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## ENERGY

# European and World Energy Perspectives: the 1980s and 1990s

by Jochen H. Mohnfeld, Bonn\*

**Substantial successes have been achieved since 1973 in increasing energy efficiency and substituting other fuels for oil. However, reliance on oil and oil imports remains high. The temporary easing on the oil market must not lead to complacency as any relaxation in energy policy efforts may well contribute to provoking the next oil price shock.**

In analysing Europe's energy future, it must be stated at the outset that there just cannot be an independent European energy policy in isolation from the rest of the world. The most prominent feature of Europe's energy position is its dependence on imports. A second feature is the tight interrelationship between Europe and other main consumer regions of the world that also import energy.

"Europe" is defined here as the group of Western-oriented European countries belonging to the OECD – 19 in all. These countries currently depend on oil for 51 % of their total energy supplies<sup>1</sup> – of which on average 76 % is imported<sup>2</sup>.

To a lesser extent, Europe is also dependent on imports of gas (14 % of gas consumption). Even in the case of coal, the basis on which European industry grew, about 59 mtoe<sup>3</sup>, or 21 % of total requirements, have to be imported. By far the greater part of the uranium necessary for nuclear power stations is also imported.

In addition, this import-dependence is not limited to Europe. Other large consumer areas of the world, notably the United States and Japan, are in a similar position. And since all importers are to a large extent dependent upon the same sources, European patterns of behaviour in the energy sector are not without significance for the rest of the world. Conversely, energy supplies to Europe are considerably affected by consumption trends in the rest of the world.

The interdependence of the European oil supply with the rest of the world is best illustrated by a few figures. In the world oil market, roughly 85 % of the amount

available for export goes to the OECD industrial countries alone; the little that remains goes mainly to the developing countries. (The Eastern bloc and China are self-sufficient or small net exporters<sup>4</sup>.) Of the OECD demand on the world oil market, Europe alone takes 473 million tons (46 %), followed by the United States with 291 million tons (29 %), and Japan with 231 million tons (23 %)<sup>5</sup>. In absolute terms, therefore, Europe is the most import-dependent region of the world, and hence the most vulnerable.

Europe's dependence on energy imports and the resulting interdependence with other areas require that European energy supplies be considered in a worldwide framework.

## Problems of a Common European Energy Policy

There are essentially two supranational organisations concerned with energy policy in Europe: the European Communities (EC) – including the European Coal and Steel Community (ECSC) and EURATOM – and the International Energy Agency (IEA). Both organisations are faced with particular difficulties caused by the differing baseline situations in their member countries. These structural differences must not be forgotten if results to date are to be fairly judged and the future possibilities for a common energy policy realistically assessed.

<sup>1</sup> 1981 data; all data include marine bunkers.

<sup>2</sup> UK and Norway were net exporters (18.2 and 16.5 mtoe respectively).

<sup>3</sup> Million tons of oil equivalent.

<sup>4</sup> At present, the CMEA countries and China export a net 35 mtoe and are expected to be net importers of about the same amount by 1990. The possibility of even higher oil imports cannot be excluded.

<sup>5</sup> 1981 figures.

\* Economics Ministry, Energy Department.

Countries with greatly differing energy resources are represented in both the European Community and the IEA. The European countries have also followed different paths in the development of nuclear energy – the only conventional form of energy in which the question of resources is not paramount. Major structural differences relate to such factors as the level of industrial development, but they are also affected by population density and climate. The economic policy framework is another important determinant for national energy policies. Some countries prefer a liberal, market-oriented energy policy; others guide the energy economy to a large extent by government regulation.

By stressing these differences it is not intended to prove that a common European energy policy is impossible. These facts simply set limits to what is possible. The problems of a common European energy policy can be summarised as follows:

□ It is difficult to find a suitable yardstick for assessing the energy policy of the European Community. The EEC Treaty provides only for harmonisation of economic policy. The development of a common energy policy is not specifically mentioned. If measured against the ambitious goal of the Commission of the European Communities to install a supranational energy policy and to relinquish national responsibilities, many projects have certainly come to grief in recent years – in coal or oil policy, for example. In most cases, financing was the stumbling block. As a rule, member countries have clung grimly to their national interests. It has to be admitted that the joint financing of projects is theoretically part of the role of the European Community, but member countries simply cannot afford another “Common Agricultural Policy” in the energy sector. Nobody is thinking realistically in these terms. The possibility of agreement seems to exist only for ventures which involve limited expenditure and which have proved impossible for individual member countries to achieve on their own.

If, however, the criterion for assessing EEC energy policy is seen in terms of whether the member states all share the same view of the problem and how to solve it, considerable progress has been achieved in the last few years. For example, a definite step has been taken towards setting common objectives for 1990 and towards making a critical review of the real progress already achieved in individual countries.

□ The IEA is the only international organisation of Western industrialised countries whose mandate relates specifically to energy policy. It has no joint financing competence, hence no contribution problems.

Its sole function is one of coordination, which is perhaps the major reason for its undeniable success in binding member countries to the principles of a unified energy policy. As regards membership, the IEA embraces more countries than does the EEC, since it includes the other major consumer regions, particularly the USA and Japan. Twenty-one countries are members of the IEA. On the other hand, France is the only EEC country which is not a member of the IEA. But through the synchronisation of the IEA and EEC crisis management systems, France is included in the world-wide solidarity of the industrialised countries.

□ Given the different baseline situations of the European countries, conflicts of interest are clearly still too great to permit supranational integration of energy policy in Europe with partial surrender of national independence, either now or in the foreseeable future.

□ Conversely, a relatively homogenous situation does facilitate agreement on certain energy policy sub-goals and measures, and while Europe as a whole does not fulfil this condition, there are smaller areas where views converge. A good example of how this could, and indeed does, function is provided by the research and development projects jointly financed by small groups of countries under the auspices of the IEA.

□ Since all European countries other than the two oil producers depend to a greater or lesser extent on imported crude, there is a strong shared incentive to become less dependent on this risk-bound and increasingly expensive energy source. But even the two European oil producers have nothing to gain by depleting their reserves too quickly. Thus, there is a common interest in curbing the increase in consumption and ultimately replacing oil by alternative energy sources.

□ Through constant governmental cooperation in the EEC and IEA, something like a common code of ethics has emerged with regard to energy and the recognition of common principles – the 12 Principles of the IEA, for example.

□ At present, the greatest chance of changing the energy policy landscape seems to lie in this coordination and alignment of energy policies, while taking care to avoid complicated regulations with encumbering details. The chances of reaching agreement on principles and goals are in fact always greater if the necessary actions are not prescribed in detail, or if they have legal or financial implications. One important task of international energy policy will be persuasion at both governmental and consumer levels.

□ The critical examination of the energy policy of each individual member country, which itself is a regular exercise in the IEA and to some extent in the EEC, has proved a most useful instrument. This is the only way of determining whether the same goals are being pursued and comparable efforts being made. Member countries have to justify their national energy policies to partner countries, a fact which makes them think twice before departing from recognised principles and bans without good cause.

□ The European countries have no choice but to advance together along the same path, regardless of which organisation umbrella they walk under. Because of the high degree of economic interdependence, going it alone would benefit the individual country only for a limited time. Negative economic developments in partner countries due to energy bottlenecks would finally affect them all.

□ Europe's dependence on the world oil market demands coordination with the other big consumer areas of the world, in particular North America and Japan. Europe on its own would be too small a basis for an energy policy. Interfacing with the energy policy responsibility of the other consumer regions is therefore

an important task to be carried out in the framework of the IEA.

□ Finally, account must also be taken of what are at present the relatively modest, but fast growing, energy requirements of the non-oil producing developing countries. Because of its dependence on the oil-producing countries, Europe is also, of necessity, vitally concerned in increasing its cooperation with them. This could take place either within a specifically European framework, or in a global context.

### **The Crucial Role of Oil**

It is thus obvious that energy policies in Europe really cannot be different from those of the other industrial countries. The following analysis, therefore, looks at the energy perspectives of the IEA and OECD countries over the next 20 years and, as far as is necessary, makes reference to Europe.

The main task – and this is by no means a new message – is to make energy supplies less dependent on oil and to achieve the restructuring as quickly and smoothly as possible. Oil was, and still is, the crucial factor in the energy supply of the Western industrialised countries. In 1973, it contributed 53 % of the total

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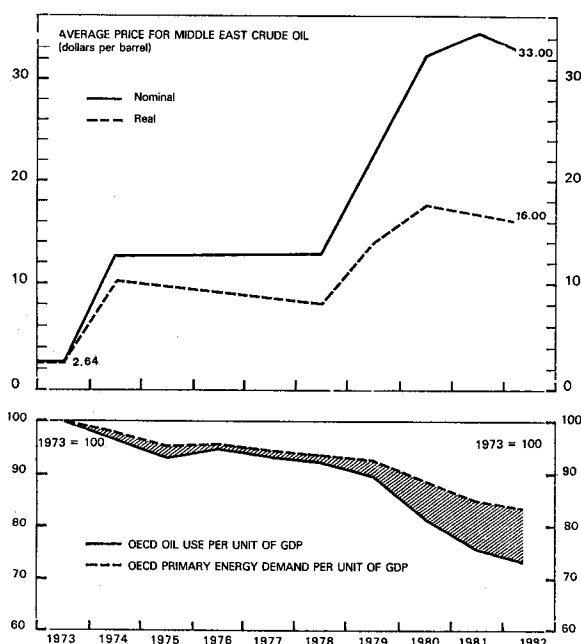
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energy demand of OECD countries, in 1981 its share had fallen to 47 % and will probably fall further to 45 % in 1982. Since most energy sources are competing directly or indirectly with each other, there is an interdependence of the markets of all energy sources. By its sheer volume, oil is still the price leader, and its development influences all other energy sectors. This interdependence exists not only in a national framework but also in an international context. All industrialised countries depend more or less on energy imports (OECD average 30 %, OECD Europe 46 %) and they all rely more or less on the same import sources.

Though oil still constitutes the backbone of world energy supplies, its importance has gradually diminished. While GDP in OECD countries was still rising from 1973 to 1981 in real terms by 20 % and total energy consumption still increased, though only slightly (2 %), oil use decreased by 170 million tons or 9 %. Per unit of GDP, oil use shrank rapidly, by 24 %. Total energy use per unit of GDP was also shrinking during this period but only by 15 % (cf. Figure 1). In 1982 these ratios will probably shrink further: total energy use per unit of GDP may have fallen by the end of the year by 16 % against 1973 and oil use by 30 %. These numbers reflect energy conservation in general as well as a substitution of other energy sources for oil. The shaded area in Figure 1 shows this substitution process. Developments since 1973 clearly demonstrate that structural change in the energy sector is well under way.

**Figure 1**  
**Crude Oil Prices**  
**TPE/GDP and Oil/GDP Trends 1973-1982**



On the other hand, the very difficult circumstances under which these changes took place should not be overlooked. Both oil price shocks of 1973/74 and 1979/80 have not only accelerated conservation and substitution processes but at the same time caused heavy economic losses. Industrialised countries have still not recovered from their worst recessionary phase since World War II. Unemployment in the OECD countries has climbed from 19 million in 1979 to probably 30 million by the end of this year. The serious social and political implications of such a rapid rise in unemployment are evident. The OECD Secretariat estimates that the real GDP of OECD countries in 1980 was 5 %, and in 1981 another 8 %, below the level which would have been possible without the 1979/80 oil price shock. The sum of these negative macro-economic effects in 1980 and 1981 corresponds to an output loss of about 1,200 billion dollars.

Despite the success up to now in reducing dependence on oil there is no reason to believe that in the long term the energy supply and demand situation will be well balanced. From the standpoint of reserves, oil is by far the scarcest energy source. The lifetime of the known reserves is little more than 30 years at present production rates. This has been somewhat lengthened in the last two years – not because of additions to net reserves but because of sharply declining demand.

The reserve situation for *natural gas* is more favourable (nearly 50 years at current production rates). Nevertheless, natural gas is also a precious hydrocarbon whose extraction over the next 20 years can be increased only within certain limits<sup>6</sup>. *Coal* reserves are larger by far and could last several hundreds of years at today's production levels. *Uranium* resources are limited. Their lifetime can, however, be expanded far beyond that of coal if advanced technologies (breeder reactor) are introduced. In conclusion, one could say that today's consumption pattern of mineral energy resources is the reverse of their reserve situation.

Apart from these *physical* limitations, oil carries a particular *political risk*. This stems from the dependence of industrialised countries on imports from abroad. In the OECD countries, the import share in total oil consumption averaged 59 % in 1981, whereas in 1960, it was only 46 %. The oil import share, however, is declining from its 77 % peak in 1977, mainly because the US has halted its production decline. These aggregated numbers conceal of course that apart from

<sup>6</sup> IEA/OECD: Natural Gas, Prospects to 2000, Paris 1982.

the two producing countries, Norway and the UK, most European countries depend on imports for 95-100 % of their oil demand. The same applies for Japan, whereas the US is able to produce 60 % of its oil needs domestically.

Despite the present easing of the oil market the potential for external disruption remains high. The three disruptions since 1973 (Yom Kippur War, Iranian Revolution, Iran/Iraq War) illustrate this vulnerability. Accidents as well as politically motivated actions may cause similar crises in the future. The disruption potential is of course smaller in an over-supply situation (as at present) than in a barely balanced market.

### Medium Term Outlook

Apart from the possible surprises which forecasters tend to put into footnotes, and which readers tend to neglect, the easy oil market situation will probably continue for the next 3-5 years.

Assuming a recovery of the world economy from 1983 onwards, world oil demand (outside Communist countries) in 1985 could recover to 48-50 mbd<sup>7</sup>, or about the 1980 level of 49 mbd. Demand for OPEC oil under this scenario could be around 23-25 mbd and non-OPEC output is also estimated at 23-25 mbd. The real oil price during this period is likely to decline or at least remain stable.

From the mid-1980s onwards, the situation will be characterised by a gradual increase of world oil demand and shrinking reserve capacity. A tightening of the world oil market can thus not be expected before the second half of the 80s, provided the hidden risks do not materialise beforehand.

One should not overlook the risks inherent to the oil market in the next 5-10 years. A "normal" development is dependent upon two critical assumptions: The first concerns the production policy of OPEC countries. Will they be willing to produce and export oil during the entire decade at prices and conditions favourable to the reasonable growth of the world economy? This question may sound odd in view of OPEC's present difficulties of producing below "willing" capacity, but it seems prudent to take a longer term view. Since the Iranian revolution, the low absorbing countries in particular have been warned not to accelerate their industrialisation too much. These lessons could lead to a further shut-in of oil-producing capacities towards the end of this decade when oil demand is rising. Capacity may also quickly

disappear involuntarily, as occurred at the outbreak of the Iran/Iraq war. The supply risks have also been increased by a continuous rise of the Saudi Arabian share in OPEC production during the last 10 years (around 35 % at present, 16 % in 1970). Secondly, the oil demand forecast by the IEA Secretariat is assuming a modest growth which some, however, would argue understates the possible growth of demand. This moderation of demand will be realised only if conservation efforts are continued with the same speed as in the past few years and if alternative energies such as coal and nuclear power really assume a greater role. If the speed of structural change should, however, slow down, the rising overall energy demand will undoubtedly concentrate again on oil. Since the reserve capacities of the oil-exporting countries would by the end of this decade more or less be soaked up, a small event would be sufficient to cause yet another oil price explosion.

### Short-term Disruption and Structural Change

The calm oil market could create the illusion that a further strengthening of energy policies, both on national and on international levels, is not required in order to achieve a balanced energy supply mix in the long term. Even the medium- and longer-term outlooks tend to be heavily influenced by the present oil market surplus. However, on both the supply and demand side structural change can be achieved only in a very long-term process and until this has taken place, industrialised countries will remain vulnerable. Energy production projects (such as power stations, coal mines, etc.) and infrastructure investment projects for producing and consuming energy can frequently have lead times of 5 to 10 years. Projects which have not yet been commercially tested (such as most types of solar energy, synfuels) may easily have lead times of ten years and more.

Many people are understandably confused about the significance of what is actually happening in the oil market. It would perhaps be helpful to review what occurred six years ago. The present situation may be compared with the events of 1976 when, following the 1973/74 price rises and the ensuing world recession, world oil demand was low and there was significant spare production capacity in OPEC countries. This apparent calm proved deceptive. By 1978, in response to economic recovery, OECD oil demand had risen by 4.4 mbd from its 1975 low point. When the Iranian revolution disrupted production, a further price explosion resulted. Some industrialised countries had misinterpreted the message in 1976 and, as a result, relaxed efforts to reduce oil dependence.

<sup>7</sup> Million barrels per day; conversion factor: 1 mbd = 49.2 mtoe per year.

Consequently, industrialised countries are still today in a severe economic recession.

The speed of structural change in energy production and consumption is closely related to the oil market cycle. The two oil price shocks during the last eight years have greatly accelerated structural change. There was a great push towards energy conservation and behavioural changes during the first two years following the 1973/74 oil crisis; but from 1976 onwards the structural change slowed down again. This is illustrated by Figure 1. The specific oil consumption to produce one unit of GDP even increased in 1976. This phenomenon is closely related to price developments. With a certain time lag, the decline of real oil prices (from 1974 to 1978) translates into a slowdown of oil substitution.

Today, the price decline is even steeper than from 1974 to 1978. If in addition, weaker prices are generally expected for a number of years, there is a real danger that short-term prices will be factored into long-term investment decisions – or more precisely, that they will delay energy investments.

This by no means implies that the breathing-space granted to the world economy by sinking oil prices is unwelcome from an energy policy point of view. But energy policy must warn against a too short-sighted view which does not correspond to the long-term scarcity of oil. If all consumers were to follow short-term price signals, this would pre-programme further extreme price fluctuations.

One of the main tasks of the IEA in the present "post-crisis" period will be to remind governments, industry, and the private consumer of the continued necessity to move on with structural change in the energy sector and to guard against a relaxation of energy policy efforts. There are many signs that just such a slowdown is already happening. Generally, the funding of energy research and development projects has been diminished; public support for expensive synfuel projects has been drastically cut; tax or other financial

incentives have been withdrawn for a range of conservation investments; nuclear power programmes are falling further and further behind schedules envisaged even a short while ago. Particularly in the United States the argument is gaining ground that the adaptation to new structures should be left entirely to market forces. These developments stress the danger that long-term energy goals are losing in priority in the political decision-making process against other competing aims as soon as tension on world oil markets lessens.

Since there will be no absolute energy supply security, particularly in Europe, as long as a high share of oil consumed is being imported, it is most important to have an instrument available to cope with short-term supply disruptions. The IEA has such an instrument in place. Its Emergency Sharing System can cope with supply disruptions in excess of 7 % of normal supplies. The IEA countries have also made progress in dealing with minor disruptions as was obvious by the very modest upturn of prices at the beginning of the Iran/Iraq war in autumn 1980 measured against the unchecked price rise in 1979.

There is a close interrelation between short- and long-term energy policies. If the economic consequences of short-term supply disruptions cannot be contained, the entire process of long-term structural change is endangered. The very high investments necessary to create new energy production facilities and a less energy-intensive consumption pattern can be financed only in a healthy economy. Conversely, progress towards structural change will diminish the short-term disruption potential.

### The Next Twenty Years

All the elements needed for the solution of the long-term energy problem are well-known. This point, therefore, can be dealt with briefly. Failure to solve the long-term energy problem will not be attributable to

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technical difficulties. What is lacking are not plans and ideas for overcoming potential bottlenecks, but the implementation of those plans. The obstacles are of an economic, social, and political nature, although that does not make them any less difficult to surmount.

Forecasts for the next twenty years are affected by many unknowns. But on the basis of our present knowledge, the following key figures illustrate what needs to be achieved. The IEA countries' oil imports, which totalled 21.5 mbd in 1980 and fell to 18.6 mbd in 1981<sup>8</sup>, will have to be brought down further by the end of this century to a level of 15-17 mbd. This must be achieved despite both a further growth of the OECD economies at a satisfactory rate (of around 3 % p. a.) and a further increase in overall energy demand. Oil consumption as a share of total energy consumption, which today still averages nearly 50 %, could then be reduced to 25-30 %.

Reducing oil consumption simply by slowing down economic growth would lead to an entirely unsatisfactory solution, because it would not solve any

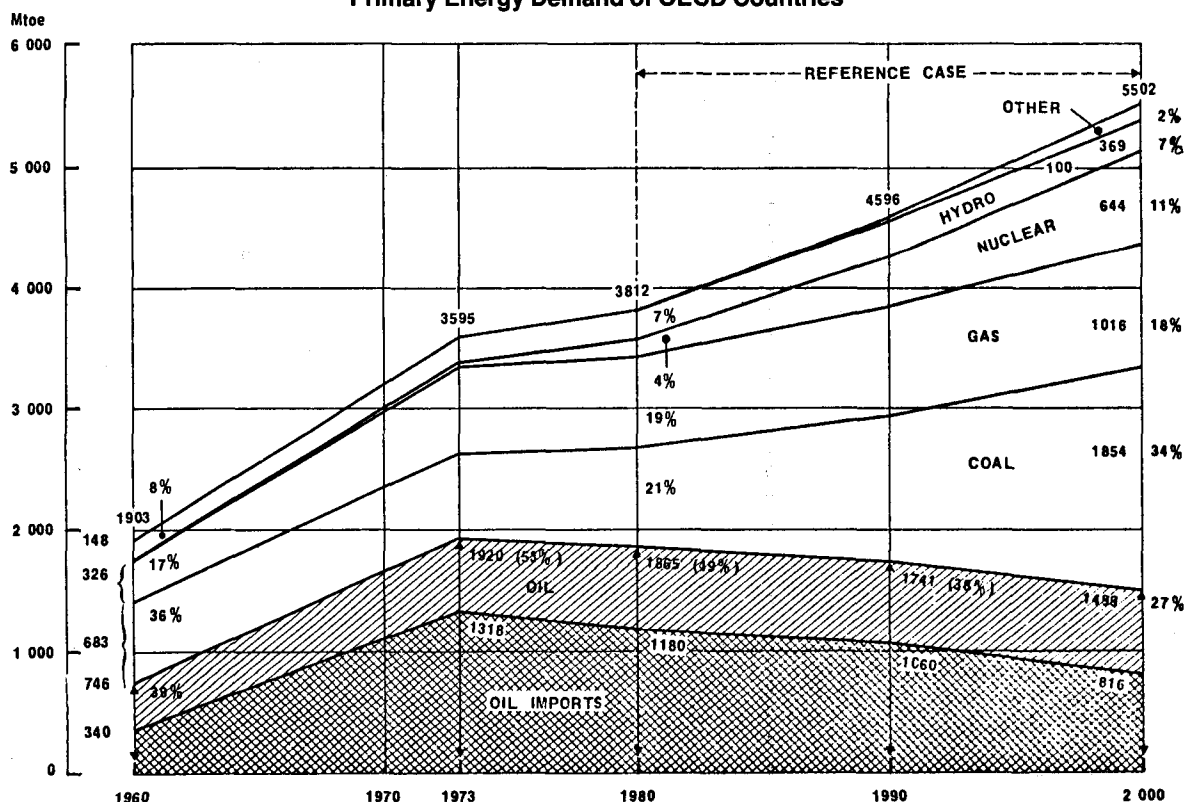
<sup>8</sup> Net oil imports in 1982 are estimated at only 17 mbd, but it has to be kept in mind that this occurs under recessionary conditions, while the figure for the end of this century assumes sustained economic growth of almost 3 % p. a.

of the social and political problems with which the industrialised countries today are struggling. In order to reduce oil imports to the above-mentioned levels, the energy future in the industrialised world (OECD/IEA) must be directed towards achieving the following targets:

- ☐ increase of coal production and utilisation by around 150 % in the next 20 years;
- ☐ increase of nuclear power production by around 170 % until 1990, and further significant increases (around 65 %) until 2000;
- ☐ stabilisation or even small increases of oil production in OECD countries through new discoveries, enhanced recovery and – although still limited – production of synthetic oil to compensate for declines in existing fields;
- ☐ limited increase of domestic natural gas production and significant increase of imports;
- ☐ considerably greater conservation efforts so that the growth in energy consumption steadily falls in relation to the economic growth rate (0.5 ratio).

Figure 2 illustrates the order of magnitude of this possible change. This "reference case" is not a forecast

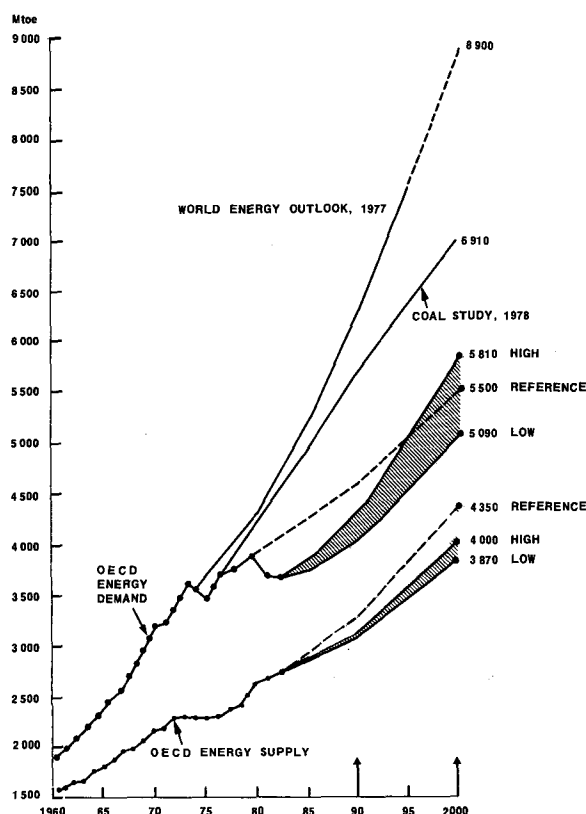
**Figure 2**  
**Primary Energy Demand of OECD Countries**





but a scenario of a development which would enable a smooth transition to a better balanced energy supply structure in the next twenty years. Only if these aims are realised are the economies unlikely to suffer from exogenous energy disturbances. These guidelines are not plucked out of the air. They are based on a detailed analysis by the IEA Secretariat of world energy supply and demand to the year 2000. An econometric analysis which initially assumes a mere continuation of existing energy policies and no drastic structural change in the economy has led to the conclusion that a supply deficit on world oil markets in the 1990s can be avoided only if oil prices rise in real terms and energy policies are considerably strengthened. Figure 3 gives the results of this econometric analysis and illustrates the possible range of results under different assumptions (high demand case: 3.2 % economic growth, no oil price rise; low demand case: 2.7 % economic growth, oil price rise of 3 % p. a.<sup>9</sup>). The IEA's study concludes that simply to continue with present trends will not be sufficient to guarantee the balanced development described by the reference case.

**Figure 3**  
**OECD Primary Energy Demand and Supply**  
**History and Projections**



The shaded area shows the range of projections; the Reference Case is taken from Figure 2. For comparison, two previous IEA/OECD forecasts are shown.

## Summary

- For energy supplies, Europe is, together with Japan, one of the most import-dependent regions of the world and will only slowly be able to free itself from this dangerous situation.
- For the foreseeable future, cooperation and policy alignment seems to be the most promising approach for steering energy policies in the European countries towards the same goal, leaving the detailed choice of means to be tailored to the individual national situation.
- Since all oil-importing countries largely depend on the same sources and since the other sources of energy are interdependent at world level, no country can solve its own energy problems at the expense of any other. The only prospect of solving present global energy problems lies in internationally concerted efforts, with all the major consumer countries pulling together.
- In spite of the substantial short-term successes in reducing oil consumption and imports, oil will continue to be the backbone of energy supplies in the foreseeable future.
- The temporary easing on the oil market must not lead to complacency. Any relaxation in energy policy efforts may well contribute to provoke the next oil price shock.
- Reduced dependence on oil imports can be achieved only through long-term structural change. In 20 years, coal could force oil back into second place as a source of energy. Nuclear energy and gas imports must also be substantial contributors to meeting the still rising energy demand.
- All the resources necessary to overcome long-term energy problems are available. What is lacking is the determination to achieve what are acknowledged to be the right objectives.
- The goal of a smooth transition to a less oil-dependent structure can be attained, but not by merely continuing with present energy policies. Only by more intensive efforts can the economies be restructured into a less energy- and oil-dependent pattern of consumption and production. Only then will there exist the prospect of achieving once more an acceptable rate of economic growth in the long term. If this cannot be achieved, it will have serious social and economic implications. The cost of an intensified energy policy would be less than the economic losses incurred without it.

<sup>9</sup> For the period 1985-2000; for the period 1980-1985, the assumptions are as follows: high demand case: economic growth 2.6 %, real oil price -3.9 %; low demand case: economic growth 2.4 %, real oil price -3.3 %.