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**Report on the Situation of Oil Supply, Refining and Markets in the European
Community**

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Community**

(Working Document of the Commission)

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REPORT

Background to the Report

- 1 The European Commission has been preparing regularly Reports for the Council on the situation of oil supply, refining and markets in the European Union since the late 1970's as a result of the oil price shocks. These have covered such developments as the problems of overcapacity, changes in demand structure and stricter environmental requirements. The last such Report was prepared in 1992 following the Gulf Crisis, in the form of a Communication to the Council [COM (92) 152].
- 2 The Council adopted a number of conclusions in response to the paper on 30 November 1992 which have influenced the work of the Commission. The strategic importance of a competitive refining industry to the stability of the product markets and Community supply security was acknowledged. The importance of the environment was stressed and close consultation with industry was recommended on possible environmental measures and the costs to producers and consumers thereof. Since then the Auto Oil Programme, which represents a new form of in depth cooperation between the Commission and industry has been started. The first proposals concerning both fuel specifications (gasoline and diesel) and motor vehicle emission standards resulting from this initiative are now being discussed.
- 3 The review of the current restrictions on the use of fuel oil in power generation (Directive 75/405/CE), which has resulted in the proposal in the White Paper - An Energy Policy for the European Union [COM (95) 682] to withdraw the Directive, was another of the Council recommendations. Support for the Producer Consumer Dialogue was stressed, and the Commission has remained active in this, and indeed co sponsored the International Energy Conference in Puerto La Cruz, Venezuela in September 1995 which brought together Ministers from producer and consumer countries to discuss energy issues in which they share a common interest. The Council reaffirmed the need for the Commission to continue to undertake these regular reviews and noted the importance of them to the Community when discussing energy policy.
- 4 The present Report is based on the mandate in the Council Conclusions 10369/92 of 30 November 1992 in which the Commission, 'is encouraged to regularly analyse the situation in the oil markets and in the refining sector in the Community' and in which the Commission is asked to, 'carry out in depth consultations with the oil industry prior to the introduction of environmental protection measures, particularly with a view to the influence of these on the cost for producers and consumers of such measures'. The Report has been prepared taking into account developments which have taken place in the sector since 1992, and the recent White Paper on Energy Policy which develops an approach based on three main pillars of energy policy for the Community, namely competitiveness, the environment and security of supply, which are all relevant for this sector.

- 5 The objective of the Report, is therefore to identify and explore the key issues concerning the sector (oil supply, refining, and marketing) notably refining industry performance, the environment, security of supply and the Internal Market and where appropriate comment on the implications for the Community.
- 6 The Report is the product of extensive analysis of the sector which has been undertaken following lengthy consultations with individual oil companies, industry associations and input from national administrations. The principal points and conclusions to emerge from that analysis are presented here covering the major issues and conclusions and in a series of annexes which deal with the issues in more depth within the overall general economic context.

The Oil Industry

- 7 Oil is by far the largest component of gross energy consumption in the Community. Consumption in quantitative terms is expected to increase over the next 25 years despite a marginal decline in its percentage share from 42% to between 36% and 38%. These figures are taken from the 2020 Study prepared as part of the White Paper on Energy Policy; discussions on how these can be reconciled with the Community's international obligations with regard to greenhouse gas emissions will take place in more specific fora dedicated to this issue. The Community is the largest world net importer of crude oil. Its total product imports and exports are approximately equal and it is characterised by its open trade policy.
- 8 The Oil sector represents a major partner in the Community economy. Accordingly, the successful performance of its different segments (notably Refining and Marketing) has been and will continue to be of strategic importance for the Community in the field of energy, and both economically and socially. The sector is currently going through a period of change with the possibility of new alliances and joint ventures as enterprises adapt to changing trading conditions in the Community and new market opportunities, particularly in Asia.
- 9 The Report concentrates mainly on downstream Refining and Marketing in the Community. These two activities have been considered as broadly separate although the proximity of individual refineries to particular markets, which reflects the importance of distribution costs, is also a factor. Oil companies are often vertically integrated, from Exploration and Production (Upstream) to Refining and Marketing (Downstream), and in some cases have large Chemicals activities as well. The financial performance of the integrated whole is often considered to be a measurement of the health or profitability of the industry and some recent consolidated profit announcements have been good. However, it is important to consider each activity separately as there are opportunities to participate in only one part of the chain, for instance exploration companies, refining companies and marketing companies. These compete within particular sectors hence each individual activity has to be considered on a stand alone basis.
- 10 The refining sector has consistently provided the Community with secure supplies of oil products, such as transport and heating fuels, at competitive prices whilst at the same time improving its environmental performance. However, the Report reveals some trends in refining profitability which might impact negatively on industry's capacity to continue this role which requires ongoing investment, given that increasingly there are opportunities outside the

Community which may prove to be more attractive as investments than those within the Community.

Refining Profitability

- 11 The refining sector has suffered from poor profitability for some time. Margins on the most basic of the refining processes, the initial processing by distillation, are currently virtually nil whilst the margins achieved on upgrading processes which improve the intermediate products, such as catalytic reforming and cracking, remain too low. Individual refineries may be able to cover operating costs, but to sustain industrial development in the sector it is not sufficient to merely cover cash costs.
- 12 The three principal elements of the problem are outlined below. On the refining and demand side there are two factors, that of excess refining capacity and that of the product mix, notably the relative demand for gasoline and diesel. On the supply side there has been a change in the crude supply structure to Community refineries towards lighter crudes. These create their own particular problems, and when combined have also affected price differentials between products as explained below. The regulatory framework within which the industry operates has also had a crucial effect (environmental legislation, fiscal regimes on oil products).
- 13 Excess refining capacity takes two forms, firstly there is an excess of crude oil distillation capacity relative to the amount of crude oil processed. Secondly, there is an excess of conversion capacity which converts the low-value fuel oil produced in the crude oil distillation process to lighter higher-value products such as gasoline.
- 14 In this respect it is worth mentioning that the apparent contradiction of high reported utilisation rates and excess capacity can be explained by poor quality utilisation data. Percentage rates for utilisation are computed based on the initial nominal quoted capacity of a refinery, and over time the operator is often able to improve on this by making technical improvements to processing equipment as technology advances. However, these 'capacity creep' increases are not necessarily publicly available for competitive reasons and there is actually more surplus capacity than as demonstrated by the data.
- 15 The excess of crude oil distillation capacity as already stated is long-standing, and while the industry has made strenuous efforts over the last fifteen years to reduce it, an excess, albeit diminishing, persists. The situation is not helped by the above 'capacity creep' increases which are also achieved in conversion plant.
- 16 The excess of conversion capacity has arisen because of over-investment in recent years. This has happened mainly for two reasons. First of all the change in product mix demand. A different fuel mix between diesel and gasoline from that which was actually experienced was forecast - underestimating the growth in demand for diesel and overestimating the growth in demand for gasoline (demand for the latter actually fell).
- 17 Secondly, on the supply side it was forecast that the crude oils available over the period would on average become heavier whereas they in fact became lighter. This in turn was the result of a

lightening in the 'basket' of crude oils placed for sale by Saudi Arabia in order to maximise their oil revenues, and far better than expected production levels of North Sea crude which is generally light. This was made possible by cost reductions and technological advances in the upstream sector. Overall less rather than more conversion processing capacity has therefore been required as refining lighter crudes produces more lighter products.

- 18 Finally, there has also been the major impact which regulatory factors have had. There has been an increase in the cost of environmental protective measures, which is not immediately recoverable in product prices in the present market conditions. High clean up costs and the unpredictability of rates of fiscal duties have also had an impact on refining investment decisions.
- 19 The combination of these three elements has several consequences. In the short term there has been a 'mismatch' between refining capacity and product demand which has led to reduced differentials between light and heavy products which have led in turn to poor returns on investment. Refiners are reluctant to close refineries given the high clean-up and social costs. Instead, they are tempted to adopt a 'wait and see' approach as long as operations are cash positive or to try to sell refineries, even at very low prices, rather than close them.
- 20 The tendency for producer involvement downstream, which is welcomed as a demonstration of commitment to the Community market provides a pool of potential purchasers who may be governed by different strategic principles, and willing to enter the sector, particularly when refineries are available on attractive terms. There are likely to be further closures but even when refineries are closed there is no guarantee that margins will improve as the capacity may effectively be replaced by imports.

Marketing

- 21 The situation of the marketing sector varies across the Community but overall is in substantially better condition than is refining. Structural differences of historic origin play a major role as do the different levels of upstream and downstream integration of the participants in the respective market areas. There is a general trend across the Community for the number of retail sites to decrease with a corresponding increase in average volumes sold per site. However the pace of this restructuring across individual Member States differs depending on a number of factors.
- 22 The advance of the hypermarkets at the expense of traditional operators in a number of Member States has also been significant. For the moment, this appears to be to the advantage of the consumer in terms of the significantly lower prices that are on offer but it is causing the traditional operators and notably the refiners to suffer a material drop in profits in those markets most effected. This in turn damages the ability of the operators to maintain capital expenditure on improving retail outlets in those markets and may lead to more retail site closures. Secondly, some operators are swapping retail outlets in order to reinforce their presence in particular areas. This often leads to a reduction in unit costs which may be shared with consumers provided there remains sufficient competition. These developments affect the overall structure of the market and accordingly the role of the traditional operator is changing.

Given the scale of change and the importance of the sector these trends both require monitoring.

Environmental Issues

- 23 There is a great deal of concern across the Community about the environment and in particular air quality. Citizens are demanding improvements and indeed specific commitments in this respect were made in the Framework Convention on Climate Change. Environmental legislation, particularly with regard to the downstream sector, is complex. Environmental measures cover the operating arrangements in the refining process itself, product specifications and emission limiting equipment in the distribution chain. However improving for instance fuel specifications is not an isolated activity and requires close cooperation with other industrial sectors. This has been the case with the Auto-Oil Programme and its search for the right balance between the most cost effective measures.
- 24 The Auto-Oil Programme is a tripartite initiative on air quality, emissions, fuels and engine technologies by the Commission; the Refining industry (EUROPIA) and the Motor industry (ACEA). The objective was defined as being to provide policy-makers with an objective assessment of the most cost-effective package of measures including vehicle technology, fuel quality, as well as local measures, necessary to reduce emissions from the road transport sector to a level consistent with the attainment of the new air quality standards being developed for adoption across the Community.
- 25 Specific measures are often introduced on a step by step basis and at any given time industry is commissioning new equipment in response to earlier legislation, planning how to meet the future targets specified in existing legislation and involved in discussions on how further improvements may be made. These measures demand heavy expenditure by the industry in refineries and in storage and distribution plant, and each new protective measure, such as a further lowering of emission levels is generally proportionally more expensive than the last as the technical challenges of even greater improvements increase correspondingly. Some estimates of the potential costs are included in Table D5 in the Annex.
- 26 The whole Community benefits from improved air quality and in view of the magnitude of the investments required and the long term nature of the refining industry there is an obvious need for consistent and predictable regulatory measures based on a cost effectiveness approach to ensure that these benefits can be realised.

Security of Supply

- 27 Security of Supply remains a major issue, as outlined in the White Paper on Energy Policy, although the risk of any serious threat to the Community's security of oil supply in the short term is considered to be low. Conditions have changed substantially from the crisis/sub-crisis situations which existed some twenty years ago when crude and product supply sources and markets were much less diversified, transparent and efficient than they are today.
- 28 Nevertheless because the Community will continue to depend heavily on imported crude oil there is an ongoing need for vigilance in both the short and long term. More than three quarters

of proven world oil reserves are located in potentially unstable areas from a political and/or economic point of view and this highlights the continuing requirement for measures, adapted where necessary to changing market circumstances, to meet the possibility of sudden supply disruptions which would be highly damaging for the world and Community economies. Considering the fact that secure refined oil product supplies represent an indispensable element of the socio-economic wellbeing of our population the existence of a strong and competitive refining sector in the Community is of strategic importance.

- 29 Good producer-consumer relations need to continue to be developed in order to protect the current stability, and the dialogue and alignment of interests via mutual investment and operational arrangements should continue. Improvements in technology which make exploitation of new provinces possible will contribute to this and further improve the diversification of supply. Upstream investment possibilities in both OPEC and non OPEC producer countries are now beginning to open up for Community companies and producer investment in the Community downstream sector is continuing. Such moves consolidate the mutual interest that both parties have in the successful performance of the oil sector as a whole and are to be welcomed as long as they are based on market principles.

Internal Market

- 30 The Internal Market in the Oil Sector is relatively well developed and transparent compared to other energy sectors. Many of the developments in the refining sector stem from the fact that the Internal European Market is part of the wider world market with global competition. It is clear that very little rate approximation between Member States has taken place since 1 January 1993. As outlined in the White Paper on Energy Policy this is an area where progress is difficult, given the wide range of interests and views but efforts continue in order to remove distortions.
- 31 Similarly in the field of product technical normalisation there still remain across the Community many instances of differing norms in essentially similar products which may not allow the full benefits of the Internal Market to be realised.

Conclusions

- 32 A healthy oil sector underpins social and economic progress in the Community, provides the necessary security of supply at competitive prices and can support improvements in environmental protection. The security of oil supplies at reasonable prices to the Community is largely dependent on the smooth functioning and stability of the international oil market. Hence there is the need to continue to foster and develop a policy of dialogue and cooperation with the Community's main oil suppliers and competitors on the international market and to enforce and promote the Energy Charter Treaty.
- 33 It is of prime importance that a good climate for investment be developed. While the industry as a whole shows today a generally good financial performance mainly due to its vertical integration and diversification of activities the fact is that the Community refining sector has over the last few years experienced a period of very poor refining profitability, the reasons for which result from market circumstances as well as from regulatory factors.

- 34 This situation is likely to lead in the short term to a restructuring process resulting in the closure or sale of refining capacity which to a certain extent has already started. However, it is not possible to predict exactly where or when, or even how much capacity will be involved because of the wide range of factors involved across the Community. To the extent that rationalisation will occur in the sector the Commission emphasises that, as in the 1980's, individual refiners must remain responsible for taking decisions about capacity closures. These decisions should take place in the most cost effective way and satisfy the competition rules of the Treaty. The Commission will continue to monitor the situation and discuss with industry and Member States.
- 35 It is in the Community's long term interest to have a strong technologically advanced refining industry. It contributes to security of supply, competitiveness in general, and that of the sector itself and the petro-chemical sector plus the associated service and equipment supply industries in particular, and of course to employment in the Community. It must also be recognised that there is growing competition for investment from regions outside the Community where new markets are growing and strengthening.
- 36 Environmental policy and the necessary legislation required to bring about the desired improvements in air quality will continue to impact on the sector, particularly because of the magnitude of the investments required. Its importance will continue to influence activities both in the refining and marketing areas. Measures should be coherent within a consistent and predictable framework based on a rigorous cost-effectiveness approach.
- 37 The Commission recognises that, although Member States have generally increased their rates of excise duty, very little rate approximation has occurred. The Commission has launched a wide ranging consultation process, before considering what, if any, proposals are necessary in order to improve the functioning of the Internal Market. In addition the Commission recommends further study of possible improvements in the field of product technical normalisation.
- 38 The Commission will undertake regular analyses of the oil and refining and marketing industry in the Community including an improvement of the accuracy of our understanding of the refining capacity situation and utilisation rates, recognising the importance of these for the formulation of energy policy and the successful implementation of the White Paper on Energy Policy.

ANNEX A

General Economic Context

The strong recovery in the Community economy in 1994 gave way to a marked slowing of the rate of expansion during 1995. Output growth which had reached 4% during parts of 1994 is for 1995 as a whole likely to be of the order of 2.5%. The outlook for 1996 is now less favourable than previously anticipated and it now seems likely that growth will be below 2%. However, the main forces determining the growth outlook for the European economy are favourable to a renewed pick-up in the rate of expansion in economic activity during the year and although the average for the year is likely to be below that of 1995, the underlying trend would, in contrast, be positive.

The main positive growth forces include:

- the world economy outside the Community is set to expand at a healthy pace;
- the fundamentals of the Community economy in terms of low inflation, moderate wage pressures and sound investment profitability are favourable; and
- monetary policies have eased.

Outside the Community economic activity has been expanding at a strong pace since 1992. There has been a renewed dynamism of world trade as the emerging markets in Asia and Central and Eastern Europe rapidly integrate into the world economy and the benefits of the trade liberalising measures agreed in the GATT Uruguay round begin to be felt. The rapid pace of export market growth appears to have slowed down but the outlook for the external environment remains relatively favourable.

ANNEX B

Crude Oil Supply

B.1 Global Energy Reserves

Following the oil shocks of 1973 and 1980, long run adjustments have now been made and energy supply and demand have achieved a new balance. As a result, global energy reserves are considered adequate and are unlikely to pose a physical constraint in the medium term.

Proven oil reserves are some 43 years (Chart B.1). This is certainly the lowest resources/production ratio (proven reserves to current rate of production) among the fossil fuels, although these oil reserves are equivalent in energy terms to the gas reserves (ca. 135 billion tonnes oil equivalent (btoe)). However, new discoveries and higher recovery rates from existing fields have matched or exceeded consumption for many years - proven reserves have trebled since the mid-1960s. In geopolitical terms, it is of the utmost importance to note that 65 % of the reserves are held in the Middle East, a further 11% in Venezuela and Mexico and 6 % in the CIS (Chart B.2).

World proven reserves of solid fuels (at present rates of production) extend to over 200 years. Proven gas reserves extend to some 65 years. These have been growing recently in parallel with the big increase in demand for this fuel. 70 % of world gas reserves which are located in the CIS or the Middle East, much of which are within range to economically supply western or central Europe.

There is uncertainty about the impact of the changing shift in world demand for oil. Oil demand will grow strongly, particularly in China, India and other fast-developing Far East countries. So although there is unlikely to be a shortage of oil in the medium term, there could be growing competition from the emerging economies, particularly as both the US and Europe face increasing dependency on imported energy.

B.2 Global Oil Supply

From the mid-1980s, OPEC had regained some of the share lost to new non-OPEC production following the oil price shocks of the 1970s. However, in recent years, technology and cost reduction advances in oil exploration and production, notably in the North Sea region, have resulted in OPEC taking a lower than expected share of the growing demand for oil (Charts B.3 and B.4).

Demand for oil is forecast to continue to rise, very gradually tightening the global supply/demand balance. As well as increasing the requirement for non-OPEC crudes,

supplies from OPEC countries are bound to increase, particularly from the high-reserve countries of the Middle East and from Venezuela. There is already available some 2-3 mb/d of spare production capacity, mainly in the Gulf, without taking into account potential Iraqi production of ca.2 mb/d.

Between 1985 and 1994, world crude prices (as represented by Brent crude in current money terms) averaged about \$20/bbl compared to nearer \$40/bbl between 1975 and 1985. Over the past three years, the average has been nearer \$17/bbl (Chart B.5). Conventional wisdom has it that oil prices can be expected to increase in real terms, albeit only very moderately, over the next ten to fifteen years. Even against this background of a tightening supply/demand balance, crude oil prices are expected to rise only moderately for a number of reasons:

(i) Technology-Driven Reduction in Exploration and Production Costs

Many of the larger non-OPEC producing regions are mature developments, with reserves well on their way to depletion. Oil in the lower 48 states of the USA (i.e. excluding Alaska) has been exploited more thoroughly and for longer than almost anywhere else in the world. Even Alaskan oil, although discovered more recently, faces a future of declining production. The fall in oil prices in the mid-1980s had contributed to this trend by making some of this non-OPEC oil production uneconomic. However, many mature non-OPEC areas have been undergoing a revival, or at least have not declined by as much as expected. The technical response of the oil industry to the challenge of extracting oil economically at lower oil prices has exceeded expectations.

There has been a significant reduction in cost of finding and extracting oil. Although there have been man-power reductions to improve productivity, technology has played the greater part. Exploration techniques have become more efficient and drilling technology improvements have considerably enhanced the productive capacity of oil fields. Small, formerly uneconomic, oil fields in the North Sea can now be exploited using specialist production vessels; horizontal drilling has become a widespread technique in only a few short years as a method of significantly enhancing oil field production capability. At the same time, many governments have improved their fiscal regimes in order to encourage oil exploration and production. Estimates for the cost-reductions vary, but it is possible that finding costs could have halved over the past decade. Once developed, technology developments cannot be undone. Nor will technology stand still: even if future progress does not match that of the recent past, further developments will serve to dampen future oil price rises.

(ii) Increasing Global Reserves

Reserve additions have been replacing oil at least as fast as it is being used. Yet large areas of the world have still to be exploited or even remain unexplored. Potential new oil provinces include the west of the Shetland Islands, the Barents Sea, the Alaskan

National Wildlife Reserve, the South Atlantic and South-East Asia. Although obviously not an inexhaustible resource, the reserve base of oil does not seem to be a problem for some considerable time to come. However, it should again be noted that the traditional OPEC oil producers are expected to remain the predominant owners of global reserves.

(iii) The Changing Influence of OPEC

OPEC recognises that not only should prices preferably be moderate, but that stable prices would be in their long-term interest. As history has demonstrated, oil price shocks only choke off demand. Based on this experience, OPEC is in future likely to adopt a more market-orientated approach to pricing and supply, allowing prices to be driven by supply/demand factors.

(iv) Re-integration of the World Oil Industry

The growing participation of producer countries in EC downstream activities has over the last few years been followed by the opening-up by most of these countries of their upstream sector to consuming countries' companies. This process of re-integration is likely to continue and expand worldwide and will assist the stabilisation of world oil markets.

(v) Increased Sophistication of Oil Markets

Oil markets have become increasingly sophisticated in their operations. They have become much more transparent thanks to the information technology revolution and the underlying trends driving markets are now far better understood. That is not to say that there will not be volatility - after all, volatility is the basis upon which markets make their money. But the prospect of sustained oil price crises, induced by non-transparency of the driving forces, have become less.

(vi) Government Action to Facilitate Emergency Supply

Effective measures now exist at global level, notably the IEA, and at regional levels, such as the EU, to face potential supply disruptions. The Gulf War was a good reminder to the world that these measures exist and can work. At both the IEA and EC levels, efforts are being made to keep these measures in line with changing market circumstances.

(vi) Alternatives to Oil

It is worth considering the alternatives to oil. In twenty years, oil has been effectively ousted from much of the steam generation sector (in particular for electricity production) in the developed world, first by coal, then by nuclear. Now it is the turn of natural gas. Over the next ten to fifteen years Europe's demand for gas could increase

by 40 %, with half of the increase being for the power generation sector. Although oil will retain its near monopoly of the transport sector, it will have to fight for a dwindling share of static markets - not an environment for price increases. In the long term renewable sources of energy such as solar, wind, biomass, biofuel and geothermal which produce little or no pollution will constitute the main sustainable energy source and the Commission, as mentioned in the White Paper on Energy Policy, will come forward with a strategy for further development in the form of a Communication.

B.3 European Union Crude Oil Supply

B.3.1 Reserves

Europe has significant coal resources although these will be decreasingly exploited. Oil and gas reserves, although modest by world standards, are expected to remain a significant indigenous energy resource.

Total Western European proven oil reserves are less than half of the gas reserves (2.2 billion tonnes (bt) versus 4.9 btoe of gas). Most of those reserves are under the North Sea. EC oil reserves are 0.9 bt with almost all of the rest of European reserves being held by Norway. The European reserves to production (R/P) ratio is just 8 years, although reserves are being replaced almost as fast as they are being used so, taking probable reserves into account, the actual life will be considerably longer.

B.3.2 Production

Energy production in the EC can be expected to peak around 2000 after which all of the primary fuels, except renewable energies, are forecast to decline modestly. By 2005, EC energy production is unlikely to have fallen below that of 1992.

EC North Sea oil production peaked in the mid-1980s and fell back quite rapidly over the following few years. However, production has actually been increasing since 1991 as technological advances in exploration and production as well as more favourable tax regimes have allowed new smaller fields to be brought on-stream economically while enhancing recovery from existing fields. As a result, decline is not expected to set in again until the late-1990s.

B.3.3 Import Dependency

Europe has been deficit in energy for many years, in spite of a long established and substantial domestic coal industry, and, in more recent years, the development of major oil and gas reserves in North-West Europe and a major nuclear power industry. Rising EC

energy demand and declining domestic primary energy production will result in an increasing reliance on imports from third countries, notably the Middle East and the CIS.

The dependency of the EC on imported energy (i.e. energy imports as a percentage of gross inland energy consumption) currently stands at around 48 %. Although only slightly higher by 2000, dependency could reach 55 % by 2005, accelerating thereafter.

The main change in import dependency is in coal - as domestic production declines, EC imports have risen from 29 % of consumption in 1990 to around 44 % at present and are expected to be 50 % by 2005.

Gas dependency is around 40 % and the strong demand growth forecast for the next ten years increases that figure to over 55 % by the middle of the next decade.

The dependency of the EC on imported oil is already high (Chart B.6). Imports accounted for nearly 80 % of consumption in 1990, although the recent strong performance of EC North Sea production has actually reduced the figure slightly. Including Norway, this figure drops to 60 %. With the projected long-term downturn in EC crude oil production expected to have only just started by 2005, and the expected continued modest growth in oil product demand in prospect, EC import dependency may be expected to rise to 83 % by around 2005.

B.3.4 Crude Quality

Until relatively recently, circa 1993, the quality of the crude oil barrel (that is, the overall mixture of crude oils) processed in European refineries had been getting progressively heavier. Production of domestically produced crudes, which tend to be relatively high quality, had fallen while imports of heavier crudes had increased. This exacerbated the impact on refining of the rising demand for high quality products for transport and resulted in significant refinery investment in new plant to convert heavy oil fractions into lighter ones. However, from 1993 onwards the average gravity of the EC crude slate has changed significantly due to the factors mentioned below. (Chart B.7 illustrates the trends in the average gravity of crude oil supply pre- and post-late 1993.)

Over the past two years, North Sea oil production has enjoyed a revival. Consequently, the total level of oil imports into Europe has fallen slightly. Net crude oil imports into the EC-12 in 1994 were 27 mt, or 6½ %, lower than in 1992.

The quality of imported crudes has changed too. OPEC crudes tend to be heavier, but not only has their share of global oil supply fallen somewhat over the past couple of years, but the overall quality has improved too. This is the result of a specific strategy by Saudi Arabia to maximise exports of higher value light grades in place of medium and heavy grades as far as possible in order to compensate for the substantial fall in oil revenues experienced since

the 1986 price fall. This has included the development by Saudi Arabia of recently discovered oilfields containing very light crudes.

Finally, global supplies of condensates and natural gas liquids (NGLs) have been rising for some years. Blended with crude oil or directly imported as refinery feedstock, they have had the effect of lightening the global supply barrel.

The unexpected lightening of the EC crude supply barrel mentioned above is one of the main causes of the present poor profitability of EC refineries.

The future direction of the quality of crude oils processed by EC refineries is difficult to forecast. In the very long-term, the vast reserves of medium and high gravity crudes held by the countries of the Middle East will eventually supply an increasing share of EC requirements as domestic reserves are depleted. In the near term, the supply barrel may well remain of a higher quality than had previously been expected.

B.3.5 Supply Security

For the moment, there is generally little cause for concern as to both the current and future outlook for security of oil supply. Conditions have changed substantially from the crisis/sub-crisis situations which existed some twenty years ago when both crude and product supply were much less diversified than they are today (Tables B. 1/2/3/4/5/6).

Moreover, there is the potential for an excess of oil supply over demand for some years to come. Nevertheless, the underlying assumptions as to the stability of crude oil supply sources should be subject to continual review. Indeed, as has already been indicated, more than three-quarters of world oil reserves are located in potentially unstable areas from a political and/or economic point of view. These will remain the dominant source of EC supply in the future.

There is therefore an ongoing need for the EC to see to it that good producer-consumer relations are fostered by a process of dialogue and alignment of interests via investment and operational arrangements. Upstream investment possibilities for EC companies in producer countries are now opening up, and the developments that producer country companies have been pursuing in the EC downstream sector in recent years are continuing. Such moves consolidate the mutual interest that both parties have in the successful performance of the oil sector as a whole. Instances of this process are:

- The development of co-operation in the energy field between the Gulf Co-operation Council (GCC) countries and the EU, as found in the progressive vertical integration of respective GCC and EC industries where EC downstream investment is undertaken by GCC companies while upstream investment is undertaken in GCC countries by EC companies

- The Commission's co-sponsorship of the Fourth International Conference on Energy in Puerto la Cruz, Venezuela on 25/27th September 1995
- The Commission's participation in the Barcelona Conference of 27/28th November 1995 on Euro-Mediterranean Co-operation
- The establishment of the European Energy Charter which will provide a context within which investment by EC companies in the exploitation of the hydrocarbon resources of the CIS and CEEC may be undertaken with confidence

Further attention needs to be given as to how best to facilitate this process of dialogue, hence the need for the EC as the world's largest oil importer to support and promote the political dialogue between producers and consumers following the new impetus given by France and Venezuela at the Paris conference in July 1991.

Having sought to promote supply security via appropriate political arrangements as described above, there remains an ongoing need to ensure that there are in place adequate arrangements for the management of crisis situations via the maintenance of stock obligations and other co-ordinating activity. In this connection, there is broad satisfaction as to the complementarity of IEA and EC systems and the continuing efforts of both institutions to keep the necessary arrangements in line with the changed situation of the oil markets and, particularly as far as the EC is concerned, to adapt the existing crisis legislation to the functioning of the internal market.

A further issue to emerge in the context of supply security is the general question of crude oil supply logistics. The EC must have regard to the continuity of its long-term crude oil supply and be vigilant as to new opportunities to ensure its access to the supply arrangements that are evolving as a result of new crude oil production sources and changing political circumstances. Examples in this connection would include the new pipeline networks that are being developed or mooted in respect of new CIS production, notably from the Caspian Sea, and the re-opening of the ADRIA pipeline in Croatia, as well as the possibilities that are being considered in respect of Russian oil exports in the context of Trans-European Network support, as provided for in the Treaty.

ANNEX C

Oil Product Demand and Supply

C.1 **Global Context**

World energy consumption more than doubled over the last three decades, reaching 8.4 btoe in 1990. Between 1974, the year following the first major oil price shock, and 1992, the annual rate of growth was almost 2 %. Growth has recently ceased because of declining consumption in the former communist countries, but, as these economies recover, the underlying trend will be restored and demand for energy can be expected to grow again. The IEA estimate that energy could grow at 2 % or more each year over the next 10 to 15 years.

As regards the split by type of EC-15 1995 gross primary energy consumption of 1369 mtoe, oil predominates with 574 mta, representing a share of 43 %, with gas coming some way behind in second place with 277 mtoe (20 %). While by 2005 oil consumption rises to 606 mta, its share drops to 39 %, principally in favour of gas and renewables. (Charts C.1 and C.2 respectively show the position for each year.)

Overall OECD oil growth is forecast at around 1 % p.a. between 1992 and 2010 by the IEA. Outside the OECD, while energy growth in the countries of the CIS and Central and Eastern Europe takes some years to recover (but is still forecast to increase at an average of 0.6 % p.a. between 1992 and 2010), the developing world will achieve growth rates of as high as ca. 4 % p.a.. In quantitative terms the forecast OECD growth of 1% is considerably larger than that of the developing world's 4%. In particular, the developing countries of the Pacific Rim, led by China and the "tiger" economies of South Korea, Taiwan, and the ASEAN countries, as well as Latin America, will be foremost in this growth.

In the OECD, oil will continue to be increasingly concentrated in the growing transport sector, offsetting declining demand in other sectors. In the developing world demand will grow in all sectors because of the burgeoning need for energy in general and the lack of suitable alternatives to oil in many parts of the world. Transport sector growth will be the strongest. Although world oil demand will continue to increase, it will be outstripped by the other main primary energy sources, particularly gas. While losing share, oil will remain the most important source of world energy.

C.2 **EC Oil Product Demand**

C.2.1 EC Oil Product Demand Statistics

There has been a flattening-off in overall demand in recent years, while relatively modest growth (ca. 0.5 % p.a.) is expected over the next ten. (Chart C.3) illustrates the expected evolution of EC-15 oil demand, including the barrel split, over the period 1990-2005, the projections from 1995 on being based on the Commission's latest base case.)

The Western European demand barrel has become steadily lighter over the last twenty years, with the most pronounced growth being observed in middle distillates, followed in turn by gasolines and other products. (Chart C.4 demonstrates this evolution in percentage terms. Chart C.5 provides a further demonstration of how the barrel lightening has been predominantly in the direction of middle distillates since 1990 and also shows how this is expected to continue for a further ten years, albeit at a decreasing rate after 2000.)

EC-12 oil demand was 494 mt in 1994, excluding some 35 mt of fuels for marine bunkers. At these levels oil accounts for some 43 % of total EC energy consumption. Gasoline (i.e. aviation and motor gasolines plus light chemicals feedstock) accounted for 27 % of total EC oil demand, middle distillate (jet and heating kerosines, and gas and diesel oils, including marine bunker fuel) for 44 %, fuel oil (industrial and power station fuel plus marine bunker fuel) for 18 %, and other products (refinery gas, liquefied petroleum gas, solvents, petroleum coke, lubricants, bitumen and waxes) for 11 %.

It is to be noted that the share of light products has been increasing steadily since the oil price shocks of the 1970s caused demand for heavy fuel oil to decline in the face of competition from other energy sources while the demand for gasoline, kerosene and diesel for transport has risen. More recently, and unexpectedly, the demand for diesel has continued to grow steadily at the expense of gasoline.

C.2.2 EC Demand Outlook

Commission forecasts predict that the overall level of demand for energy in the European Union will increase slowly but steadily over the next ten years, rising at around 1 % per annum.

As a result of the "dash for gas", mainly in the power generation sector, natural gas is expected to be the fastest growing fuel - demand could rise at over 3 % p.a.. Nuclear and renewables will grow too while coal declines. Oil is forecast to rise only modestly - around 0.5 % p.a..

While there is a possibility that the Directive 75/405/EEC banning the use of oil in power generation will be repealed, it is expected that oil demand for this use will fall. There is, however, some growth expected in the sectors of final demand - mostly transport fuels. Oil will retain the greatest share of total EC primary energy. By 2005 it is still expected to account for around 40 % of total energy consumed.

Oil demand growth will be concentrated in the non-substitutable transport and non-energy uses. Regionally, most of the growth is in Southern Europe, where there is more scope for increases in oil use as a result of stronger economic growth. Competition with gas will be an important factor, particularly where Heavy Fuel Oil (HFO) is being displaced for power generation (notably Italy) and where gas is being introduced as a new fuel (Greece, Portugal, Spain and parts of Scandinavia).

Overall, the demand barrel is expected to continue to lighten. In common with the worldwide trend, although not as strong as the trend in the developing world, growth is expected in the middle of the barrel. The products involved are kerosene for aviation uses and particularly diesel for transport, more than offsetting continuing decline in space heating uses of these fuels.

Gasoline demand may grow slightly, mainly in Southern Europe, but the continuing trend towards diesel-fuelled passenger cars is expected to limit growth, unless there are taxation changes to equalise excise taxes on the two fuels on an energy basis. This would still not reverse the trend completely though as there are still operating efficiency advantages in using diesel. Current concerns about particulate emissions by diesel vehicles should be technically resolvable.

The residual end of the barrel is expected to decline since fuel oil faces both environmental regulation and competition from natural gas. Nonetheless, a not insignificant proportion of residuals are used for purposes where substitution is not straightforward, HFO for marine bunkers, bitumen, lubricants and petroleum coke. These uses account for around 40 % of residuals in Europe and are likely to grow in line with the economy.

C.3 EC Oil Product Supply

The 1994 mass balance of EC-12 oil product supply was as follows: total EC-12 product demand of 494 mt and non-EC-12 exports (including bunkers) of 110 mt were met by 517 mt of net refinery production, non-EC-12 imports of 76 mt and EC-12 stocks and other changes of 11 mt.

The EU's own refining industry provides the overwhelmingly greater proportion (86 %) of overall product supply. While overall net imports of oil products are approximately zero (Chart C.6), this is made up of significant net exports of gasoline (15 mta), which have been increasing strongly over recent years, balanced mainly by net imports of fuel oil and naphtha (Charts C.7/8/9). Sources of product imports are widely diversified (Table B.2).

ANNEX D

Environment

D.1 Political and Economic Context

Protection of the environment is an EC objective of major political and economic significance. In Chapter XVI of the EC Treaty is set out the policy on the environment which the Commission has to promote.

There is a great deal of concern across the Community about the environment and in particular air quality. Citizens are demanding improvements and indeed specific commitments in this respect were made in the Framework Convention on Climate Change.

The whole Community in general will benefit from improved air quality. For the energy sector in particular, environmental measures will have far-reaching effects, and is to be regarded as one of the key issues for the oil industry, having impacts on both the refining and the marketing sectors.

D.2 Current and Proposed Measures

The impacts of both current and proposed measures relate to operating arrangements in the refining process itself, to new tighter product specifications, and to emissions-limiting equipment in the distribution system.

The current EC directives in regard to pollutants in various oil products have given rise to tighter specifications in respect of sulphur, benzene and lead levels as set out in Tables (D.1/2/3).

In addition, there now exists a directive adopted by the Council in 1994 on the control of volatile organic compound (VOC) emissions resulting from the storage of petrol and its distribution from terminals to service stations (the so-called 'Stage I' Directive - 94/63/EC). This Directive is a first step in the implementation of a strategy to achieve an overall reduction in VOC emissions throughout the EC. It applies to the operations, installations, vehicles and vessels involved in the storage, loading and transport of petrol from one terminal to another or from a terminal to a service station.

The Auto Oil Programme and possible future measures arising are outlined in section D.4.2. below.

D.3 **Implications for Downstream Economics and Decision-Making**

Current measures and proposals are already involving the industry in heavy expenditure which they are concerned will not be recovered in oil product prices. The implied investment, including expenditure incurred to date, for the downstream oil sector in respect of existing and potential EC environmental measures is substantial. Table D.5 quotes estimates made by the industry and other sources as to the ranges of expenditure to be expected.

The amount of middle distillate desulphurisation capacity already installed as a result of the measures is considerable, namely 155 mta of capacity by 1994 (Table D.6 gives the breakdown by country) compared with total middle distillate demand of 225 mt.

A further potential economic implication is that the obligatory clean-up costs which are imposed on refiners who close plant are impacting on refinery closure decisions in that they raise substantially the cost of so doing. In accordance with the 'polluter pays' principle, operators who shut down refineries, depots, retail sites or other installations are required to clean up the site to specified acceptable standards. The costs to be incurred are potentially substantial - for a medium-sized refinery these could typically lie in the range ECU 60m - ECU 80m, and for a retail site be in the order of ECU 200,000.

D.4 **Environmental Outlook**

D.4.1 Possible Future Measures

It is clearly a complex matter to assess all of the technical and non technical environmental options that are available in respect of measures that could be applied in the refining sector, having regard to their economic aspects in terms of cost effectiveness and implications for competitiveness, as well as geographical considerations.

There has, however, evolved over the last few years a new approach to the formulation and selection of oil sector-related environmental measures. These are now aimed at achieving the new air quality targets for 1999/2005 in regard to emissions of pollutants Nox, SO₂, CO, particulate matter, lead, ozone, benzene, hydrocarbons, cadmium, arsenic, nickel and mercury.

With regard to a second round of reductions in permitted VOC emissions, the Commission services are reflecting on the most cost-effective ways and means to achieve these, either via technical adaptations at service stations (the so-called Stage II measures which some Member States have already decided upon) or via the installation of large carbon canister in cars.

D.4.2 The European Auto Oil Programme

Further environmental measures are in prospect. A major initiative on the part of the Commission in conjunction with the EC oil (EUROPIA) and motor manufacturing (ACEA) industries was launched in July 1993 with the objective of improving air quality. This initiative forms part of the Commission's new strategy in regard to vehicle emissions which is based on a multifaceted, coherent approach to pollution-reduction measures to be implemented by the year 2000. The initiative is called the European Auto Oil Programme (EAOP), and the strategy is fully in line with the Commission's Fifth Environmental Action Programme, which places particular emphasis on cost-effectiveness analyses.

The intent of the EAOP is to identify which new measures may be required to meet air quality targets the development of which are based on a rational approach via the reduction of emissions in the most cost-effective way. These measures identified by the EAOP will form the basis for the next step in the new European legislation on both emissions and fuel qualities.

The European auto oil programme has also identified improved inspection/maintenance schemes and a number of non-technical measures (eg road pricing, restriction of traffic in certain areas and scrappage schemes) as important elements of national policies to comply with future air quality objectives. However, the nature of most non-technical measures does not lend itself to regulation on an EU but rather on a national/local level.

To date, four parts of the EAOP have been finished, namely:

- (i) the European Programme on Emissions, Fuel and Engine Technologies (EPEFE),
- (ii) the Air Quality Study of conditions in seven European cities,
- (iii) the monitoring of the quality of fuel available on the market, and
- (iv) the cost-benefit analysis of the technical and non-technical measures proposed for the achievement of the required air quality standards.

The main aim of the EPEFE research test programme was to establish the relationship between engine technology, fuel quality and emissions. The results of the programme have served in assessing the emission reductions which can be achieved through changes in the equality of fuel.

This excellent example of co-operative effort on the part of the Commission and the oil and motor manufacturing industries is expected to lead shortly to the establishment of sets of specifications to come into force in 2000 in respect of the properties of motor fuels which will bring about significant reductions in the emission levels of pollutants produced in their use and manufacture. As well as meeting environmental requirements, the new sets of

specifications will be consistent with the need to retrain the cost of resulting measures to manageable levels, and with other social and economic needs of EC countries.

D.4.3 Industry Proposals on a Cost-Benefit Approach to Commission Measures

The oil industry are proposing that the cost-benefit approach adopted in the EAOP be used as the basis for a much more thorough and comprehensively global approach (called Energy Impact Assessment - Energ.I.A) in respect of Commission proposals which potentially will have direct or indirect repercussions on the energy sector. The approach proposed would take into account all impacts on energy and related activities in the cost-benefit assessments of proposed EC measures, amongst which they make mention of those relating to the environment. The assessments should involve a comprehensive and objective cost-benefit analysis, quantitative and qualitative, in relation to the impacts that proposed Commission measures would have on the realisation of EC energy policy objectives. This approach merits further examination by the Commission services.

ANNEX E

Oil Refining

E.1 Refinery Numbers, Capacity and Utilisation

E.1.1 Definitions of Capacity Types

Two of the principal elements of the refining process need to be defined in order to be able to discuss and understand adequately the economics of the refining sub-sector.

The first is the *crude oil distillation* process, which is that part of the refining process relating to the initial processing of the crude oil, that is the *primary distillation* process, with the plant itself known as the crude distillation unit (CDU). Generally, when people refer to 'refining capacity', 'CDU capacity', or 'straight-run' capacity, it is this capacity that they mean.

The second covers *upgrading* processes, which improve the quality and value of intermediate products of the refining process. Such processes include those which improve distillates (like catalytic reforming), and *conversion* processes (like catalytic cracking). *Conversion* processes convert fuel oil manufactured in the initial *crude oil distillation* process, or other intermediate products of the refining process which have a fuel oil value, to middle and light distillate products, thereby enabling refiners to match product output more closely with demand. Conversion is often quoted in terms of the equivalent catalytic cracking (CCU) capacity needed to produce the same amount of distillate, catalytic cracking being one of the commonest examples of conversion plant. Others include hydrocracking, residue cracking, combination cracking, visbreaking, coking and alkylation.

The terminology presented in these definitions is used throughout this document.

E.1.2 Refinery Numbers

There were 93 refineries in the EC-12 at end-1994 following a long period of closures since 1980 when there were 141. The total numbers of refineries plus primary distillation capacity and details on refinery complexity at the beginning and end of the period plus 1988 are given in Table E.1.

While the overall number of refineries has declined over the period, it may be seen that the number of complex refineries has actually increased (from 55 to 66), with decreases in semi-

complex refineries (from 24 to 13) and in simple refineries (from 62 to 14), thus representing a significant increase in the complexity of total EC refining capacity.

Following the closures, only three refineries with a capacity of less than 1 mta remain. In addition, some refineries are poorly located and, together with the low-capacity refineries, are in the current margins climate consequently suffering from particularly poor profitability.

E.1.3 Trends

Total EC-15 *crude oil distillation* capacity as reported by Member States for 1994 was 637 million tonnes per annum (mta), of which 560 mta was utilised. This represented a utilisation rate of 87 % and followed the more or less steady rise in utilisation observed since 1985 when utilisation was only 63 %. This increase reflects the programme of crude distillation capacity reductions undertaken by many refiners over the period, in part accounted for by the closures of complete refineries mentioned earlier. Table E.2 sets out the situation at 1.1.1995 for each Member State in respect of capacities of both *crude distillation* and *conversion plant*, while crude distillation capacities, throughputs and utilisation are plotted on Chart E.1 for the period 1985-95.

The *crude oil distillation capacity* figures, on which the utilisation rates are calculated, do not however include an adequate allowance for both the so-called 'capacity creep' which has been taking place over recent years and which describes small but ongoing expansions of existing nominal nameplate capacity as reported, and capacity which has been taken out of service but is available at relatively short notice. Hence the utilisation rates are over-stated, falling even further short of total utilisation than the figures indicate.

Conversion plant capacity for the EC-15 area amounted to 199 mta (in terms of catalytic cracking equivalent) in 1995, up 50 mta or 35 % compared with 1985 (Table E.3/Chart E.2). This figure represents 31 % of total CDU capacity. This strong growth in conversion capacity reflects the industry's expectations at the time as to future gasoline demand growth and an increasingly heavy crude supply slate. These expectations were vindicated up until the early nineties when gasoline growth flattened off and the crude slate started to lighten (see Charts B.7, C.3, C.4 and C.5, presented in earlier Annexes). The general consensus in industry is that the conversion capacity in place was nevertheless utilised as although margins were low they were still sufficient to cover cash variable costs.

E.2 **Refining Margins and Profitability**

E.2.1 Margins Definitions

Refinery profit margins are defined as 'gross margins' for the purposes of this document. That is, they are the difference between the proceeds derived from oil product sales and the cost of crude oil feedstock, divided by the amount of crude oil processed.

E.2.2 Observed Margins

Chart E.3 sets out refining profit margins expressed in US dollars per barrel of crude oil processed which have been earned over the period 1988-94 in North-West Europe (NWE) and in the Mediterranean (Med). For NWE, they are plotted for both '*Straight-Run Refiners*' (that is, the '*straight-run margin*', defined broadly as that earned by refiners running only crude distillation plus catalytic reforming plant) and for '*Upgrading Refiners*' (that is the '*upgrading margin*' defined as that earned by those refiners running crude distillation plus catalytic cracking, gas-oil desulphurisation and catalytic reforming plant). For the Med, they are plotted for '*Upgrading Refiners*' only.

As an initial observation, it may be seen that while there has recently been little difference between typical upgrading margins in NWE and the Med, over the period 1992-94 Med margins were higher by up to circa \$0.6/bbl. Secondly, it may also be seen that both straight-run and upgrading margins have fallen since peaking in 1991, reaching levels of circa \$0/bbl and \$1.8/bbl in 1995.

It is estimated that upgrading margins would have to reach significantly higher levels on a sustained basis before refiners would earn adequate returns on the upgrading investments they have made in recent years. Chart E.3 demonstrates that upgrading margins have only once - in early 1991 during the Gulf crisis - reached such levels, and then only for a few months.

E.2.3 Explanation of Trends

The refining sub-sector of the EC downstream oil industry has been experiencing for some time what must now be regarded as chronically weak margins. At the same time, there has developed a surplus of motor gasoline manufacturing capacity and a tightness in diesel fuel supply.

This situation has come about as a result of:

- (i) the evolution of the economic recession as reflected in a flattening off in overall EC oil product demand, in particular in gasoline,
- (ii) an ongoing EC excess crude oil distillation capacity to refine crude oil relative to oil product demand.
- (iii) an unforeseen increase in the availability of light crude oils from the North Sea and Saudi Arabia which has made it possible to manufacture additional light product

without having to utilise all of the available refinery conversion plant (originally installed by the industry in the expectation of a growth in heavier crude supply which would have given rise to a light product deficit) (Chart E.4 demonstrates the effect of this development on both crude and product price differentials),

- (iv) the switch in road transport fuel demand from motor gasoline to diesel, driven in part by fiscal disparities in many Member States between diesel and gasoline which have boosted diesel demand at the expense of gasoline, and
- (v) an increasing number of environmental constraints, in particular the introduction of unleaded gasoline, necessitating investment in additional refinery plant to improve quality, which has given rise to a non-intended addition to light product manufacturing capacity.

Despite the large reductions in crude distillation capacity which were facilitated over the eighties, the over-capacity situation remains and seems unlikely to disappear for some time without further plant closures. The further reduction of both crude distillation and conversion capacity appears therefore to offer one contribution to the resolution of this problem.

Some refiners have responded by closing further crude oil distillation capacity or in some cases by selling out complete refineries to purchasers whose economics are dictated by the strategic objective of entering new markets. Overall, however, there have been insufficient reductions in crude oil distillation to tighten oil product supply and thus boost straight-run margins to acceptable levels.

In addition, no conversion capacity has been closed, and consequently there has not been the tightening in the availability of light distillates that would be necessary to boost upgrading margins.

There has been only one outright refinery closure recently, (capacity approximately 5m toe) largely because refiners have been reluctant to take such strategically significant decisions, given their one-way character and the heavy environmental and social charges that would be incurred.

The necessary reductions in crude distillation capacity have not yet happened because of the uncertainty as to if/when demand will pick up again, the ongoing trend to reduce costs which has allowed refiners to remain cash-positive, and the reluctance of individual refiners to face the strategic and operational implications as well as the substantial costs of refinery closures.

As a result of the situation in both crude distillation and conversion, refiners, most of whom have at least a partial conversion capability, are trapped between having cash margins which, although low, are positive on the one hand but which do not offer adequate returns on conversion plant investment on the other.

Given all the above factors, the industry is faced with an unusual degree of uncertainty as to the prospects for the sector and is therefore adopting a "wait-and-see" position vis-à-vis decisions on capacity. Table E5 gives details of net expansion and reduction in capacity which, at the beginning of 1995, had already been advised. Table E6 gives details of OPEC foreign refining capacity at the end of 1995.

E.2.4 Effects on Refining Profitability of International Trade

The overall oil product trade balance of the EC has improved considerably over the last few years (Charts C.6/7/8/9, presented in earlier Annexes). Some concern remains, however, that any reductions that are achieved in EC refining capacity could be off-set by increased imports, thus preventing any improvement in margins.

It should be noted in this connection that the Generalised System of Preferences (GSP) provisions which have in recent times favoured oil product imports from some countries are shortly to become more severe, in line with the original intention of the GSP system which was to favour investment in the Less Developed Countries (LDCs).

Imports could become an important factor with either the rising oil product self-sufficiency of Far Eastern countries which may have the effect of deflecting exports from Middle Eastern refineries to the EU, or with increasing oil product exports from the CIS. In regard to the latter, the likely evolution of the downstream interactions between the EC on the one hand and the CIS and CEEC on the other continues to be unclear, given the uncertain pace and direction of developments there. In the short to medium term, there is a consensus that changes are unlikely to have any ongoing major impact on downstream oil supply economics. In the longer term, it is felt likely that the CIS and CEEC will invest in refinery plant so as to match their product output more closely with domestic demand, thereby allowing their crude oil production to be exported as crude rather than product, a more profitable option than their current practice of exporting product surpluses on to international markets.

In the USA, the moves to introduce Reformulated Gasoline in an attempt to reduce noxious emissions have had implications for EC refiners in that some have had at least temporarily as a result of supply logistical changes enforced on US importers to reduce exports of motor gasoline to the USA. Some countries and companies argue that the new regulations, introduced in 1995, have favoured US refiners. The situation is, however, evolving and it remains to be seen whether the effects on EC refining profitability will prove to be material in the longer run.

E.3 Refining Outlook

There is a consensus that the outlook for the sector is characterised by an unusually high degree of uncertainty, the consequence of which is to hobble the commitment of the industry to the sector as a whole. This is being manifested in a 'wait-and-see' approach on the part of most industry players in regard to strategic decisions.

More specifically, it is widely accepted by operators that there is a need for further refinery closures before margins can be expected to be restored to acceptable levels in the short to medium term, although it remains a possibility that the capacity surplus currently observed is merely temporary in character.

It is also accepted, however, that further closures may prove difficult to achieve. This is so because of the heavy costs of closure.

A further factor thought to be inhibiting refinery closure decisions is the question of the clean-up costs that would generally be incurred, as referred to earlier. Rather than close refineries which are unprofitable, it is believed that owners are instead being tempted to maintain them on a 'tick-over' basis, minimising investment while manufacturing such quantities and qualities of product as will leave them cash-positive. This course of action merely contributes to the general over-supply situation. In these circumstances, as an alternative to bearing the costs of closure, some refiners may well, for strategic or other reasons, be tempted to sell to purchasers whose strategic intentions and/or economic circumstances make such deals attractive to them. Moreover, the new owners would have a low level of invested capital to remunerate and thus be in a position to operate profitably at margins which only covered operating costs, thereby directly weakening further refining margins throughout the sector as a whole.

Accordingly, refiners are keeping their investments - other than obligatory care-and-maintenance or that required for statutory reasons - on hold, given the absence of any prospect of improvement in the near or even the medium term. With obligatory investment, refiners are fearful that they will not earn adequate returns, all of which is producing a 'wait-and-see' mood in the industry.

Against this background, there is also the competition that other parts of the world present in regard to attracting industry investment. Better returns may be available elsewhere. International oil companies may concentrate their scarce capital resources in non-EC areas whose refining industries may well become more competitive and efficient than the EU's, as they argue, with corresponding consequences for the EC economy as a whole.

ANNEX F

Oil Product Marketing

F.1 Marketing Sub-Sector Definition

The marketing sub-sector comprises the transportation from the refineries by ship, road, rail or pipeline to customers. Delivery to customers is sometimes direct, but more usually it is undertaken via intermediate storage depots used as a base for more local distribution. In the case of motor gasoline and diesel fuel, most customers obtain their product supplies via retail networks of service (that is, filling) stations, which in many cases are owned or franchised by the companies which own the refineries. Competitive pressures are such that operators seek to offer a higher quality of service vis-à-vis their competitors.

F.2 Retail Statistics

Since 1985 the number of service stations throughout the EC has been steadily declining. Total station numbers in the EC-15 now stand at 122,900, being a 23 % reduction on the 158,700 in operation in 1985. (Table F.1 gives details of the evolution of site numbers over the period in each Member State, while Chart F.1 plots the evolution across the EC as a whole.)

These reductions in site numbers have happened as operators have sought to increase fuel volumes sold per station and thus reduce unit costs. (Chart F.2 plots the evolution of volumes sold per site for the EC-12.) A factor in the evolution of the retail sector has in recent years been the rapid expansion in some countries of sales through hypermarkets, which have largely been at the expense of those of the traditional oil companies.

F.3 Retail Market Shares and Profitability

There has been a marked trend in retail market shares over the last ten years, with the traditional integrated oil majors and independents alike losing ground to the hypermarkets as well as to the so-called national oil companies and operators owned by producer country interests.

The hypermarkets have been seen to make most progress in France and the UK which they are continuing to achieve via a policy of severe price competition. In this way the competitive structure of the motor fuels market is undergoing significant change.

As a response to this development, there has in recent times been an increasing trend to market rationalisation by integrated companies in motor fuel sales, where via a policy of selective swaps and disposals of retail filling stations, companies have focused their sales in particular geographical areas. While marketing is generally in better shape than refining, there is no doubt that in some areas the serious inroads hypermarkets are making into the business activity previously regarded as the province of the traditional oil companies are affecting the economics of the marketing sub-sector.

F.4 **Harmonisation Questions**

Fiscal disparities within many Member States between diesel and gasoline duties have boosted diesel demand at the expense of gasoline, and have thus exacerbated the mis-match between EC refinery output and demand (Table E.4).

Moreover, fiscal disparities between Member States in respect of the same products have not permitted the abolition of tax frontiers, are producing cost, market and competitive distortions, and have given rise to problems of fraud. Given that it has been requested by the representatives of both industry and national administrations in discussions on fiscal issues in Lisbon on 13th/15th November 1995, the harmonisation of fiscal duties is now established as a necessary element in meeting the objectives of the Treaty in respect of the internal market.

On product standards, there is currently across the EC as a whole a proliferation of oil product specifications in respect of automotive fuels arising from the often relatively slight differences to be found in different Member States in the specifications for essentially similar products. Some operators argue that standardisation of such product specifications throughout the EC would allow considerable simplification of their logistical arrangements, thus facilitating cost reductions which could at least in part be passed on to consumers. On the other hand, others view such variations in specifications as providing the context for normal competition on quality.

ANNEX G

Glossary Of Terms

The following definitions of terms used may be helpful, particularly for those who do not have specialist knowledge of the oil industry. It is presented alphabetically for ease of reference.

'ACEA': Association des Constructeurs Européens d'Automobiles.

'ASEAN': Association of South-East Asian Nations

'BAT': Best Available Technology.

'bbl': Barrel, being a measure of volume used in the oil industry. 1 cubic metre equals 6.29 barrels. A metric tonne of crude oil contains about 7.33 barrels.

'bn': Billion.

'bt': Billion metric tonnes.

'btoe': Billion metric tonnes of oil equivalent.

'Capacity creep': An industry term used to describe the slow but steady expansion in actual capacity compared with the nominal capacity of plant that normally comes about as a result of ongoing improvements made by operators to plant, for example by way of the removal of bottlenecks in the flow of process liquids, etc.

'CEEC': The Central and Eastern European Countries - that is the former Soviet satellite countries of Central and Eastern Europe, plus the Baltic states.

'CIS': The Commonwealth of Independent States - that is the countries of the former Soviet Union.

'Conversion capacity/plant' is a sub-category of upgrading capacity/plant (see below). Conversion plant converts fuel oil, or other intermediate products of the refining process which have a fuel oil value, to middle and light distillate products, thereby enabling refiners to match product output more closely with demand.

'Crude oil': Mineral oil as found in its naturally-occurring state underground or under the sea-bed.

'Crude oil quality': Crude oils have a number of different qualities of significance for refiners, among the more important and best known being sulphur content and gravity. In layman's terms, the gravity describes the lightness/heaviness of the crude, the lighter the crude the greater the proportion of lighter, and therefore generally more valuable, products which may be distilled from it without recourse to expensive conversion processes (see 'Conversion capacity/plant' above). Accordingly, lighter crudes tend to command higher prices. Another point to note is that lighter crudes tend to, but do not always, have a lower sulphur content and therefore do not require to the same extent desulphurisation treatment which adds to refining costs, a point of increasing significance given tightening sulphur specifications. Where this is the case the market value of the crude is increased further.

'Downstream oil sector': The downstream sector of the oil industry comprises:

- (i) the transportation and storage arrangements involved in the supply of crude oils and partially refined oils to refineries,
- (ii) the refining process itself, and
- (iii) the transportation, storage, distribution and sales arrangements involved in moving finished oil products from refineries to customers.

The activities involved in (i) are often referred to simply as 'supply', those in (ii) as 'refining', and those in (iii) as 'marketing'. We have adopted this simplified terminology throughout the Report except where otherwise indicated.

The 'supply' activities undertaken in (i) include the movement of crude oils via ship and/or pipeline and/or storage tankage to refineries.

'Refining' activities listed in (ii) include the refining of both crude and partially refined oils (taken from one refinery to another for further processing) in a complex sequence of chemical processes and blending operations. These ultimately produce a wide range of finished oil products for use by customers in a variety of applications, such as in fuel for transport or heating, feedstock for the chemicals industry, road-making materials, lubrication and others.

'Marketing' activities described in (iii) involve the transportation from the refineries by ship, road, rail or pipeline to customers. Delivery to customers is sometimes direct, but more usually it is undertaken via intermediate storage depots used as a base for more local distribution. In the case of motor gasoline and diesel fuel, most customers obtain their product supplies via retail networks of service (that is, filling) stations, which in many cases are owned or franchised by the companies which own the refineries.

'EC': European Community, taken throughout this Report to include all fifteen Member States unless indicated to the contrary.

'ECU': European Currency Unit.

'EUROPIA': European Petroleum Industry Association.

'Fuel oil': The heavier products which are manufactured from crude oil in the initial distillation process. These are used in the production of heavy finished products for burning in power stations, ships' boilers, etc.

'FSU': Former Soviet Union.

'GSP': Generalised System of Preferences

'HFO': Heavy fuel oil.

'kPa': Thousands of Pascals.

'LDCs': Less Developed Countries

'Light distillate': The lighter products which are manufactured from crude oil in the initial distillation process. These are used in the production of light finished products such as motor gasoline, feedstock for the chemicals industry, etc.

'Med': Mediterranean.

'Middle distillate': The products of medium weight which are manufactured from crude oil in the initial distillation process. These are used in the production of finished products such as automotive gas oil (that is, diesel fuel) and heating gas oil (that is, domestic heating fuel).

'mt': Million metric tonnes.

'mta': Million metric tonnes per annum.

'm³': Cubic metre.

'NGLs': Natural gas liquids.

'NWE': North-West Europe.

'p.a.': Per annum.

'ppm': Parts per million.

'Refining': The chemical and physical processes involved in separating the hydrocarbon compounds found in crude oil together with the conversion of some of them into other

hydrocarbon compounds so that they may be blended together into a range of usable finished products.

'Residue': Fuel oil and other heavy intermediate products manufactured in the initial distillation phase of the refining process.

'R/P': Reserves to production (ratio - used in regard to oil and gas reserves).

'Straight-Run Products' are those manufactured in the primary distillation process.

'TPA': Third Part Access.

'tpa': Tonnes per annum.

'Upgrading capacity/plant' is a term used to describe processes which improve the quality and value of intermediate products of the refining process.

'VOC': Volatile organic compound.

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EU - 12 - Evolution of crude oil * trade 1985 - 1990 - 1994

	1985**		1990		1994	
	Mta	%	Mta	%	Mta	%
TOTAL IMPORTS	377.0		467.5		502.0	
EXTRA - EU imports (1 + 2 + 3 + 4)	312.6	100.0	428.4	100.0	455.2	100
1. OECD countries of which :	25.4	8	46.6	11	82.5	18
. Norway	23.2	7	43.8	10	80.1	18
2. OPEC countries of which :	206.0	66	253.5	59	253.9	56
. Algeria	18.3	6	19.0	4	18.2	4
. Iran	25.6	8	54.0	13	45.8	10
. Iraq	24.8	8	21.3	5	-	-
. Kuwait	9.9	3	10.9	3	13.6	3
. Libya	37.7	12	51.1	12	49.6	11
. Nigeria	38.8	12	26.1	6	32.5	7
. Saudi Arabia	28.4	9	51.9	12	82.8	18
. Venezuela	10.3	3	8.0	2	7.5	2
3. Ex - USSR	27.5	9	61.2	14	66.7	15
4. Other countries of which :	53.7	17	67.1	16	52.1	11
. Egypt	11.7	4	11.1	3	8.2	2
. Mexico	18.3	6	17.0	4	10.2	2
TOTAL EXPORTS	87.4		67.8		96.1	
NET IMPORTS/(EXPORTS)	289.6		399.7		405.9	

* Refinery Feedstocks and NGL included.

** For 1985, EU - 12 does not include ex-GDR.

EU - 12 - Evolution of all petroleum products trade 1985 - 1990 - 1994

	1985 *		1990		1994	
	Mta	%	Mta	%	Mta	%
TOTAL IMPORTS	166.4		179.5		165.4	
EXTRA - EU imports (1 + 2 + 3 + 4 + 5 + 6)	91.7	100	89.2	100	76.0	100
1. OECD countries of which :	17.3	19	24.6	27	20.4	27
. Norway	2.7	3	6.3	7	6.6	9
. Sweden	4.5	5	5.5	6	5.4	7
. United States	6.9	8	8.1	9	6.5	9
2. OPEC countries of which :	28.6	31	28.4	32	22.2	29
. Algeria	8.6	9	7.7	9	8.4	11
. Kuwait	6.7	7	5.3	6	0.7	1
. Libya	2.7	3	5.2	6	4.0	5
. Saudi Arabia	3.0	3	6.6	7	4.4	6
. Venezuela	4.5	5	2.6	3	3.2	4
3. Ex - USSR	22.5	25	17.8	20	10.4	14
4. Romania	4.0	4	2.4	3	0.9	1
5. Other Eastern Europe countries	6.0	7	5.2	6	1.2	2
6. Other countries of which :	13.3	14	10.8	12	20.9	27
. Egypt	0.5	1	0.5	1	2.1	3
TOTAL EXPORTS	123.4		157.5		165.6	
of which :						
. United States	9.8		12.6		12.1	
NET IMPORTS/(EXPORTS)	43.0		22.0		(0.2)	

* For 1985, EU - 12 does not include ex-GDR.

EU - 12 - Evolution of total gasoline trade 1985 - 1990 - 1994

	1985 *		1990		1994	
	Mta	%	Mta	%	Mta	%
TOTAL IMPORTS	17.2		28.4		22.5	
EXTRA - EU imports (1 + 2 + 3 + 4 + 5 + 6)	4.4	100	7.9	100	5.1	100
1. OECD countries of which :	1.5	34	2.7	34	2.3	45
. Norway	0.1	2	1.2	15	0.9	18
. Sweden	0.5	11	0.5	6	0.9	18
. United States	0.1	2	0.4	5	0.0	0
2. OPEC countries of which :	0.4	9	1.7	22	0.3	6
. Algeria	0.1	2	0.6	8	0.2	4
. Kuwait	-	-	0.2	3	-	-
. Libya	0.1	2	0.2	3	0.0	0
. Saudi Arabia	0.2	5	0.6	8	0.1	2
. Venezuela	0.0	0	0.0	0	-	-
3. Ex - USSR	1.0	23	0.8	10	0.1	2
4. Romania			0.4	5	0.0	0
5. Other Eastern Europe countries	0.7	16	0.5	6	-	-
6. Other countries of which :	0.8	18	1.8	23	2.4	47
. Egypt	-	-	-	-	0.0	0
TOTAL EXPORTS	23.9		35.3		37.5	
of which :						
. United States	5.9		5.1		6.8	
NET IMPORTS/(EXPORTS)	(6.7)		(6.9)		(15.0)	

* For 1985, EU - 12 does not include ex-GDR.

EU - 12 - Evolution of naphtha trade 1985 - 1990 - 1994

	1985 *		1990		1994	
	Mta	%	Mta	%	Mta	%
TOTAL IMPORTS	21.9		24.3		22.8	
EXTRA - EU imports (1 + 2 + 3 + 4 + 5 + 6)	16.5	100	16.5	100	13.9	100
1. OECD countries of which :	2.7	16	3.1	19	1.6	12
. Norway	0.5	3	0.5	3	0.4	3
. Sweden	0.2	1	0.2	1	0.3	2
. United States	0.2	1	0.6	4	0.1	1
2. OPEC countries of which :	6.5	40	7.2	43	7.5	54
. Algeria	2.9	18	2.2	13	4.1	29
. Kuwait	1.4	8	2.1	13	0.5	4
. Libya	1.1	7	1.3	8	1.0	7
. Saudi Arabia	0.5	3	1.3	8	1.8	13
. Venezuela	0.0	0	0.2	1	0.0	0
3. Ex - USSR	4.8	29	2.9	18	0.3	2
4. Romania			0.3	2	0.0	0
5. Other Eastern Europe countries	0.8	5	0.0	0	0.0	0
6. Other countries of which :	1.7	10	3.0	18	4.5	32
. Egypt	0.3	2	0.3	2	0.9	6
TOTAL EXPORTS of which :	12.0		14.7		13.4	
. United States	1.0		0.7		0.5	
NET IMPORTS/(EXPORTS)	9.9		9.6		9.4	

* For 1985, EU - 12 does not include ex-GDR.

EU - 12 - Evolution of gas/diesel oil trade 1985 - 1990 - 1994

	1985 *		1990		1994	
	Mta	%	Mta	%	Mta	%
TOTAL IMPORTS	59.4		55.6		47.7	
EXTRA - EU imports (1 + 2 + 3 + 4 + 5 + 6)	34.1	100	30.7	100	20.2	100
1. OECD countries	5.1	15	6.5	21	6.5	32
of which :						
. Norway	1.3	4	2.4	8	2.5	12
. Sweden	2.1	6	2.4	8	2.4	12
. United States	0.9	3	0.8	3	0.8	4
2. OPEC countries	9.6	28	7.8	26	2.8	14
of which :						
. Algeria	3.4	10	2.6	8	1.1	5
. Kuwait	2.8	8	2.1	7	0.2	1
. Libya	0.7	2	1.6	5	0.7	3
. Saudi Arabia	0.6	2	1.1	4	0.7	3
. Venezuela	1.2	4	0.4	2	0.0	0
3. Ex - USSR	11.3	33	9.5	31	6.0	30
4. Romania			1.5	5	0.4	2
5. Other Eastern Europe countries	5.5	16	2.6	8	0.4	2
6. Other countries	2.6	8	2.8	9	4.1	20
of which :						
. Egypt	0.0	0	-	-	-	-
TOTAL EXPORTS	33.7		40.5		48.7	
of which :						
. United States	0.3		1.8		1.5	
NET IMPORTS/(EXPORTS)	25.7		15.1		(1.0)	

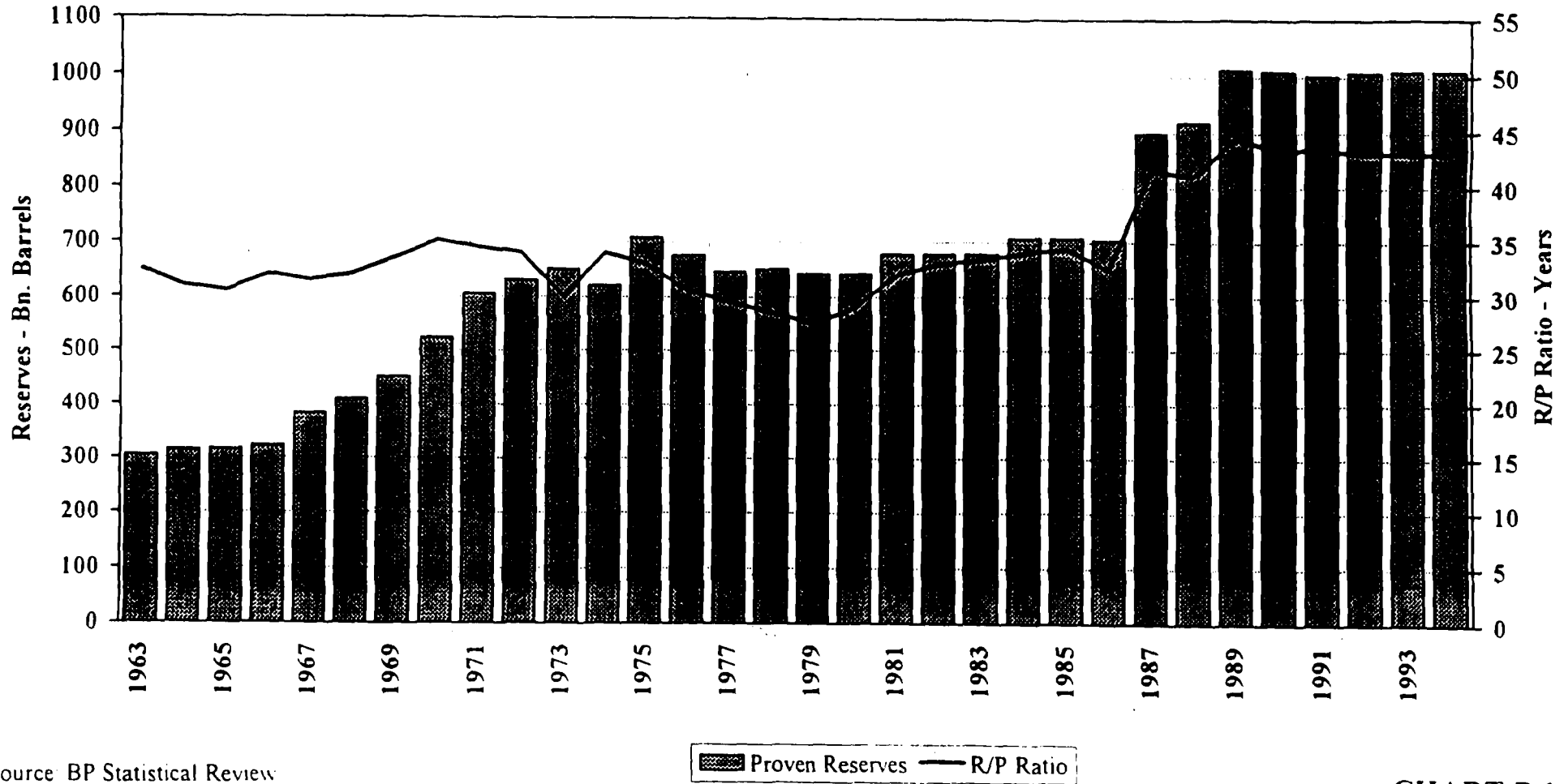
* For 1985, EU - 12 does not include ex-GDR.

EU - 12 - Evolution of residual fuel oil trade 1985 - 1990 - 1994

	1985 *		1990		1994	
	Mta	%	Mta	%	Mta	%
TOTAL IMPORTS	45.3		40.2		42.1	
EXTRA - EU imports (1 + 2 + 3 + 4 + 5 +6)	25.4	100	21.2	100	21.5	100
1. OECD countries of which :	3.2	13	4.5	21	4.0	19
. Norway	0.2	1	0.9	4	1.3	6
. Sweden	1.4	6	2.1	10	1.5	7
. United States	1.4	6	0.3	1	0.7	3
2. OPEC countries of which :	9.1	36	7.6	36	7.5	35
. Algeria	0.6	2	0.6	3	1.0	5
. Kuwait	2.3	9	0.9	4	-	-
. Libya	0.5	2	1.8	8	1.5	7
. Saudi Arabia	1.1	4	1.8	8	0.8	4
. Venezuela	3.3	13	1.9	9	3.0	14
3. Ex - USSR	5.1	20	4.1	19	3.7	17
4. Romania	2.4	9	0.1	1	0.3	1
5. Other Eastern Europe countries			1.7	8	0.5	2
6. Other countries of which :	5.6	22	3.2	15	5.5	26
. Egypt	0.1	0	0.2	1	1.1	5
TOTAL EXPORTS	33.3		38.5		37.8	
of which :						
. United States	1.6		3.6		2.8	
NET IMPORTS/(EXPORTS)	12.0		1.7		4.3	

* For 1985, EU - 12 does not include ex-GDR.

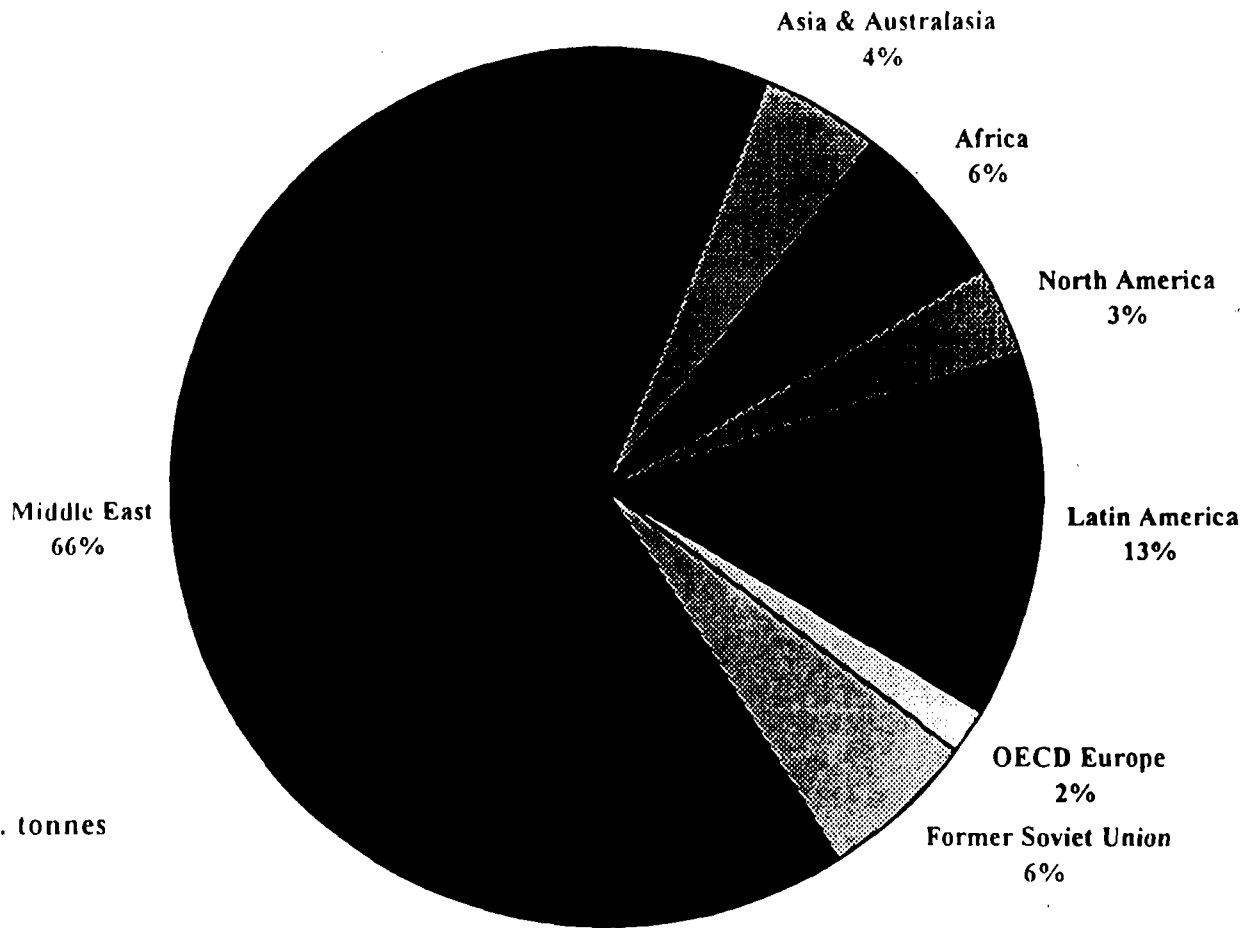
WORLD PROVEN CONVENTIONAL OIL RESERVES AT CURRENT MARKET PRICES



Source BP Statistical Review

CHART B.1

**DISTRIBUTION OF WORLD OIL RESERVES
END 1994**



Total Reserves = 137 Bn. tonnes

Source BP Statistical Review

CHART B.2

WORLD OIL SUPPLY

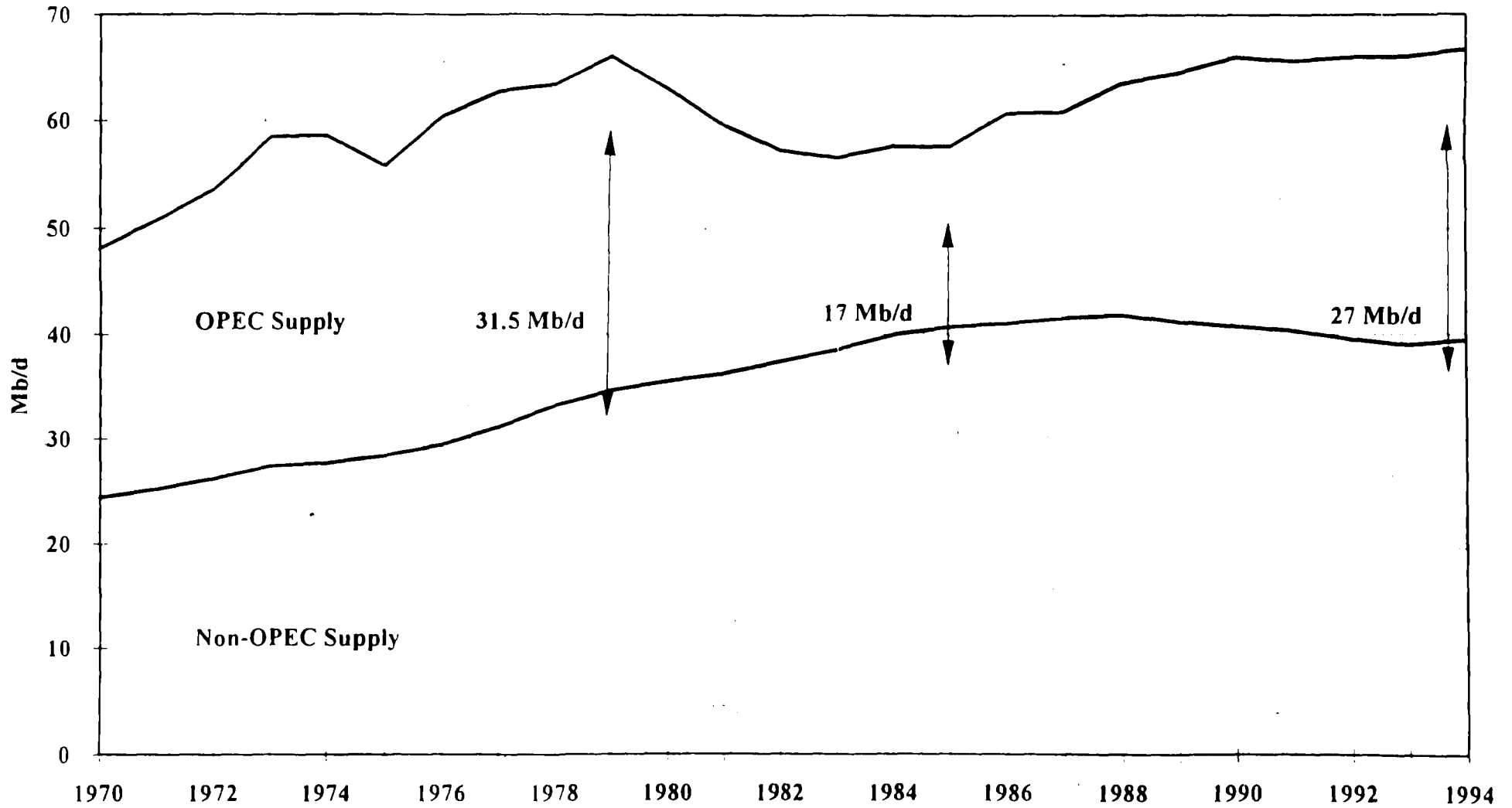
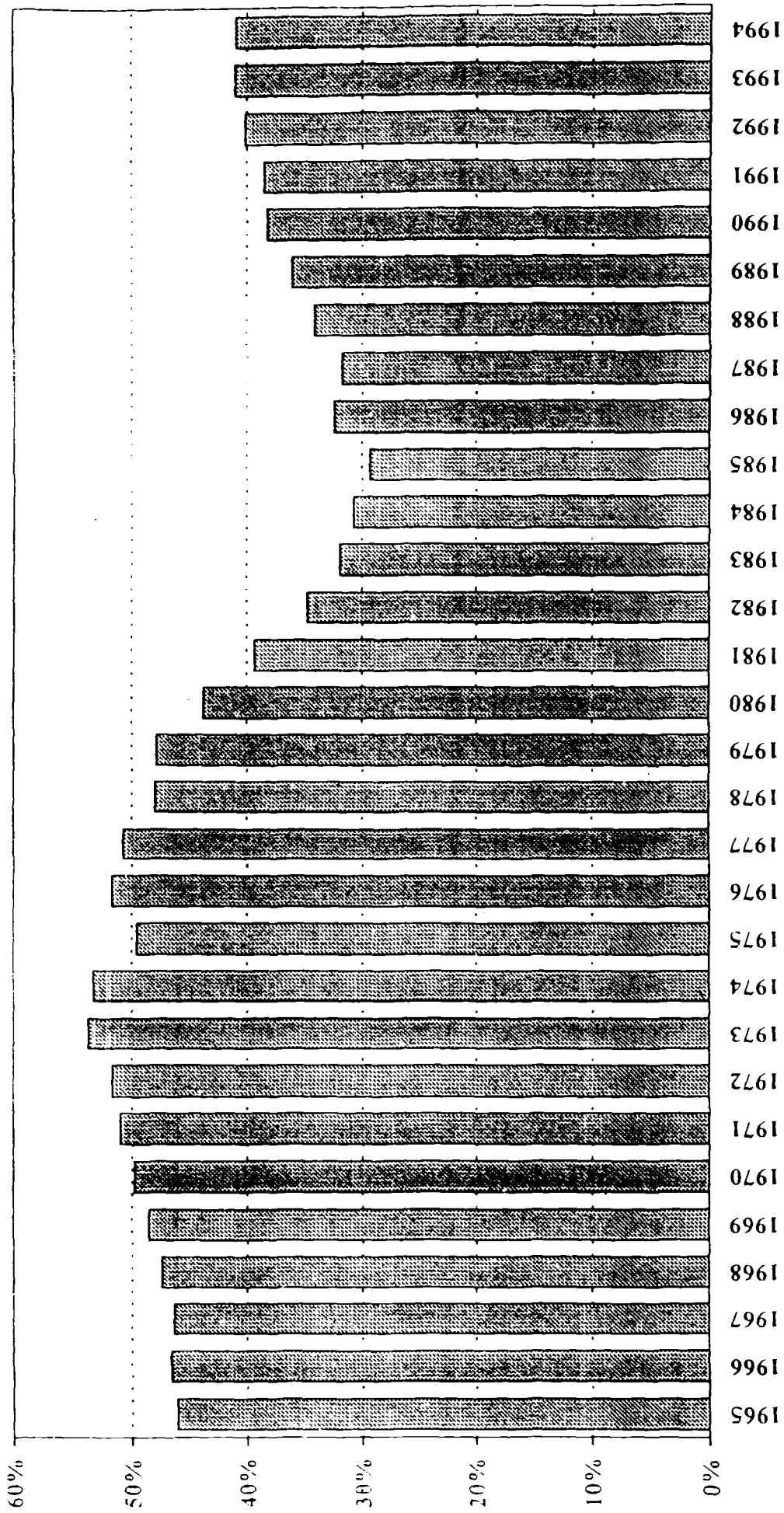


CHART B.3

OPEC SHARE OF WORLD OIL PRODUCTION



Source: BP Statistical Review

CHART B.4

CRUDE OIL PRICES
1970 to 1994

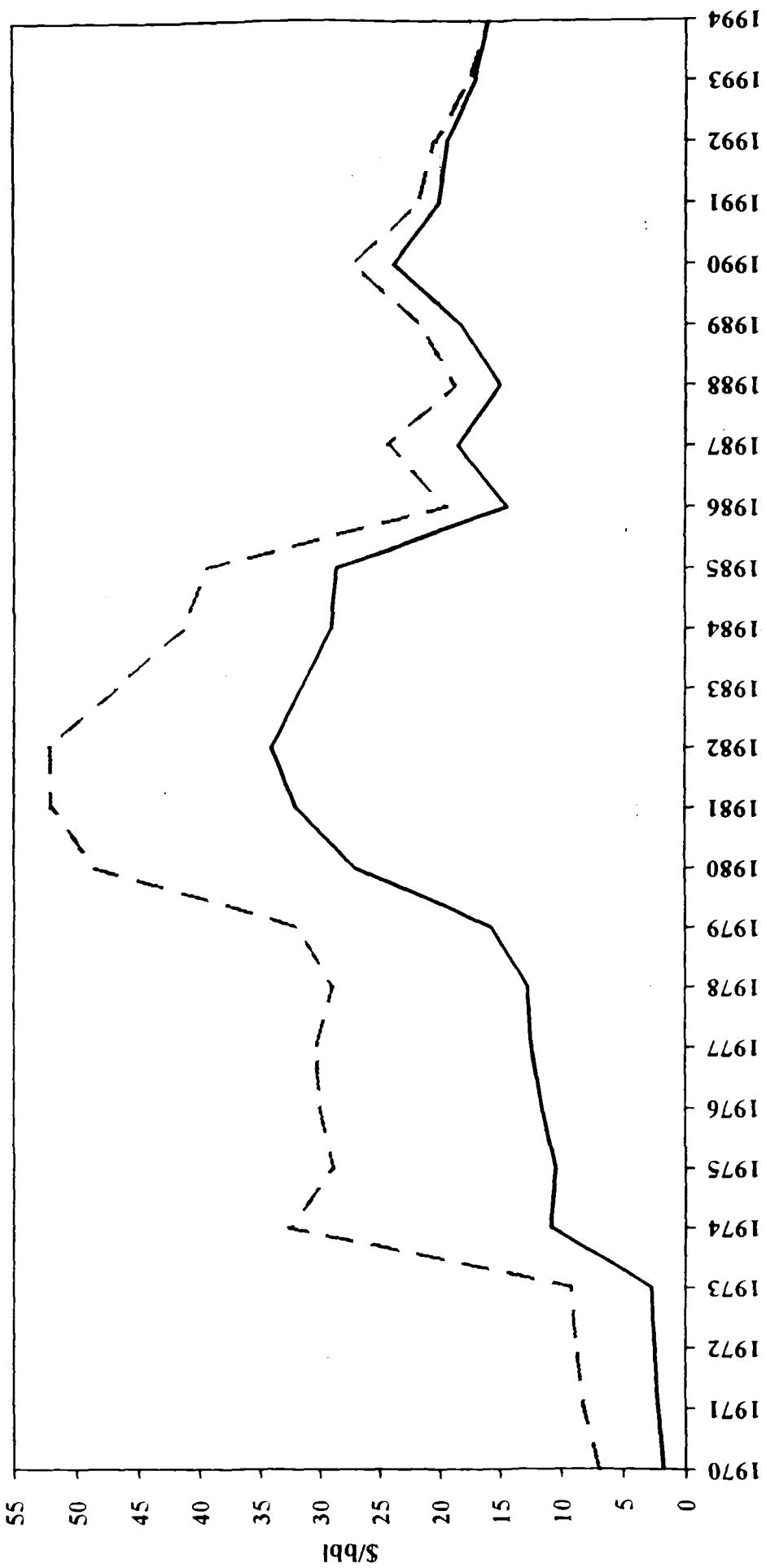
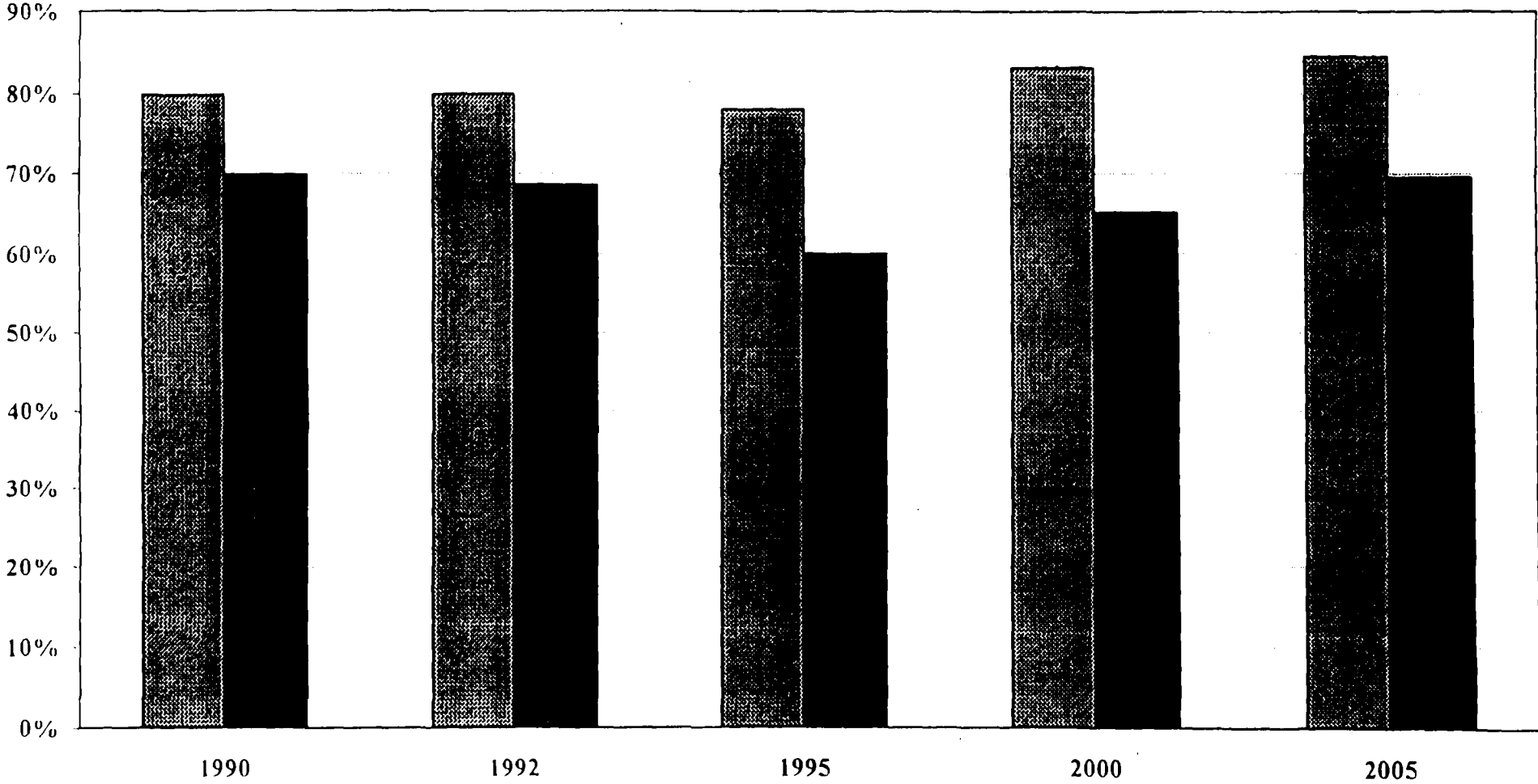


CHART B.5

— Nominal \$/bbl — 1994 \$/bbl

OIL IMPORT DEPENDENCY
EUROPEAN UNION 15

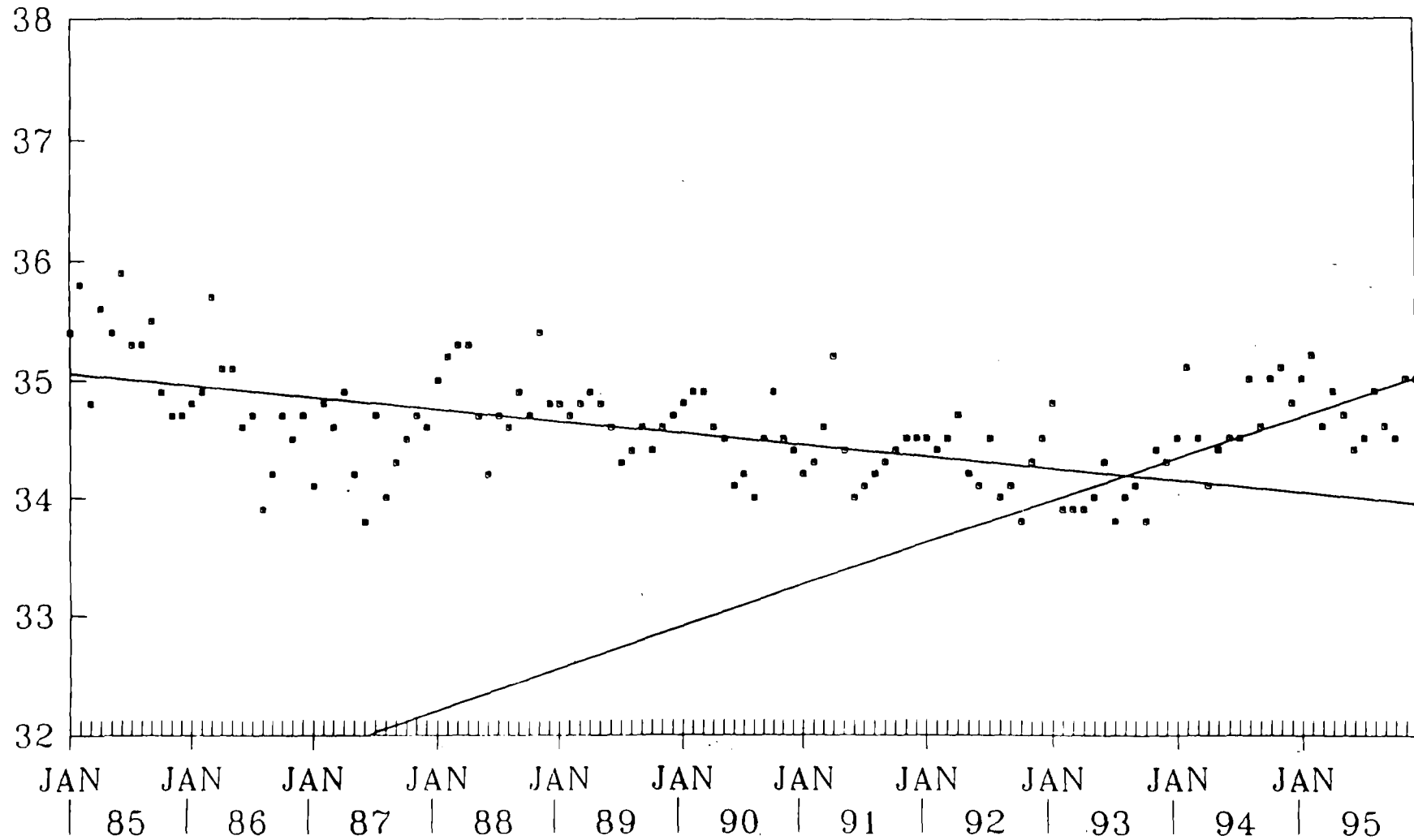


Source European Commission Estimates

■ EU ■ EU plus Norway

CHART B.6

AVERAGE API VALUES OF CRUDE OIL SUPPLIES IN THE EU 1985 - 1995



Source : Crude Oil Register

CHART B.7

GROSS ENERGY CONSUMPTION 1995
EUROPEAN UNION 15

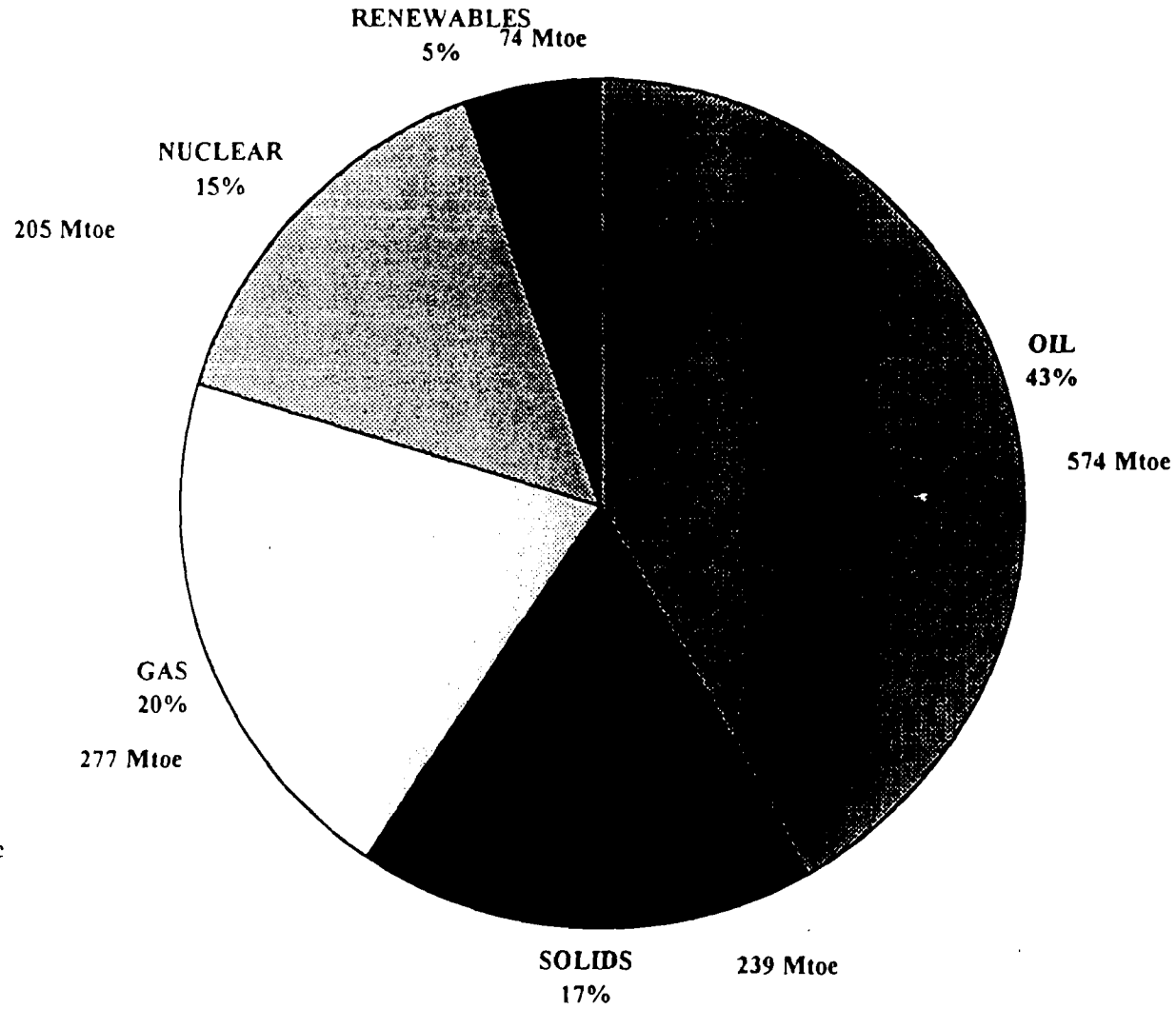


CHART C.1

W

GROSS ENERGY CONSUMPTION 2005
EUROPEAN UNION 15

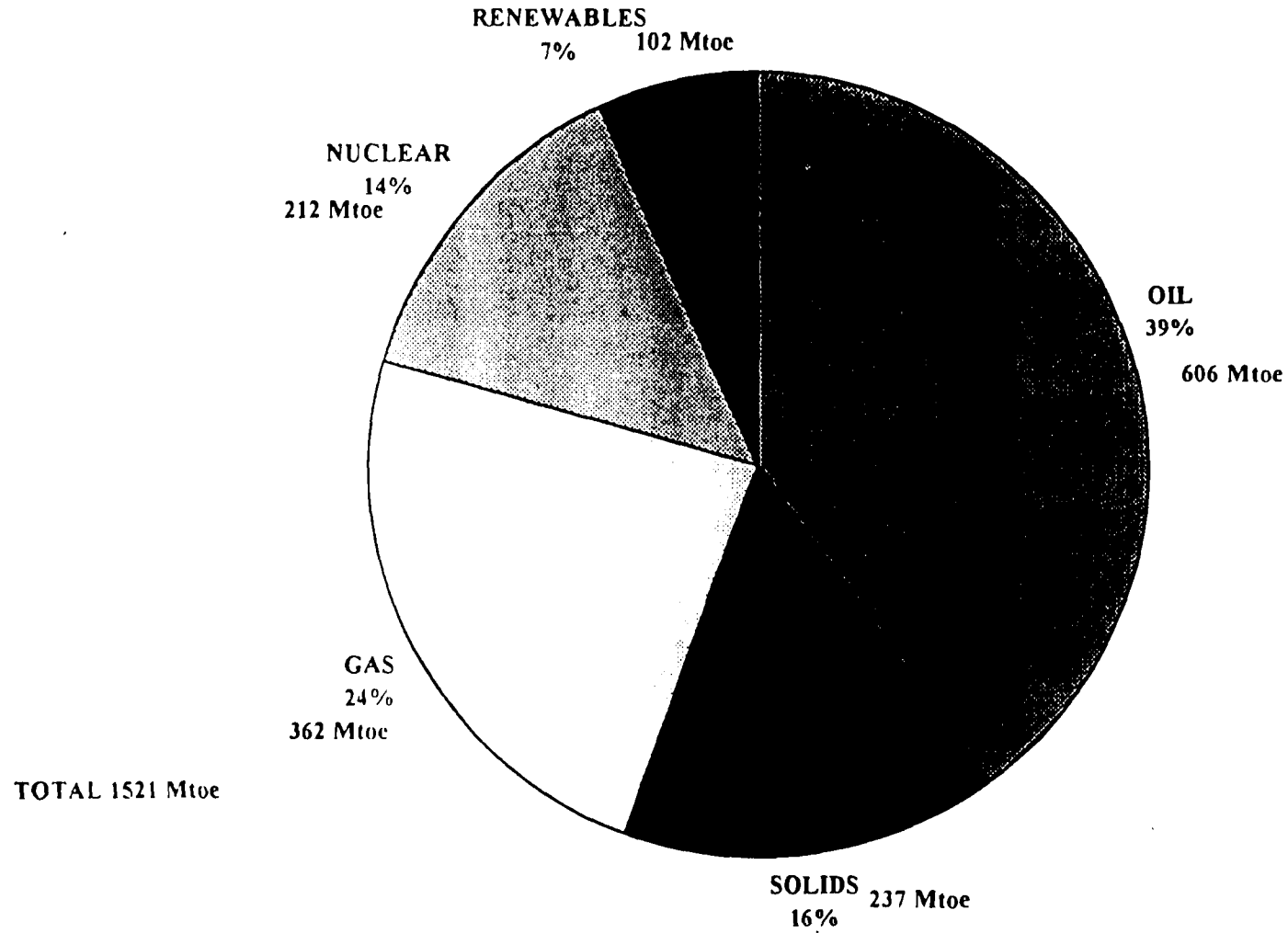
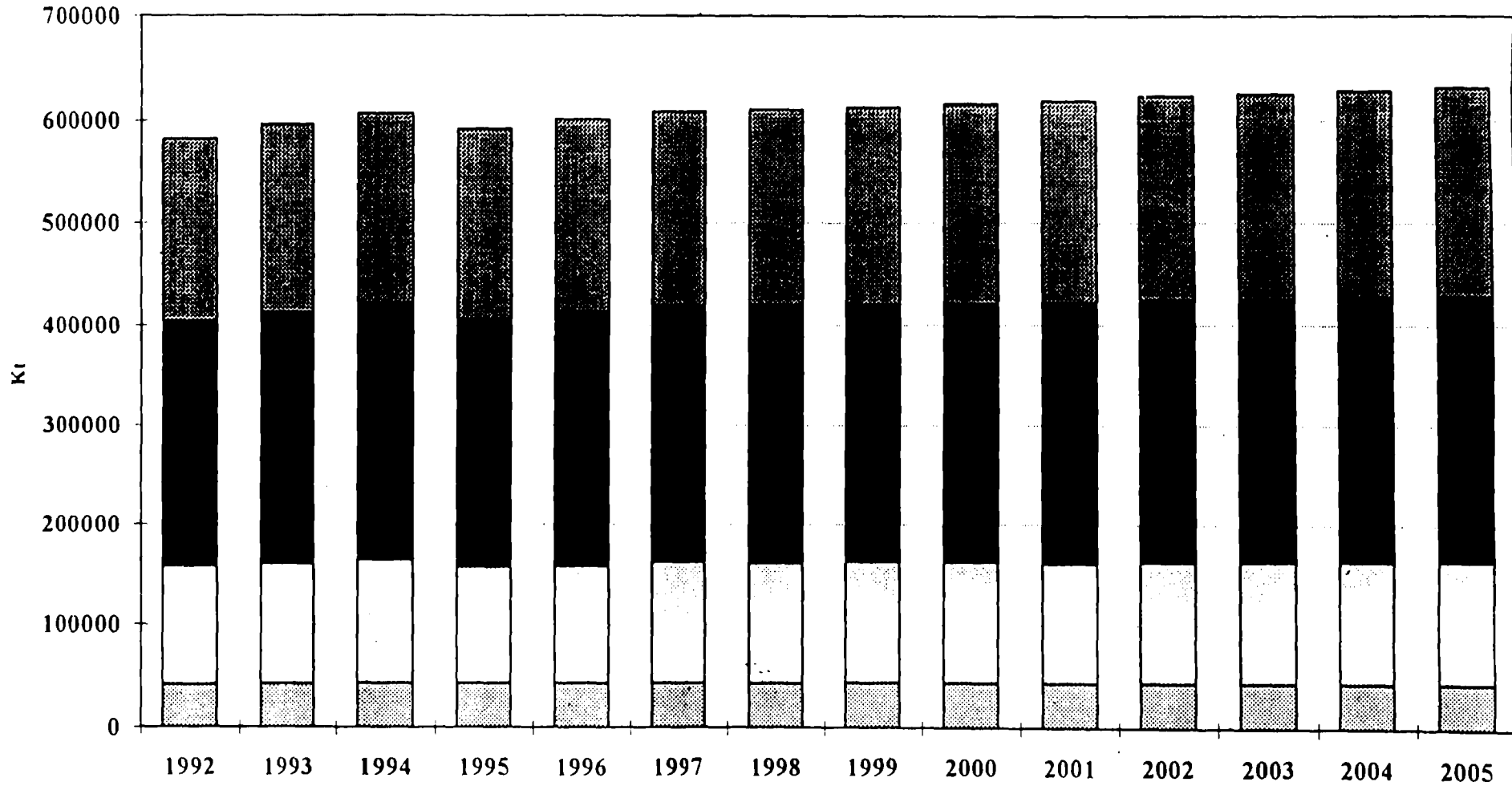


CHART C.2

Oil Product Demand European Union 15



Source: Commission Estimates

Others Fuel oil Middle distillates Gasolines

CHART C.3

Demand Barrel Shape - W. Europe

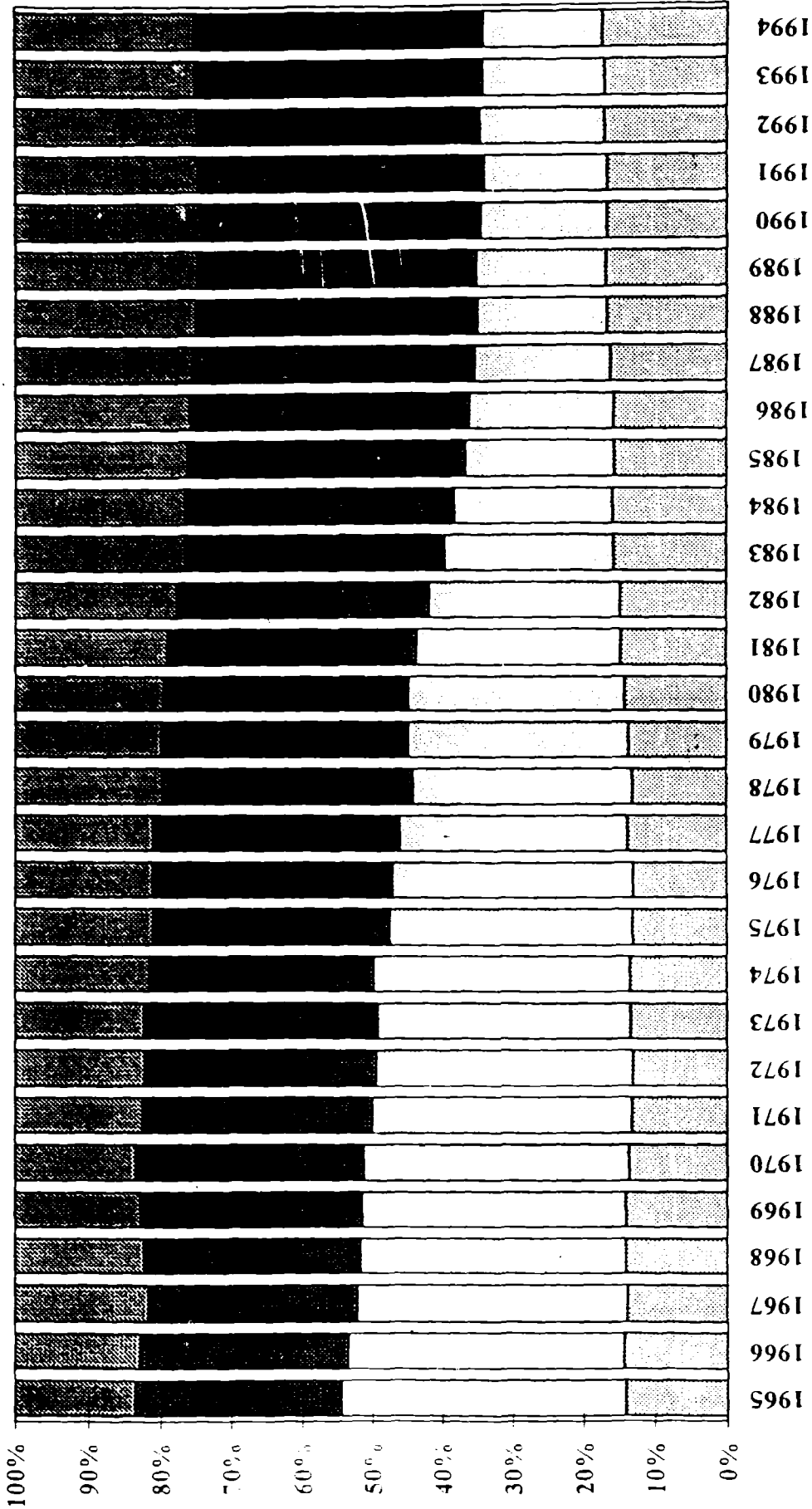
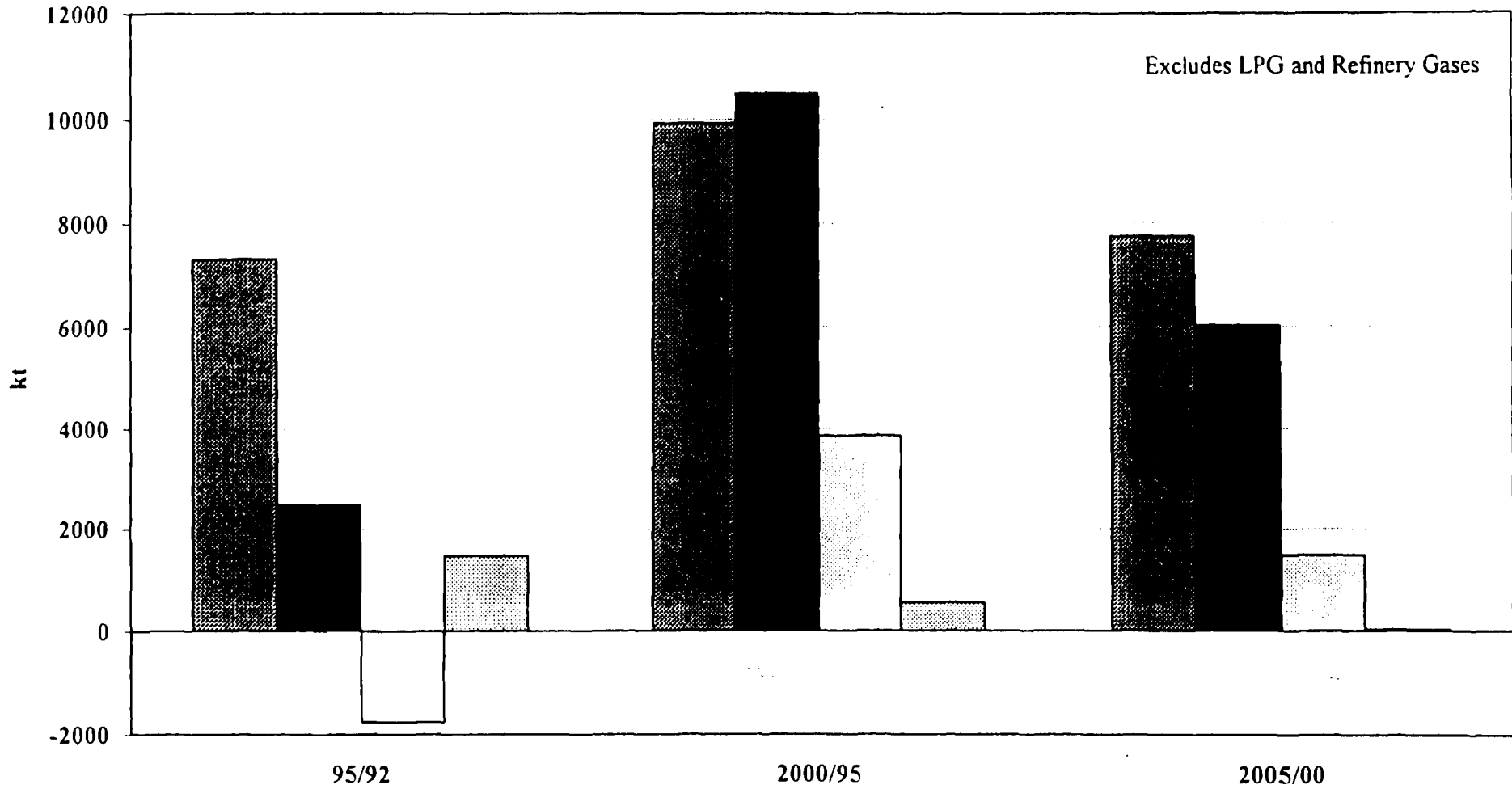


CHART C.4

Others
 Fuel oil
 Middle distillates
 Gasolines

INCREMENTAL OIL PRODUCT DEMAND European Union 15

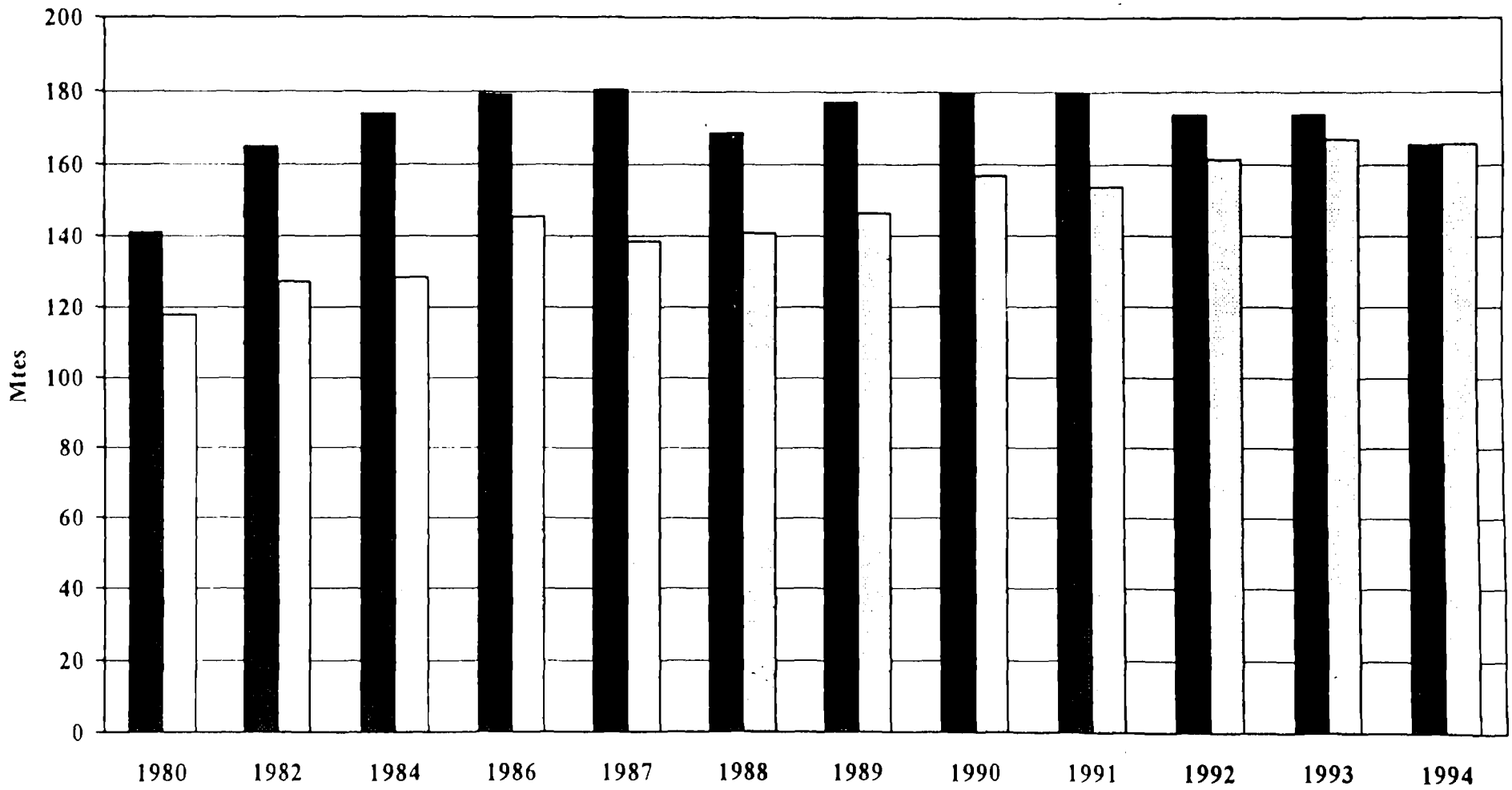


Source: Commission Estimates

Gasolines
 Middle distillates
 Fuel oil
 Others

CHART C.5

Total Products Trade European Union 12



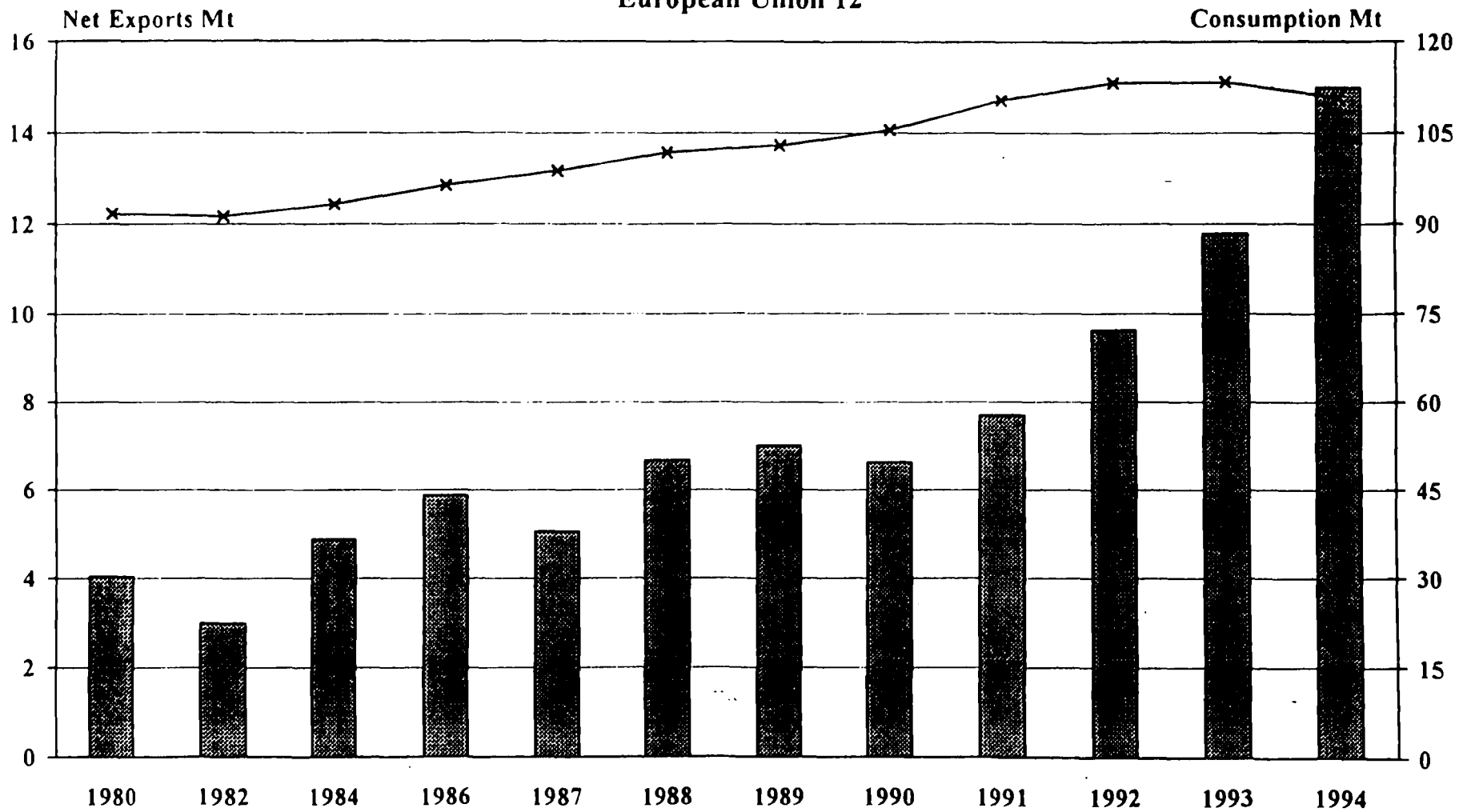
Source: IEA

■ Imports □ Exports

CHART C.6

51

Gasoline Net Exports European Union 12

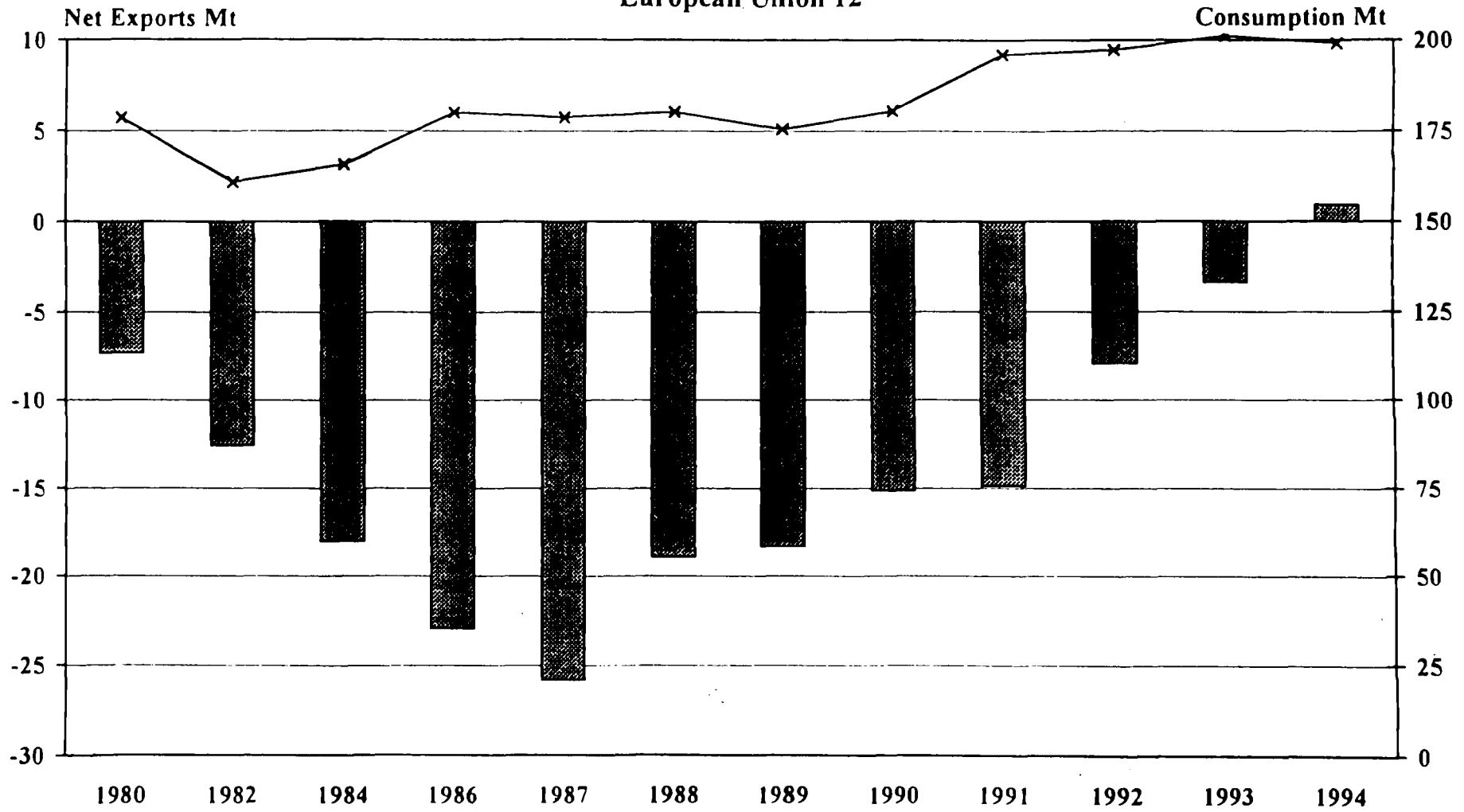


Source: IEA

Net Exports —x— Consumption

CHART C.7

Gas Oil Net Exports European Union 12

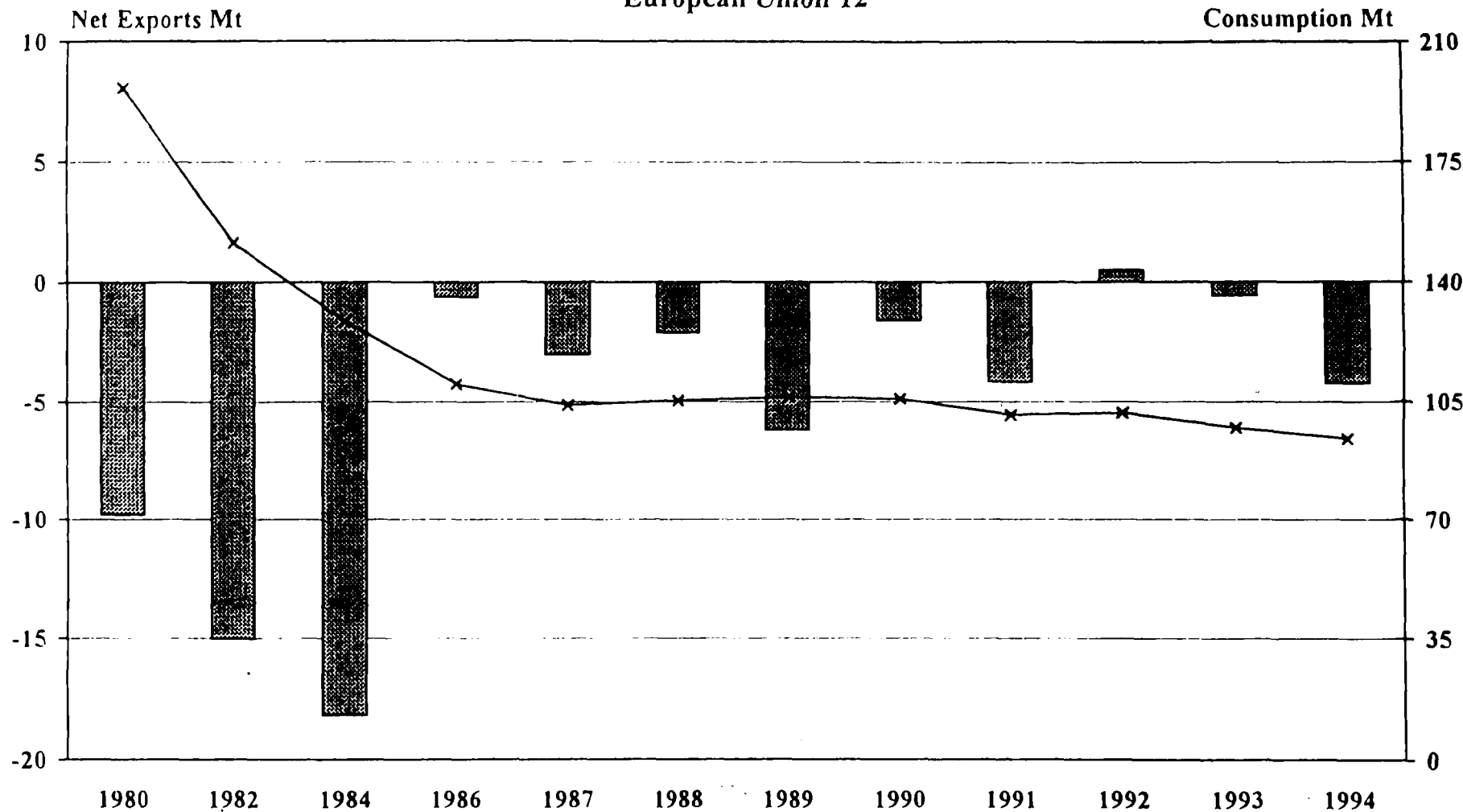


Source: IEA

Net Exports
 Consumption

CHART C.8

Fuel Oil Net Exports European Union 12



Source: IEA

Net Exports —x— Consumption

CHART C.9

Maximum Sulphur Contents for Gas Oil

TABLE D.1

Directive	Product	% Sulphur Content [by weight]
93/12/EEC of 23.03.1993	Automotive Gas Oil	<= 0.2% by 01.10.1994 <= 0.05% by 01.10.1994
93/12/EEC of 23.03.1993	Non- Automotive Gas Oil	<= 0.2% by 01.10.1994

Maximum Lead Contents for Petrol

TABLE D.2

Directive	Product	Lead Content [gms/litre]
85/210/EEC of 20.03.1985	Unleaded Petrol	<= 0.013 g/l by 01.04.1990
85/210/EEC of 20.03.1985	Leaded Petrol	<= 0.15 g/l by 01.01.1986

Maximum Benzene Content of Petrol

TABLE D.3

Directive	Product	Benzene Content [by volume]
85/210/EEC of 20.03.1985	Petrol	<= 5% from 01.10.1989

TABLE D.5**ENVIRONMENTAL INVESTMENT COSTS**

<u>Measure</u>	<u>Investment Cost</u> (ECUbn)
Some Recent Measures:	
Reduction of sulphur level in gasoline to 0.05 %	2.5
Reduction of sulphur level in diesel to 0.05 %	3 - 5
Reduction of hydrocarbons (VOC) emissions by Stage-I (Costs for changing from top to bottom loading excluded)	0.8
Total Some Recent Measures:	<hr/> 6.3 - 8.3
Potential Measures:	
Reduction of benzene level in gasoline to 1 %	6 - 7
Reduction of gasoline volatility (RVP) by 10 kPa	1.5
Reduction of sulphur level in gasoline to 200 ppm	1
Reduction of sulphur level in gasoline from 200 to 50 ppm	4
Reduction of sulphur level in diesel to 200 ppm	6
Increase of diesel cetane number to 52	1.5 - 2
Increase of diesel cetane number from 52 to 58	15
Reduction of diesel FBP (T95: 340 °C)	3
	*8 - 10 38 - 39.5
Reduction of sulphur level in inland heavy fuel oil to 1 %	7 - 12
Reduction of sulphur level in bunker fuel to 1.5 % for 30 % of demand	1.5 - 2.5
Application of strict BAT to refinery emissions over existing measures	8 - 10
Reduction of hydrocarbons (VOC) emissions by Stage II	1 - 1.5
Reduction of sulphur level in heating gas oil to 0.1%	1.5 - 2
Total Potential Measures:	27 - 29 <hr/> 57.0 - 67.5
Grand Total All Measures:	<hr/> 63.3 - 75.8

Source: Industry Figures and *Commission updates based on latest available Auto Oil Programme Results

EU-15 DESULPHURISATION CAPACITY OF MIDDLE DISTILLATES

(million metric tons/year)

1.1.1995

BE	12.4
DK	2.4
DE	27.8
EL	3.8
ES	16.4
FR	24.0
IR	0.3
IT	27.1
NL	15.2
PO	2.6
UK	23.4
SF	3.7
SV	6.3
OS	4.2
EU	169.6

Sources : EC Regulation 1056/72 &
National Administrations

TABLE D.6

EU-12 REFINERY STRUCTURE EVOLUTION 1980-1988-1995
Number & Capacity of Refineries by Type

(Situation at 1st January)

Refinery Type	No	1980		No	1988		No	1995	
		Primary Distil. Capacity mta	%		Primary Distil. Capacity mta	%		Primary Distil. Capacity mta	%
Simple	62	249	27	16	43	7	14	37	6
Semi-complex	24	148	16	20	89	15	13	52	9
Complex	55	523	57	58	460	78	66	506	85
Total	141	920	100	94	592	100	93	595	100
of which:									
Refineries									
< 1 mta	129	915		90	590		90	593	

Refinery type definition :

'Simple' refinery : primary distillation plus, where appropriate, reforming and hydrodesulphurization

'Semi-complex' refinery : 'simple' plus visbreaking and/or other thermal cracking

'Complex' refinery : 'simple' or 'semi-complex' plus catalytic cracking, hydrocracking and/or coking

Source : Commission - DGXVII-B2

TABLE E.1

REFINING CAPACITY IN THE E.U. AT 1.1.1995

(capacity in service in million tons per annum)

	ATMOS. DIST.	REFOR.	HYDRO. CRACK.	CAT. CRACK.	THERM. CRACK.	VIS- BREAK.	COKING
BE	34.5	4.7	-	5.9	-	4.2	-
DK	9.2	1.4	-	-	1.9	2.2	-
DE	113.1	17.6	8.6	15.4	3.9	10.9	5.0
EL	18.2	2.1	1.3	3.0	-	2.6	-
ES	60.0	8.0	0.7	8.4	-	8.4	1.5
FR	90.4*	11.0	0.8	18.2	-	8.1	-
IR	2.8	0.6	-	-	-	-	-
IT	102.3	12.0	7.1	14.7	6.2	15.9	2.6
NL	59.6	7.3	5.1	7.5	3.1	4.1	2.1
PO	14.4	2.2	0.5	1.7	-	1.4	-
UK	90.7	16.4	2.5	23.7	2.2	3.1	3.3
SF	11.0	2.1	1.1	2.7	-	1.9	-
SV	21.0	3.2	-	1.5	1.4	2.3	-
OS	10.0	1.4	-	1.3	0.3	1.0	-
EU	637.2	90.0	27.7	104.0	19.0	66.1	14.5

* of which 5.9 mta in reserve, immediately useable

Sources : National Administrations & EC Regulation 1056/72

TABLE E.2

EU-15 - CONVERSION CAPACITY
(million metric tons/year)

	1985	1990	1995
<i>CAT. CRACKING</i>	88.0	88.2	104.0
<i>VISBREAKING</i>	52.0	63.8	66.1
<i>HYDROCRACKING</i>	11.0	23.2	27.7
<i>THERM. CRACK.</i>)			
<i>COKING</i>)	27.8	28.0	33.5
<i>FLEXICOKING</i>)			
<i>TOTAL CAPACITY</i>	178.8	203.2	231.3
<i>CATCRACK. EQUIV*</i>	146	171	199
<i>AS % CDU CAPACITY</i>	21	28	31

* Ratios used are : Visbreaker 0.33 - Hydrocracker 1.3 -
Thermal Cracker 0.65 - Coker 1.7

Sources : National Administrations & EC Regulation 1056/72

TABLE E.3

TAXES AND DUTIES AT FEBRUARY 1996 - ECUS

	Belgique	Danmark	Deutschland	Ellas	Espana	France	Ireland	Italia	Luxembourg	Nederland	Osterreich	Portugal	Suomi	Sverige	U.K.
1. VAT (%)															
Premium gasoline	21.0	25.0	15.0	18.0	16.0	20.6	21.0	19.0	15.0	17.5	-	17.0	-	-	17.5
Unleaded gasoline	21.0	25.0	15.0	18.0	16.0	20.6	21.0	19.0	12.0	17.5	20.0	17.0	22.0	25.0	17.5
Automotive dieseloil	21.0	25.0	15.0	18.0	16.0	20.6	21.0	19.0	15.0	17.5	20.0	5.0	22.0	25.0	17.5
Heating gasoil	21.0	25.0	15.0	18.0	16.0	20.6	12.5	19.0	12.0	17.5	20.0	-	22.0	25.0	8.0
LPG (Vehicles)	21.0	25.0	15.0	18.0	16.0	20.6	21.0	19.0	6.0	17.5	20.0	17.0	22.0	25.0	17.5
LPG (Heating)	21.0	25.0	15.0	18.0	16.0	20.6	12.5	10.0	6.0	17.5	20.0	17.0	22.0	25.0	8.0
Heavy fueloil HTS	21.0	25.0	15.0	18.0	16.0	20.6	12.5	10.0	12.0	17.5	-	5.0	-	-	17.5
Heavy fueloil BTS	21.0	25.0	15.0	18.0	16.0	20.6	12.5	10.0	12.0	17.5	20.0	5.0	22.0	25.0	17.5
2. EXCISE TAX (1000L)												08.02.96			
Premium gasoline	546.0	0.0	573.0	410.6	408.7	616.9	380.6	537.3	415.9	608.7	-	495.1	-	-	463.3
Unleaded gasoline	485.3	448.5	519.9	358.9	375.3	576.2	349.3	494.2	361.7	542.0	430.2	457.8	548.0	479.1	406.2
Automotive dieseloil	302.0	300.4	328.9	248.9	272.5	354.4	302.5	361.3	263.3	327.1	300.7	326.1	291.2	291.4	406.2
Heating gasoil	14.2	241.4	42.4	135.8	79.5	78.0	50.2	361.3	5.4	81.6	79.0	-	36.5	189.3	27.6
LPG (Vehicles) (1)	0.0	208.5	169.8	58.2	31.5	68.2	69.4	157.3	56.8	29.1	104.8	89.0	0.0	162.4	333.6
LPG (Heating) (T)	18.1	315.5	26.5	12.9	7.4	0.0	22.9	173.7	0.0	0.0	0.0	0.0	0.0	131.3	0.0
Heavy fueloil HTS (T)	19.4	284.5	15.9	42.0	13.6	24.3	17.8	43.5	14.2	31.5	-	28.1	-	-	21.6
Heavy fueloil BTS (T)	6.5	284.5	15.9	42.0	13.6	18.0	17.8	21.8	6.5	31.5	37.7	12.8	36.9	213.3	21.6

DANMARK:

Fuel oil lourd - Depuis le 1er Janvier 1993, le montant de la taxe récupérable par le secteur industriel s'élève à 1820 CD par tonne.

Heavy fuel oil - As from 1 January 1993 the tax recuperable by the industrial sector amounts to 1820 CD per ton.

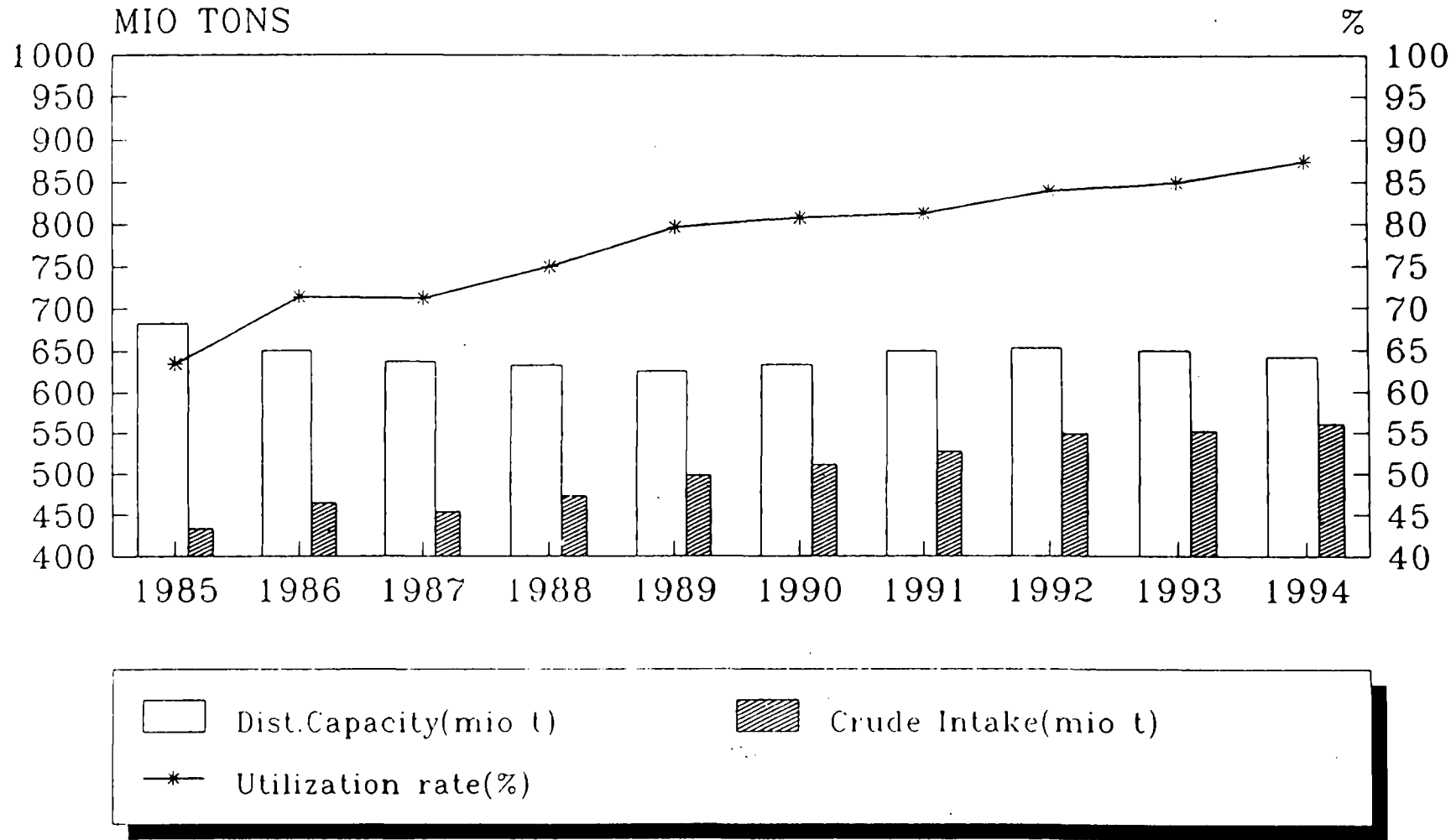
Premium gasoline - Cancelled as from 1/1/96

(1) ROYAUME-UNI: par/tonne

Exchange rates as at 08.01.1996

1 ECU = 13.2595 OS, 38.7384 BEF, 1.88485 DM, 7.29054 DKR, 158.542 PTA, 5.7135 FMK, 6.46731 FF, 844401 UKL, 309.318 DRA, 818238 IRL, 2068.64 LIT, 38.7384 LUF, 2.11041 HFL, 195.925 ESC, 8.6825 SKR

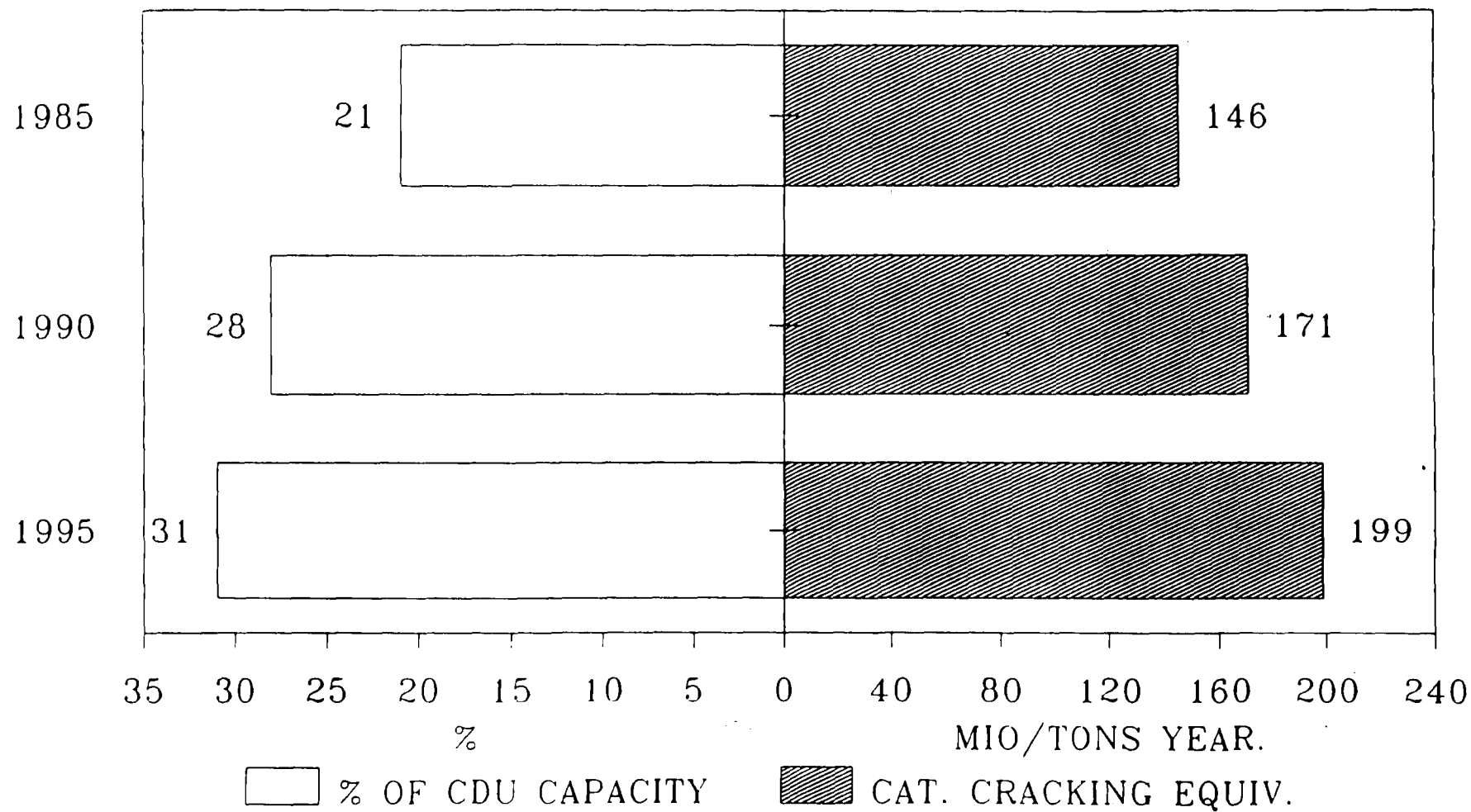
EVOLUTION 1985-1994



* crude only, mid year capacity

CHART E.1

EU-15 REFINING UPGRADING CAPACITY IN CAT. CRACKING EQUIVALENT

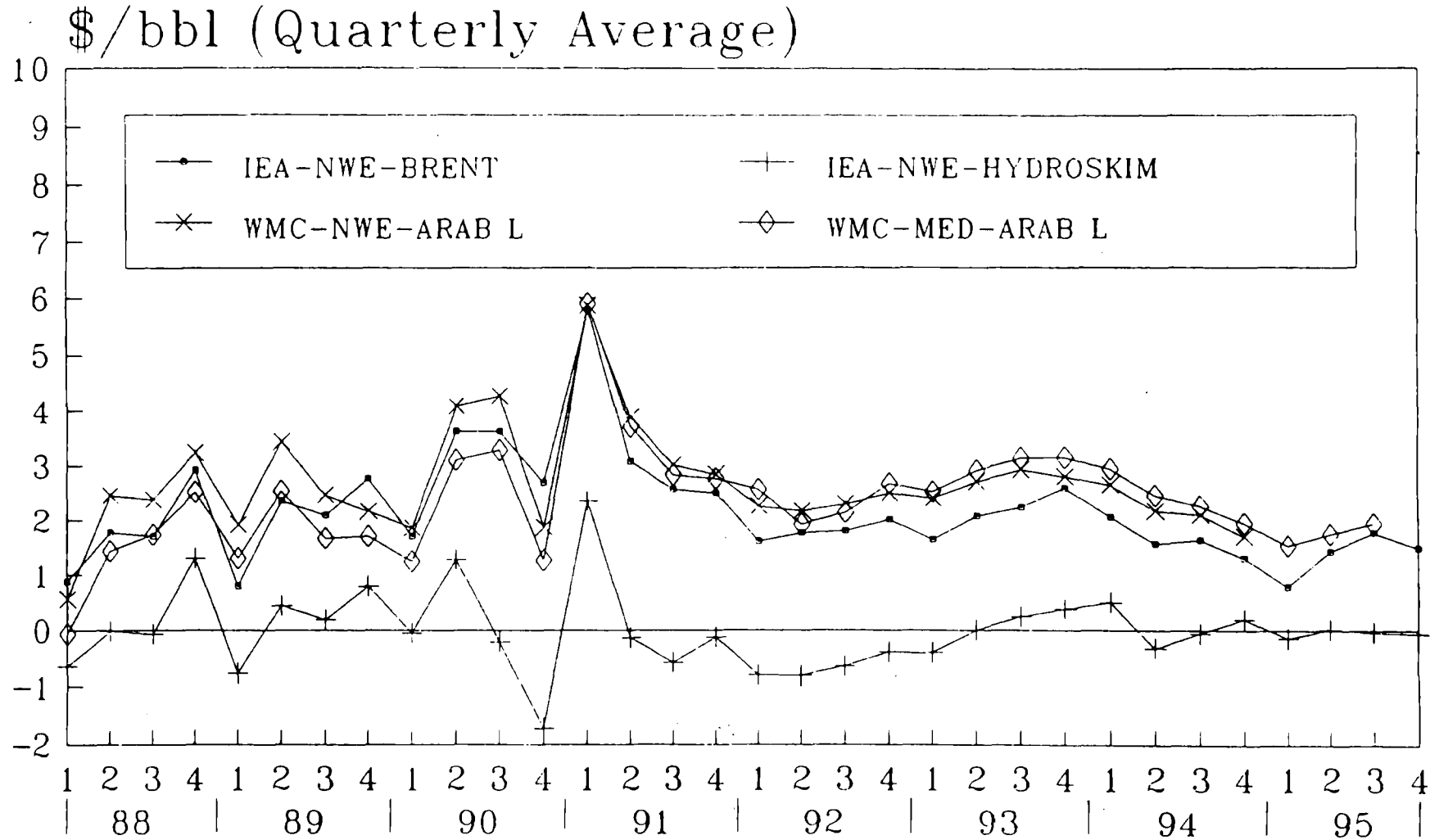


Sources : Nat. Admin. & EC Reg.1056/72

CHART E.2

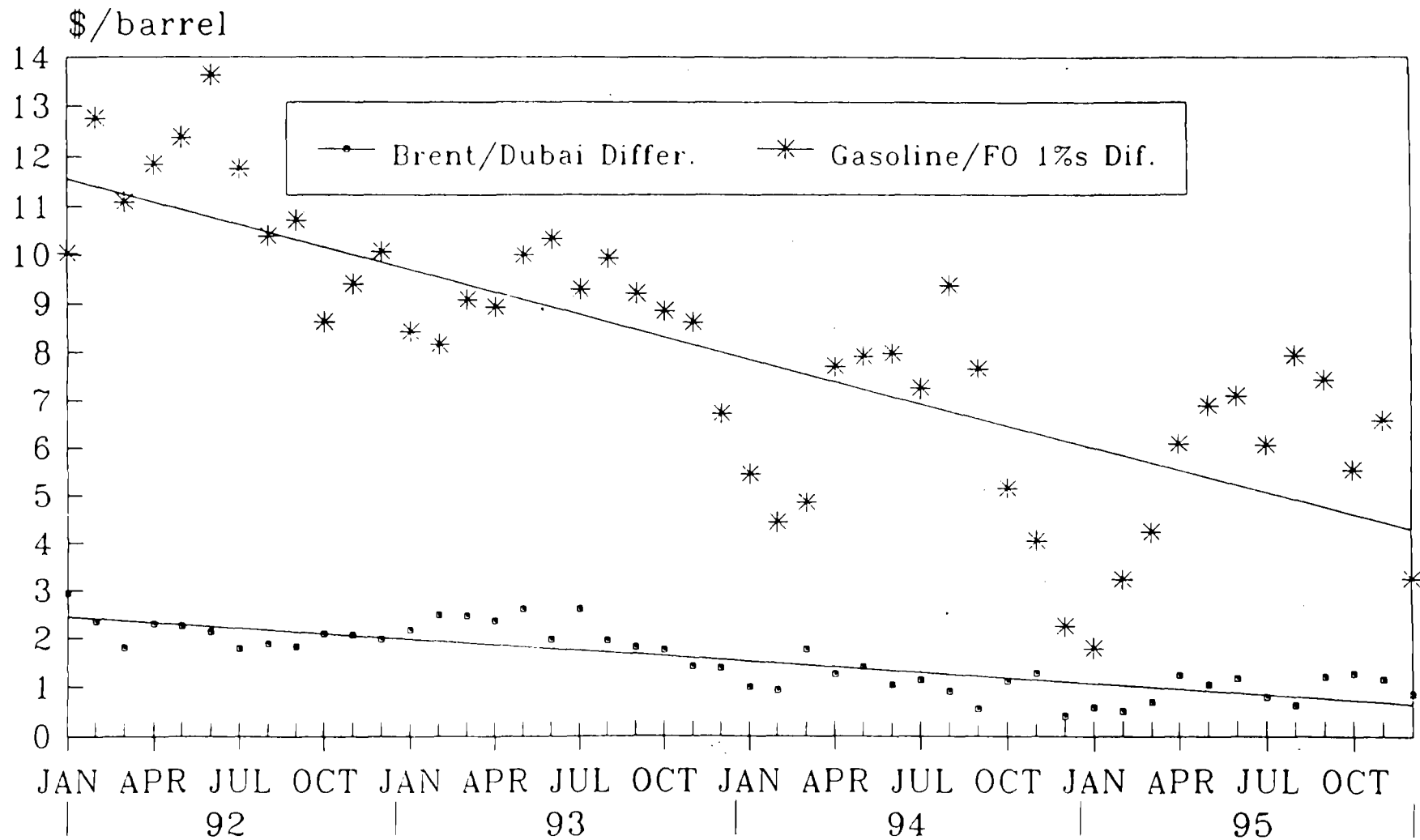
REFINING MARGINS 1988-1995

NW EUROPE & MEDITERRANEAN ZONES



WMC : Wood Mackenzie

BRENT/DUBAI & LEADED GASOLINE/FUEL OIL PRICE DIFFERENTIALS



Source : IEA Monthly Oil Market Report

CHART E.4

FUTURE NET EXPANSION OR NET REDUCTION IN THE REFINING CAPACITY OF THE EU-15

(thousand metric tons/year)

	1995	1996	1997	After or date not defined
ATMOS. DIST.	- 2400	- 2300	+ 4400	+ 1600
REFORMING	+ 100			
HYDROCRACK.		- 280	+ 700	
CAT. CRACK.	+ 580		+ 1800	+ 4700
THERM. CRACK.	+ 273			
VISBREAKING			- 300	+ 100
COKING				+ 1000
DESULPHURIS. OF MID. DIST.	+6672	+17029	+ 1805	+ 1040

SOURCE : EC REGULATION 1056/72 -
QUESTIONNAIRES OF BEGINNING 1995

TABLE E.5

OPEC FOREIGN REFINING

Net Share in thousand barrels/day as of end 1995

	Asia/ Pacific	Western Europe	USA	Total (3 reg.)
Iran	32	-	-	32
Kuwait	-	210	-	210
Libya	-	234	-	234
Saudi Arabia	152	50	300	502
U.A.E	-	142	-	142
Venezuela	-	230	750	980
Total OPEC	184	866	1 050	2 100
Total of the region	14 803	14 151	15 354	44 308
OPEC share in the region	1.2%	6.1%	6.8%	4.7%

Source : DGXVII on the basis of OPEC
official data & press articles

TABLE E.6

(in thousand of units at year end)

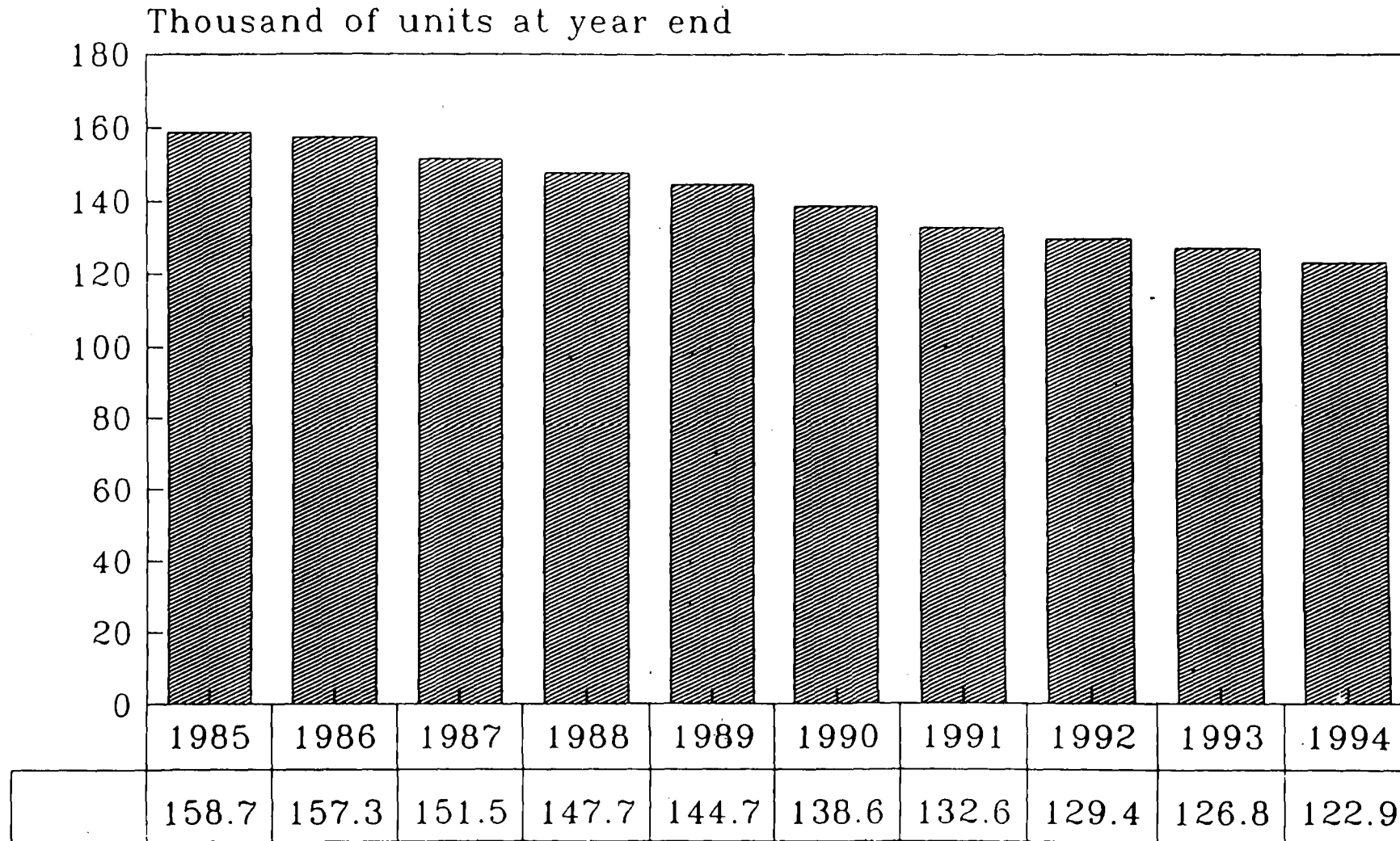
	1985	1987	1989	1991	1992	1993	1994
BE	7.3	6.7	6.5	6.0	5.7	5.5	5.4
DK	3.6	3.4	3.2	2.9	2.9	2.8	2.7
DE	19.8	20.8	19.9	18.9	18.8	18.5	18.3
EL	6.8	6.3	6.4	6.4	6.5	6.6	6.8
ES	5.2	5.2	5.3	5.7	5.8	6.3	6.6
FR	34.6	31.1	27.7	22.6	21.2	19.8	19.1
IR	3.4	3.3	3.2	2.7	2.8	2.8	2.7
IT	36.4	34.7	33.9	30.4	30.1	29.9	28.8
NL	8.1	7.6	6.9	6.0	5.6	5.1	4.1
PO	1.9	1.8	1.8	1.8	2.0	2.1	2.3
UK	21.1	20.2	19.8	19.3	18.5	18.0	17.0
SF	2.0	2.0	1.9	2.0	1.9	1.9	1.9
SV	4.4	4.3	4.2	4.0	3.8	3.8	3.6
OS	4.1	4.1	4.0	3.9	3.8	3.7	3.6
EU	158.7	151.5	144.7	132.6	129.4	126.8	122.9

Source : National Statistics

TABLE F.1

MARKETING OF OIL PRODUCTS IN THE EU-15

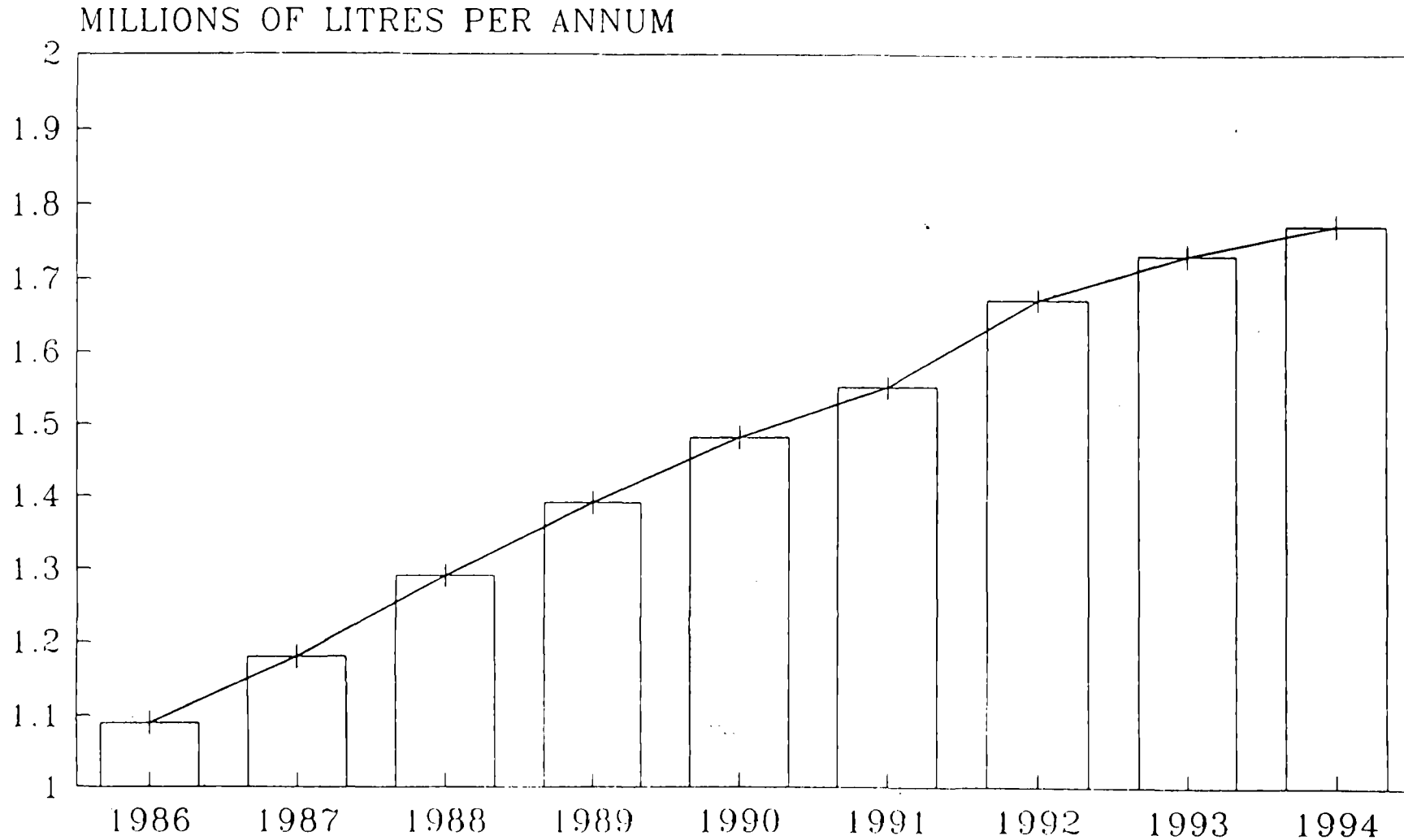
NUMBER OF PETROL RETAIL OUTLETS 85-94



Source : National Statistics

CHART F.1

EU-12 EVOLUTION 1986-1994 OF AVERAGE THROUGHPUT PER SERVICE STATION



Source : Wood Mackenzie

CHART F.2

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