985

Comparison between the programmes communicated by the Member Countries in 1978 (NP 1978) and those of 1977 (COM77-395 or NP 1977)



Les pourcentages indiquent, pour la consommation de chaque source d'énergie primaire en 1985 et pour l'ensemble, l'écart de la prévision 1978 par rapport à celle de 1977.

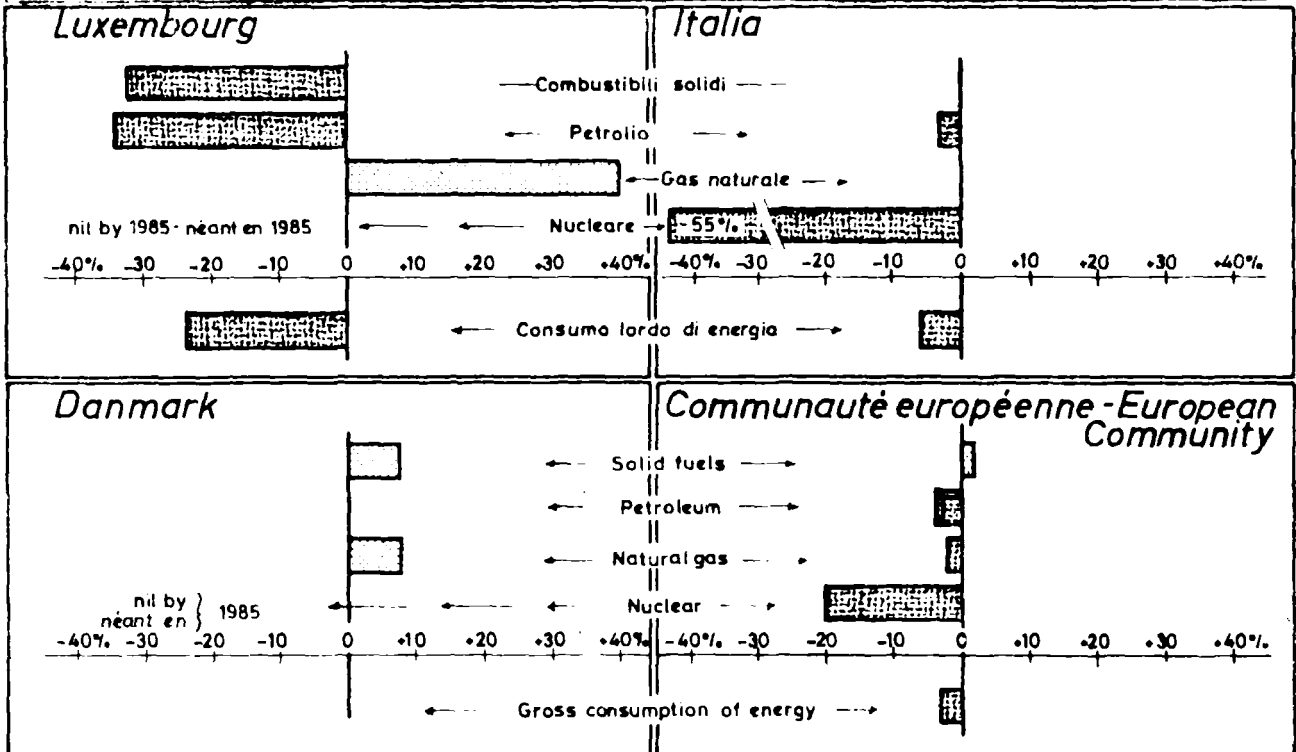
The percentages show both overall and for the consumption of each fuel, the discrepancy between the 1978 and 1977 forecasts.

## CONSUMMATION D'ENERGIE EN 1985

Comparaison entre les programmes communiqués par les Etats membres en 1978 (PN 1978) et ceux de 1977 (COM 77-395 ou PN 1977)

## ENERGY CONSUMPTION IN 1985

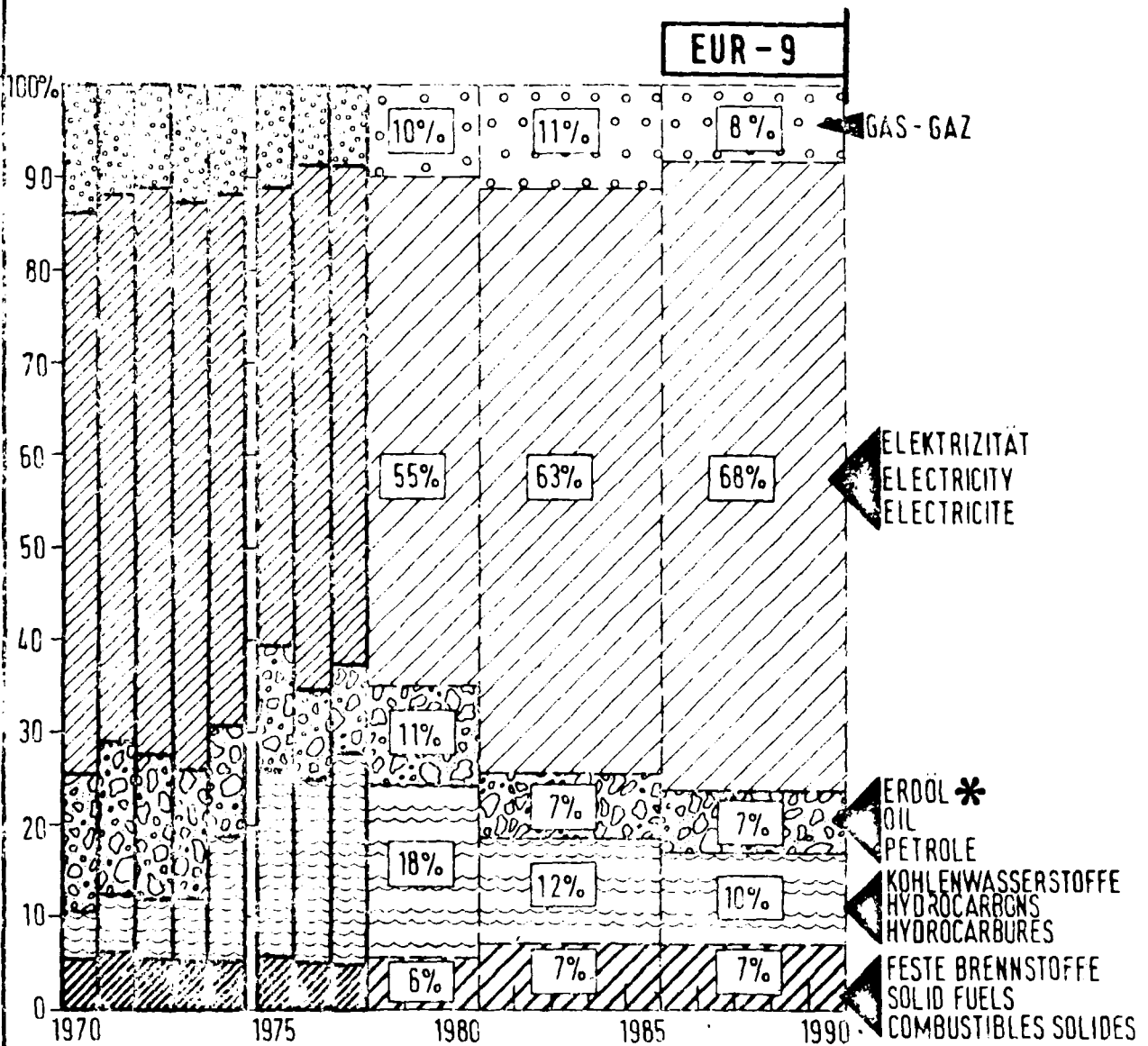
Comparison between the programmes communicated by the Member Countries in 1978 (NP 1978) and those of 1977 (COM77-395 or NP 1977)



Les pourcentages indiquent, pour la consommation de chaque source d'énergie primaire en 1985 et pour l'ensemble, l'écart de la prévision 1978 par rapport à celle de 1977.

The percentages show both overall and for the consumption of each fuel, the discrepancy between the 1978 and 1977 forecasts.

STRUKTUR DER INVESTITION IM ENERGIESEKTOR  
 STRUCTURE OF CAPITAL EXPENDITURE IN THE ENERGY SECTOR  
 STRUCTURE DES INVESTISSEMENTS ENERGETIQUES



\* Investitionen in den nachgelagerten Bereichen  
 downstream investment  
 investissement aval