THE GROWTH OF ENERGY CONSUMPTION AND PRICES IN THE USA, FRG, FRANCE, AND THE UK, 1950–1980

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FOREWORD

During the seven-year period 1973–1980 the International Institute for Applied Systems Analysis conducted a global systems analysis of the energy problem, considering prospective demand and modes of supply for the fifty years from 1980 to 2030. The central findings of this work have been published: Energy Systems Program Group of IIASA, Wolf Häfele, Program Leader, *Energy in a Finite World: Volume 1. Paths to a Sustainable Future,* and *Volume 2. A Global Systems Analysis*, Ballinger, Cambridge, Massachusetts, 1981.

This large-scale effort was supported by many studies of contributing issues; moreover, new insights asked for reconsiderations of data describing past energy-related evolutions. This paper examines data on gross domestic product (GDP), industrial output, energy consumption, and the prices of fuels and electricity in four developed countries during the period 1950–1980.

The study of these time series sheds some light on the changing relation between GDP growth and energy consumption in a period during which oil prices exploded. In particular, information on the most recent developments in energy consumption in the face of changed relative energy prices contributes to a better understanding of price elasticities and their limitations.

WOLF HÄFELE
Leader
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PREFACE

Energy consumption in the developed Western world is largely determined by demand in the USA, FRG, France, and the UK. In these countries, that have comparable economic structures and development, but differ in energy endowment, the growth of both energy consumption and energy prices is studied for a 30-year period that ends in 1980 with the first reactions to the second oil shock. The study of these time series may shed some light on the relationship between the growth of real GDP and total primary energy consumption, a relationship that entered a new phase in 1974–75 with real GDP rising faster than energy consumption. It was found that this new development, heralded by some as the "breaking of the energy coefficient" does not necessarily signify energy savings. When viewed in relation to structural changes in the economies, a stronger service sector in GDP of the European countries, and a shift toward less energy intensive industries in all four countries is indicated, this is evidenced for example by the decline of the steel industry.

Current and inflation-adjusted energy prices were studied separately for the industry, households, and transportation sectors, and by groups of mineral fuels (coal, oil, natural gas), electricity, and gasoline. The price index numbers used for the analysis of long-term growth trends were supplemented with actual prices paid during the past decade for electricity (kWhr); gasoline (liter); and mineral fuels (per toe). The actual price compilations show the shifts in price relations for various mineral fuels, resulting from different intensities of price escalations. Price leaders were found to be petroleum products for industry and household use in all four countries, and natural gas in the USA (where prices rose even more than those for petroleum products), FRG, and France while in the UK natural gas prices rose far less than petroleum products. The petroleum products price escalation was followed at a distance by solid fuels in the USA and the UK; in the FRG and France, oil and coal prices engaged in a close race. In all four countries, price increases were lower for electricity (both industry and household use); household gas; and, for a while gasoline. Price escalations were the steepest for total energy used by the industry sector, followed by total household energy (high share of electricity and household gas) with price increases for the road transportation sector (gasoline) the lowest.

The long-term growth of energy consumption, total and by groups of fuels for the economy as a whole is viewed in conjunction with the two price indices compiled for industry and household energy purchases, as there is no price index for total national energy consumption (at least not published by governments in regular statistical publications). Up to 1973 the tendency was for both industry and household energy prices to decline, and when energy prices rose, the increase was smaller than that of the general price index, measured by the GDP deflator. Thus, in the pre-1973 period, the pattern for all four countries was a steady decrease of inflation-adjusted prices and a steady increase of consumption for total energy as well as gasoline, electricity, and mineral fuels with the exception of coal, where total consumption also decreased. By the mid 1960s, when petroleum prices (always inflation-adjusted) were still declining, US coal prices and total consumption

increased, due to the demand by the utilities. A revival of coal consumption, largely based on requirements for electricity production, occurred in the mid 1970s in the FRG, France, and the UK. In the FRG and France this move was made more for security of supplies than price reasons.

To gain a closer look at the response of consumption to prices during the last decade, energy consumption was separately studied for the three sectors: industry, household, and road transportation (gasoline) which together account for 60–70 percent of national energy consumption.

In the industry sector, decreasing coal consumption coincided with increasing inflation-adjusted prices throughout the decade in the USA and the UK; in the FRG and France, that had earlier followed this trend, a revival of coal consumption in the face of rising prices began in 1978. US industry consumption of petroleum products fell in 1974–75 together with the index of industrial production; subsequently, industrial output increased and petroleum products consumption increased substantially throughout the decade up until 1979, while inflation-adjusted prices were also rising. In 1980, when prices escalated more than before, petroleum products purchased by industry fell, together with the index of industrial production. It is noteworthy that petroleum products industry consumption progressed for most of the decade despite steeply rising prices; at the same time US industry consumption of natural gas stagnated and slightly declined with even more steeply rising natural gas prices. It was a different picture for Europe. The industry sector consumption of petroleum products declined sharply with inflation-adjusted prices rising, though not as much as in the USA. However, these decreases in petroleum products consumption by European industries do not represent net energy savings, as they coincide with increases of natural gas consumption in France and the FRG (where the inflation-adjusted prices were also rising), and especially the UK (where the inflation-adjusted prices were rising much more moderately). Moreover, the cutback in petroleum products consumption by industry in France and the FRG coincided with electricity purchases rising throughout most of the decade and mostly at their long-term growth rates. In 1980, this growth continued in the FRG, stagnated in France, and gave way to a decline in the USA and UK, along with a drop in the index of industrial production in both the USA and the UK.

In the household sector, coal consumption continued its long-term decline in the USA and the UK, and with some movement upward and downward, also in the FRG and France, while inflation-adjusted prices were moving upwards. The particularly sharp price increases of petroleum products for household use were met with acute cutbacks in consumption not only in the FRG, France, and the UK (following the pattern for industry petroleum products) but also in the USA (contrary to what happened in the US industry sector). At the same time US household consumption of gas stagnated with inflation-adjusted prices rising steeply, while in the FRG, France, and especially the UK, gas (natural and manufactured) consumption by households shot up to unprecedented heights, with no cutbacks in 1974–75 or 1980, benefitting no doubt from benign price increases, especially in the UK where the resource was abundant. Household electricity consumption, also benefitting from comparatively low price increases, expanded through the decades uninterruptedly in the USA, FRG, and especially in France due to a promotion program. Only the UK growth of household electricity consumption was kept at lower levels, curbed by use of natural gas.

Thus, total household energy consumption in 1980 showed a slight drop over 1970 in the USA caused by the cutbacks in petroleum products and natural gas; a moderate gain in the UK where natural gas replaced petroleum products; and more substantial gains in the FRG and especially France, where households switched from coal and petroleum products to gas and electricity.

In the road transportation sector the inflation-adjusted price index numbers for gasoline tended to stagnate or slightly decline in the period between the two oil shocks, a factor that seems to have encouraged consumption to grow in all four countries with little change in their long-term growth rates. This development was finally stopped in the USA by extraordinary (though inflation-adjusted) prices of gasoline causing a cutback in consumption in 1979, that was amplified in 1980 when US gasoline consumption dropped to its 1974 level. In the FRG, France and the UK, where the gasoline price shock was relatively milder, consumption increased through 1980 (UK), but with a slight drop in the growth rate (FRG and France), with possibly a cutback coming in 1981.

Hopefully, the detailed monitoring of energy consumption and prices may be useful for the understanding of energy consumption in our times and provide the clues for the assessment of the requirements in the short, if not the long term.

The major observations are given in Part I, followed by Tables in Part II, and a set of graphs in Part III, while concepts, definitions and sources of the variables selected are given in Part IV.

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THE GROWTH OF ENERGY CONSUMPTION AND PRICES IN THE USA, FRG, FRANCE, AND THE UK, 1950–1980

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SUMMARY

This paper examines data on gross domestic product (GDP), industrial output, energy consumption, and the prices of fuels and electricity in four developed countries (the USA, the FRG, France, and the UK) for the period 1950–1980. The prices are taken in current values and adjusted for general inflation; they are monitored by broad sectors of the economy (industry, households, and transportation), and for electricity and groups of fuel commodities. The results are presented in four parts: a discussion of the major observations; the data presented in tabular form; a set of graphs showing the growth of energy consumption and prices; and a listing of the concepts, definitions, and sources of the variables selected for study.

PART I OBSERVATIONS

1 INTRODUCTION

1.1 Field of Observation

The present study on the development of energy consumption and prices is carried out at an overall national level. For this purpose, gross domestic product (GDP) or gross national product (GNP) for the USA is seen as value added for the economy as a whole, and the index of industrial production stands for total output of mining and manufacturing. National energy consumption is considered in terms of primary fuel equivalents, total and for groups of fuels. For industry, households, and the road transportation sector, energy consumption is analyzed by groups of energy commodities, coal, petroleum products, gas, electricity, and gasoline.

All prices are considered to apply nationwide, with a breakdown by energy-using sectors into industry, households, and road transportation.

The analysis centers on the USA and the three major energy-consuming countries in Europe: the FRG, France, and the UK. In the aggregate, these three countries are referred to as EUR 3. (Occasionally, information is also given for all European Economic Community countries under EUR 9.)

The 30 years of growth from 1950 to 1980 is presented in index numbers, with 1970 = 100, giving a clear view of the development over the last decade. For further emphasis on the more recent period, and to gauge the relative importance of the data behind the index numbers, the levels of population, GDP, and the levels and structure of energy consumption and prices are also seen in absolute values for the years 1970–1980. To facilitate comparison, both consumption and prices were converted to apply to metric tons of oil equivalents (toe).

The study is based mainly on official statistics published by governments and international agencies, including the United Nations (UN), Organization for Economic Cooperation and Development (OECD) and EUROSTAT, the Statistical Office of the European Communities.

1.2 Population, GDP, and Energy Consumption, 1970–1980

The long-term period of rapid growth of GDP and energy consumption, and the moderate increase of the general price level (measured in terms of the GDP deflator) ended in the 1970s. In the USA population grew from 205 million in 1970 to 223 in 1980; this was an increase of nearly 9 percent (Table 1). At the same time, the combined population of the FRG, France, UK (EUR 3) grew from 167 to 171 million (less than 3 percent). GDP in constant prices and dollars of 1975 (Table 2) increased in the USA from $1,361 billion in 1970 to $1,811 billion in 1980 (33 percent); in EUR 3 the expansion was from $856 billion to $1,149 billion (33 percent). National energy consumption, in terms of primary fuel equivalents rose in the US from 1,581 million toe in 1970 to 1,799 in 1980 (13.8 percent). During the same period, EUR 3 energy consumption expanded from 576 million toe to 649 million (12.3 percent) (Table 3).

In short, over the last decade, population grew about three times faster in the USA than in EUR 3; total energy consumption rose only a little faster in the USA, while real

GDP expanded at about the same rate in both areas. These growth rates did not significantly change the proportion of the USA in USA-EUR 3 totals. At the end of the decade, the US shares were still 56 percent population, 61 percent of GDP (1975 prices and exchange rates), and 74 percent of the energy consumption.

In 1980, oil was the single most important fuel category in the USA, FRG, and France (Table 4). In terms of primary energy equivalents, US oil consumption amounted to 808 million toe, followed by the FRG 121 million toe and France 102 million toe. Ranked in the order of importance in national energy consumption, the shares were 45 percent in the USA, 47.5 percent in the FRG, and 53.2 percent in France. In these three countries, the use of oil was well above that of coal which reached only 17.7 percent of the national total in France, 20.6 percent in the USA, and 29.8 percent in the FRG. Only in the UK was the 1980 oil consumption on a par with that of coal, each a little over 70 million toe – 37 percent of total primary energy consumption. However, the UK lag in oil consumption was made up by a high use of natural gas, 42 million toe – 21.6 percent of total primary energy. The comparative figures for the USA, FRG and France are 26.8, 16.5, and 12.5 percent respectively.

It may also be noted that the US share in the combined USA-EUR 3 energy consumption was 74 percent of total primary energy, 67 percent of solid fuels, 82 percent of natural gas, 73 percent of petroleum, 67 percent of nuclear, and 74 percent of other primary energy. In the case of secondary energy, the US shares were 82 percent of the gasoline supply and 71 percent of electricity. These structural elements are worth keeping in mind for the current analysis of energy prices and consumption. The breakdown of energy consumption by industry and households shown in Tables 5–9 is discussed in connection with prices in Section 5.

2 ENERGY PRICE LEVELS, 1970–1980

2.1 General

Energy price levels are shown for: mineral fuels in Tables 10–13; gasoline in Table 14; and electricity in Table 15. All prices are current without adjustment for inflation. The commodities are grouped by purchasing sectors and should provide an indication of the actual prices underlying the index numbers discussed in Section 3 and shown in Tables 16–19. Ideally, the series should be sufficiently representative to reveal whether and to what extent interfuel price relationships were affected by recent price escalations.

All prices were compiled from national government sources, and if not otherwise stated, relate to the average of the year. Data were supplemented with OECD and EUROSTAT compilations, that are also based on governmental sources, but usually relate to the first of the year.

In general, taxes are included. Special user taxes on mineral oil products such as Mineralölverbrauchssteur in the FRG, and duties on hydrocarbon in the UK, are definitely included. All gasoline prices in the US and European countries are prices at the pump, including taxes; and for the European countries, all electricity prices (industry and household) include value added tax (VAT) and other taxes, where applicable.

For gasoline and electricity, the price selections are fairly representative, whereas for mineral fuels the data are more problematic and hence the basis for comparison less solid, especially for the FRG and France, where average coal prices for national consumption are not available.

2.2 Mineral Fuels Price Levels

2.2.1 Coal and Oil

For a meaningful analysis it is necessary to have the prices of commodities that are representative for groups of users and over a number of years. The first requirement poses a problem of selection that is particularly acute for the group of solid fuels. For example, the statistical Bundesamt of the FRG monitors 14 varieties of coal at producer or wholesale prices marked by a considerable spread, reflecting qualities and suitability for various uses. However, for household coal the choice is narrowed to two varieties, anthracite and lignite briquettes. French monitoring of coal prices by the Institut National de Statistique (INSEE) is just as complex as that of the FRG Statistische Bundesamt. Unlike the UK and USA neither offers an average price for industry coal.

For hydrocarbons, the choice in the FRG and other countries is limited to relatively few, standardized commodities, but the data are not readily available for long-term series. This is especially true in Europe for natural gas used by industry or oil for home heating which gained importance only in the more recent years. For this reason, we have added OECD compilations where available.

Moreover, mineral fuels prices are monitored in a variety of measures, including short and metric tons, US and Imperial gallons, barrels and liters. To facilitate interfuel and international comparisons, data were converted to prices per metric ton of oil equivalent (toe), or rather approximations of toe, because specific gravities of liquid fuels were not considered. The conversion factors used for the various units of measurement are indicated in the source notes to Tables 10–13.

The price tables show clearly that in all four countries, household paid more than industry and utilities, whether they purchased coal, petroleum products, or gas at any one time between 1970 and 1980. The margin between industry and utilitites on the one hand and household prices is more pronounced in the European countries than in the US. This may be partly due to the fact that household fuels are sold in very small quantities, prices are listed for 50kg of coal, or per liter of heating oil.

Because of currency fluctuations, the international comparisons of energy price levels are limited to one year only – 1980. For this purpose, national currencies were converted to US dollars at 1980 exchange rates, averaged for the year. Considering that the information at hand is sketchy, and that *average* prices are not available for FRG and French coal, it still appears that US industry and utilities paid less for their coal than their European counterparts. In the US, bituminous coal, which is most widely used by industry and utilities, sold in 1980 at $50–57 per toe. Whereas in the UK the average price for coal (excluding iron and steel, and other large consumers) was $133 per toe. French prices ranged from $168 for medium grade "flambant gras" to $311 per toe for high-grade anthracite, and FRG prices varied from $161 per toe of industry coal A/Gasflamm to $186 per toe of Ruhr hard coal "Fett nuss 4" – all considerably above US levels. In part, this disparity is due to the fact that in France and the FRG, coal price increases closely

followed the oil price explosion, while in the US coal prices progressed at a somewhat slower pace than oil.

For petroleum products, the US DOE Monthly Energy Review provides average wholesale and retail prices, tax included, of "heating oil No. 2" for the years 1976–1980. Where a comparison is possible, 1976–1978, these data are in line with the OECD compilations of heavy fuel oil prices paid by the industry sector at the beginning (not average) of the year. Therefore, OECD prices were added, to allow extrapolation to 1970 of the wholesale heating oil prices.

For the backdating of the DOE heating oil prices at retail level, use can be made of the Department of Labor, BLS annual average retail price of No. 2 heating oil, published in the American Petroleum Institute (API) Basic Petroleum Data Book, Vol. 1, Number 2, April 1981.

For the FRG, petroleum product prices are available at wholesale, industry level for both the more expensive extra light heating oil and the less expensive heavy fuel oil; and at retail level for extra light fuel oil.

The French national compilations relate to heavy fuel oil No. 2, industry; and fuel oil, household. The UK national compilations relate to the prices of large industry consumers excluding the steel industry for heavy fuel oil, and to households for burning oil, standard grade.

These factors should be kept in mind in international comparisons of the 1980 price levels in US dollars (Tables 10–13). Accordingly, prices paid by industry were highest in the USA with $253 per toe of heating oil No. 2, followed by the UK $220 per toe fuel oil, France $218 per toe heavy fuel oil No. 2, and the FRG $196 per toe heavy fuel oil bulk sales.

Besides international comparisons, price levels are also important to see the shifts in the relative prices of the various mineral fuels within countries. However, such an analysis requires a data base that lies beyond the scope of the present study. Therefore the following statements only give some indication that can be corroborated as more evidence becomes available. Among the commodity price series in Tables 10–13, those that offer clues to changing interfuel price relationships are identified below. In a few instance, it was necessary to combine the more recently published national series with those collected earlier by the OECD, to get a more complete picture of the past decade.

As the gap between industry and household prices is rather constant, and there is inadequate data on oil and natural gas prices paid by household consumers in European countries, the analysis is mainly directed to the industry and utilities sector.

2.2.2 USA

Bituminous is the coal most widely used by industry and almost exclusively by the utilities for steam electricity generation. In the early 1970s and up to 1975, the cost of coal per toe used by the utilities was higher than that of natural gas. However, with the dramatic increase of natural gas prices the picture changed and from 1976 onwards the cost of natural gas delivered to the utilities has topped that of coal per toe, with the gap widening ever since. Petroleum products, whether one looks at the cost of residual oil delivered to electric utility plants, or the more expensive wholesale price of heating oil No. 2 have always been higher than bituminous coal per toe throughout the last decade. But since oil prices increased so much faster than coal, by 1980, the residual oil cost 3.6 times as much as bituminous, against a factor of 2.9 in 1976.

The shifting price relationships between coal and hydrocarbons have left their mark on the energy consumed to produce electricity. According to the US DOE 1981 April Monthly Energy Review p. 66, fuel consumption to produce electricity has risen for bituminous coal from 377 million short tons in 1973 to 527 million short tons in 1980; at the same time petroleum decreased from 560 million barrels to 421 million barrels; while natural gas fell from 3,660 billion cubic feet in 1973 to little above 3,000 billion cubic feet 1975–1977; subsequently, it rose again reaching 3,681 billion cubic feet in 1980.

2.2.3 UK

The average prices per toe of coal, gas, and fuel oil delivered to large industrial consumers excluding iron and steel and other, very large industries, were not very different from each other during the years 1971–1973, oscillating at about £14 per toe. The first oil price explosion ended this situation; in the ensuing price race petroleum products (heavy fuel oil) led throughout 1979. During this period, the average price of coal remained low. The final result was that the margin between average coal prices on the one side and gas and heavy fuel oil prices on the other side considerably widened over the decade.

Somewhat similar conclusions may be drawn from the series of average prices for coal, gas, and oil for burning consumed by the electric power plants in the public supply system.

2.2.4 FRG and France

Since natural gas prices and cost of fuels delivered to electricity plants are not readily available in national statistical periodicals, the comparisons are confined to the industry sector prices of coal and petroleum products. Average coal prices were not available, and because of the wide spread between solid fuels prices, general validity of the following observations is limited. The comparisons are based on the samples selected from Tables 11 and 12, namely industry coal A/Gasflamm for the FRG and fines lavées flambants for France. The prices for these two types are not too different from the "steam coal, washed" selected by the OECD as representative for industry coal.

From 1970 to 1973 German industry coal sold at a higher price per toe than heavy fuel oil; in 1974 and 1975 heavy fuel oil became more expensive than coal; in 1976 and 1977 prices were about even; in 1978 heavy fuel oil prices dropped while coal prices increased. After the second oil price explosion, heavy fuel oil again became more expensive than coal, although the latter had been increasing steadily.

In France, throughout the decade, heavy fuel oils sold at a higher price than industry coal fines lavées flambants, with the exception of 1973. The price tendency from 1970 to 1973 had been for coal to rise and for fuel oils to drop. In the ensuing price escalations, coal after a slow start began to parallel oil so that by 1980 coal was slightly more expensive than oil.

As a final observation on the coal–oil price relationships exemplified by the samples in Tables 10–13 it may be noted that in 1980 heavy fuel oil prices were higher than industry coal per toe in all four countries. The margin was widest in the USA with a factor of 5; smaller in the UK with a factor of 1.6 and smallest in France and the FRG with factors of 1.3 and 1.2 respectively. Going back to the beginning of the decade one sees how the margins progressed, e.g., from 1.7 in the USA and 1.1 in the FRG in 1970. These progressions are largely in agreement with the growth of price index numbers discussed in Section 3.

2.3 Gasoline Price Levels and Taxes

Gasoline prices per liter of regular with tax included, the so-called prices at the pump, are shown for the USA and European countries in national currencies together with taxes for the years 1970–1980, and in US dollars for 1980 in Table 14. Gasoline prices are compiled from national statistical publications for a standard type of regular. Here it may be noted that the price index implicit in the data in Table 14 need not be identical in all instances with the consumer price index for gasoline shown in Tables 16–19, as the latter comprises a group of products, e.g., standard and premium. Until recently the US consumer price index for gasoline included motor oil and coolants. For more details on gasoline price compilations see Part IV, Section 8.

Table 14 shows that in 1980 US gasoline supply with 283 million tons reached 35 percent of total petroleum consumption in primary energy equivalents.

The FRG gasoline consumption of 24.2 million tons reached 20 percent of national oil consumption; in France 17.8 million tons of gasoline consumption constituted 17 percent of national oil consumption. In the UK, where national oil consumption in primary energy equivalents was far smaller than in Germany and France, gasoline consumption of 19.2 million tons reached 27 percent of total oil.

The data in Table 14 show that in 1980, the price of gasoline per liter in US cents was 75.7 in France, 64.2 in the UK, 62.3 in the FRG against only 31.2 in the USA. To some extent the low US prices against the comparatively much higher FRG and French prices stems from the dollar exchange rate that was low for most of 1980. The relatively low level of US gasoline prices is also due to the fact that the US tax on gasoline is comparatively modest. From 11 cents per gallon (2.9 cents per liter) in 1970 it rose to 13 cents per gallon (3.17 cents per liter) in 1972; with no increase since that time the share of taxes in prices at the pump decreased from about 30 percent in 1970 and 1973 to nearly 10 percent in 1980. Though not explicitly stated in the US 1976 and 1979 Statistical Abstract, pp. 596 and 652 from which the tax data were compiled, it is assumed that they relate to Federal tax, which comprises the major share of Federal, state, and local gasoline taxes.

In EUR 3 the tax bite was always higher than in the US. In 1970, the share of taxes in retail selling prices amounted to 74 percent in France, 73 percent in the UK, and 70 percent in the FRG. In the ensuing years, gasoline taxes increased, though not as fast as gasoline prices. Consequently, the tax percentage had eroded by 1980 to 57 in France, 49 in the FRG, and 41.5 in the UK.

2.4 Electricity Price Levels

Prices for purchased electricity per kWhr for industry and households 1970–1980 in national currencies and US cents for 1980 are shown in Table 15. The prices represent average prices and prices for selected categories or classes of monthly consumption.

Average electricty prices are compiled in the USA as resulting from total sales revenues and the amounts of kWhr sold to industrial, residential, and other consumers. For the European countries, we used the average prices resulting from the EUROSTAT compilations of income and kWhr sold of high voltage (industry) and low voltage (household).

Electricity price compilations from the rate structure are more intricate, because rates decrease with increased consumption, prices vary with peak and off hours of consumption, and by area of consumption. For the rates shown in Table 15 we selected the rates for the consumer classes that seem to be most representative for average monthly purchased consumption by industry as 60,000–200,000 kWhr in the USA; 167,000 kWhr in EUR 3; and for households as 500 kWhr in the USA, 292–300 kWhr in EUR 3. The US data relate to the US average, whereas the European data relate to selected regions, i.e., Western region in the FRG; Paris and London for France and the UK.

The data in Table 15 show that in all four countries and in all cases, prices charged to households are always above those charged to industry for all years under consideration, and for all categories (average prices or rates).

For industry, in the USA, FRG, and France the average prices tend to be lower than the prices we picked from the rate structure for a given consumption. The gap is higher in the USA and FRG (where a higher monthly consumption may be more typical than the one we picked), and lower in France. For the UK, differences between the two sets of data are minimal.

An international comparison of electricity prices paid by industry in 1980 is somewhat hampered by the availability of data for that year: a downward biased average price in the USA, and an upward biased industry rate in the FRG and France. However, the picture that emerges from the comparison shows the tendency for electricity prices per kWhr to be lowest in the USA and highest in the FRG, followed by France and the UK.

The discrepancy is in some measure due to taxation. The inclusion of taxes in the rates amounts to 11.5 percent in the FRG and 15 percent in France. There are no taxes in the UK and US prices exclude taxes as well. All EUR 3 tax data are from EUROSTAT 1980 Electricity Prices 1973–1978, updated by correspondence.

Perhaps a more important reason for the electricity price gap is the fact that in EUR 3 coal prices followed the oil price explosions rather closely, so that by 1980 coal prices reached much higher levels in EUR 3 than in the USA, where coal prices progressed at a far lower speed than oil. Rapidly rising coal prices should be considered in relation to the share of solid fuels in total consumption of public supply thermal power stations that was 74 percent in the FRG (36.5 percent coal and 37.4 percent lignite); 49 percent in France and 88 percent in the UK, according to EUROSTAT 1981 July Electrical Energy Monthly Bulletin. In the US, net electricity production by primary energy source rose in 1980 to 50.8 percent for coal, up from 45.6 percent in 1973, according to DOE 1981 April Monthly Energy Review.

3 ENERGY PRICE INDICES (CURRENT)

The growth of "current" energy prices, not adjusted for inflation, is considered first. Later, we look at energy prices adjusted for general inflation that are used to measure the response of energy consumption.

3.1 Total Industry; Total Households; Road Transportation (Gasoline)

There is no index, at least none compiled and published by government sources, for total energy prices. Instead the prices are monitored in tiers, wholesale and retail, for groups of fuels and electricity. Current price indices for total energy, and separately for the groups of solid fuels, natural gas, petroleum products, gasoline, and electricity 1950–1980 are shown for the USA, FRG, France, and the UK in Tables 16–19, and with adjustments for general inflation in Tables 20–23. For total and each group of energy, the price indices are subdivided according to purchasing sector, industry, household, and road transportation.

From the considerable variety of government statistics of energy price compilations, we selected those series that were readily available, covered the longest periods of time, and had most recently been established. The latter point is important to note, because energy price series were recently revised in the USA, where the household energy price index now excludes gasoline; and in the UK, where an index for total fuels used by the manufacturing industries including coal, heavy fuel oil, gas, and electricity was published for the first time in May 1980. Previously there were two UK indices, one for the wholesale price of coal and petroleum products and another "manufacturing input", that included only coal, gas, and electricity. The first index overstated, the second understated, total energy price rises. For more details on concepts, definitions, and sources see Part IV, Section 7. Some of this information is also summarized in the notes to Tables 16–19.

Figure 1, based on Tables 16–19, shows the growth of prices of total energy purchased by industry, households, and transportation (gasoline). For most of the period under observation, the three tiers moved not only in the same direction but also within very narrow bands up to the first price explosion of 1973. In the course of the ensuing inflation, prices of *total* energy purchased by the industry sector increased the most, while *total* household energy and transportation (gasoline) increased, but to a lesser degree. This was observed in the USA and the European countries as well.

For *total* energy purchased by the industry sector, the indices based on 1970 = 100 stood in 1980 at 592 in the UK, and 542 in the USA, against 373 in France and 317 in the FRG. The comparatively low level of the German index is a reflection on the low inflation rate experienced in that country. Moreover, the FRG is the only one within the group of four where the *total* energy price index of the industry sector stopped rising in 1977, giving way to a slight drop in 1978. This event, fortunate for the German economy, shows that the country could profit from a strong DM or a weak dollar when purchasing petroleum from abroad. With the second oil price explosion of 1979, the prices of energy purchased by the industry sector resumed their climb. But as the DM was still gaining strength against the dollar, the FRG rise was not as sharp as that in the USA or UK.

Prices for *total* energy purchased by the household sector had comparatively more moderate increases. The indices based on 1970 = 100 stood in 1980 at 406 in the UK, 324 in the USA, 332 in France, and 243 in the FRG.

The widest gap in energy price increases between industry and households occurred in the USA. The reason why the price index for household energy tends to lag behind industry is that petroleum, a fast price riser, figures large in *total* energy used by industry, whereas the *total* energy used by households is more heavily weighted by electricity and gas; these tend to undergo slower price rises because of the regulatory activities of the Public

Utility Commissions. In the European countries, the gap between the indices of industry and household *total* energy prices may also be explained by the inclusion of petroleum products in the *total* industry sector energy prices – the FRG includes crude oil prices as well. At the same time, the use of oil and natural gas for home heating is still relatively new in Europe, and assumes low weights, if any, in *total* household energy price indices where municipal gas and electricity assume high weights. City gas may be counted among the slowest price risers, and this accounts for much of the lag between *total* industry and *total* household energy.

Households suffered bigger electricity price increases than industry in the FRG and the UK; this is contrary to the USA and France where the price of electricity used by industry rose faster than that of residential electricity. Despite these differences, electricity was in the lower tier of the price race, at a very wide margin from hydrocarbons and, on the continent, solid fuels.

The transportation sector energy prices (gasoline) based on 1970 = 100, rose in 1980 to 397 in the UK, 350 in the USA, 299 in France and 202 in the FRG. At the same time, the index of gasoline taxes that can be compiled from Table 14, with 1970 = 100, rose in 1980 to 232 in the UK, 109 in the USA, 230 in France, and 138 in the FRG. In countries with very high inflation rates, especially after the second oil price explosion, it does not seem to have mattered so much whether gasoline taxes increased very much (UK) or very little (USA). But in countries with a more moderate inflation, the impact of a higher taxation (France) or lower taxation (FRG) is evident. As regards the FRG it may also be noted that between 1976 and 1978, transportation price indices (gasoline) dropped – this was in line with a similar decrease of the price index for industry used petroleum products.

3.2 Groups of Mineral Fuels and Electricity

Current prices for groups of solid fuels, natural gas, petroleum products, and for electricity with industry sector distinct from households, are shown for the years 1950–1980 in Tables 16–19. The following remarks concentrate on the development during recent years. Since inflation was the highest in the UK, followed by the USA and France, and the lowest in the FRG, this is reflected in the growth of the energy price indices. However, inflation does affect in different degrees, and it is worth noting how the prices of various groups of mineral fuels and electricity have risen. The ultimate question is, have price increases of different intensity affected the relationships between the price levels of mineral fuels. Are the findings of price shifts between the levels of *selected* energy commodities (Section 2 above) corroborated by the developments of groups of mineral fuels? How could this affect consumption?

Solid fuels. In 1980, solid fuels price indices of the industry sector, 1970 = 100, were 520 in the UK, 392 in France, 311 in the USA, and 265 in the FRG. In the UK, and particularly in the USA, indices for the price of coal lagged considerably behind those of petroleum products throughout the decade (USA) and since the first oil price explosion (UK). This was not so in France and the FRG, where the index numbers of industry solid fuels prices rose to higher levels than those of petroleum products purchased by industry for most of the decade, 1970 to 1979 in France and over the same period with a few

exceptions (1973 and 1974) in the FRG. In 1980, only the very high increase of petroleum products prices, occasioned by the second oil price explosion, made it possible that solid fuels prices though still rising were behind those of petroleum products.

In the three countries where a comparison is feasible (FRG, France, UK) the price indices for solid fuels purchased by the household sector rose less than those used by industry. Also, within the household sector the rising price indices for coal were consistently lower than those for petroleum products not only in the UK, paralleling the purchases in the industry sector, but also in the FRG and France where the opposite held true.

Petroleum products. In 1980, industry sector petroleum price indices, 1970 = 100, were at 993 in the UK (heavy fuel only), 675 in the USA, 402 in France, and 293 in the FRG. As stated above, the industry price indices for petroleum products rose more strongly than those of solid fuels in the USA and UK throughout the last decade, and less than those of solid fuels for most of the decade in France and the FRG.

In the FRG, the industry price index of petroleum products peaked at 193.4 in 1976; then, for two consecutive years, it declined to 191.2 in 1977, and 189.5 in 1978. In fact, the slight decline in the FRG petroleum products price index may have triggered the leveling off in 1977 and the slight drop in 1978 of the *total* energy price index in the industry sector. The reason for the relatively modest performance of the French and FRG industry sector petroleum price indices may be partly due to the fact that both countries could purchase petroleum with weak dollars or strong French francs and DM. Both in France and in the FRG, the index for household petroleum products rose faster than that for industry petroleum products, whereas the opposite occurred in the USA and the UK.

In the FRG household petroleum products prices leveled off in 1977 and experienced a slight drop in 1978 just before the second oil price explosion of 1979 that caused the petroleum products price indices, for both industry and household purchases, to increase more than ever before.

Natural gas. For natural gas, the rise in industry sector price indices was greatest in the USA, for special reasons; the increase from 1970–1980 was sevenfold, bigger than all other American fuels (industry and households). In France, the prices of natural gas used by industry underwent a nearly fivefold increase, now more than the price increases of industry-purchased petroleum products and solid fuels. In the UK, the increase of natural gas prices used by industry was less than fourfold, which is rather low considering the country's general rate of inflation. In fact, with the exception of household gas, the price of UK natural gas used by industry rose less than that of any other fuel or electricity due to the UK supply of natural gas that developed from the North Sea oil exploration. In the FRG, natural gas prices purchased by industry trebled between 1970 and 1980. Considering the country's low inflation rate, this was a fairly big increase placing natural gas price indices close behind those for petroleum products and ahead of solid fuels.

In all four countries, household sector price indices for gas (mixture of natural and manufactured) showed much less of an increase than the industry sector prices for natural gas.

Electricity. In 1980, electricity industry price indices, with 1970 = 100, rose to 170 in the FRG; 278 in France; 304 in the USA, and to 413 in the UK. In the USA, FRG, and in

France, industry sector electricity prices rose less than any other of the energy groups (solid fuels, petroleum products, natural gas) purchased by industry. In the UK, electricity used by industry was the second slowest riser, the slowest being natural gas.

Finally, household electricity price index numbers rose faster than those for industry in the UK and FRG. In the USA and in France, however, the price of household electricity increased at a lower rate than that of industry electricity.

The above observations are summarized in Table 24 that shows the 1980 energy price indices by country and groups of mineral fuels and electricity, ranked in the order of their increase since 1970, current and adjusted for inflation.

The presentation of the 1980 *current* price indices highlights the differences in price escalations for the various fuel groups; this is to be considered for the growth of energy consumption with rising prices. Among the very fast risers or forerunners of the energy price escalations, with only few variations in all four countries, are: petroleum products for industry and households; natural gas except for the UK where for special reasons it remained low whereas in the USA, also for special reasons it was very high. Much slower price rises were found, in all four countries, for: electricity for industry and households, and municipal gas. Between these not so fast and very fast price risers is gasoline; this prior to 1980 had risen similar to household fuels (electricity and gas), but since has escalated more steeply.

3.3 Adjustment for General Inflation

So far, the discussion of energy prices has been in terms of current prices not adjusted for general inflation. The alternative would be to look at "real energy prices" – energy prices in *constant* national currencies. Energy prices in constant dollars are compiled by adjusting the "current" dollar prices by the GDP (GNP) deflator, or in some cases, by the cost of living or other price indices. In the US, such prices have been estimated by the Department of Energy (DOE). (See the cost of fuels to end users in 1972 dollars since 1973, for gasoline, residential heating oil, residential natural gas, and residential electricity in US DOE 1981 June Monthly Energy Review.)

A similar method was employed earlier by the US Department of the Interior and thereafter by the DOE, to calculate fossil fuels prices in constant (1972) dollars, 1960–1980. (See the US Energy Information Administration, Annual Report to Congress, Vol.2, reprint in US 1979 Statistical Abstract, p. 604, Table 1017.)

With the above-described method, and using GDP (GNP) deflators, we have compiled energy prices in the respective constant currencies for the USA, FRG, France, and the UK, for total energy and for groups of fuel commodities and electricity (see Tables 29–32). These will be used for the analysis of the growth of consumption of the various energy groups in response to prices (Section 5).

At this point we should note that the inflation-adjusted prices are the product of general inflation and the growth of current energy prices. When the index for general inflation rose more than the index of the current energy price, the inflation-adjusted energy price tends to decrease. As discussed more fully in Section 5, there were periods in the 1970s, when the inflation-adjusted prices stagnated or slightly declined, e.g., gasoline in the USA 1975–1978, FRG 1975–1978; household electricity in the FRG 1977–1978,

France 1977–1979. The most outstanding examples for decreasing inflation-adjusted prices were found for natural gas in the UK, with a fall of the 1970 = 100 based index of inflation-adjusted household prices to less than 70 in 1980. The UK fall in inflation-adjusted prices of gas used by industry was less dramatic; prices dropped in 1979 to 93.9 but have since sharply risen to 107.4 in 1980.

Finally, it may be useful to look at the 1980 inflation-adjusted price indices ranked in order of their growth since 1970 (Table 24). Obviously, the rank order is the same as that for *current* price index numbers, since all prices were adjusted by the same deflator. Within this given order it is worth checking how much price index numbers rose after adjustment for general inflation. In the USA the 1980 inflation-adjusted price index numbers rose to higher levels than those in EUR 3. For example, in 1980, the indices for such high risers as petroleum products for industry, based at 1970 = 100, reached 348 in the USA, 279 in the FRG, 273 in the UK, and 193 in France. The inflation-adjusted price index of gasoline stood in 1980 at 180 in the USA, 121 in the FRG and France, and only 109 in the UK. At the same time, the inflation-adjusted price index numbers for electricity (industry and households) and gas (households) rose no more than 2–14 percentage points above 1970 in EUR 3; in the UK for special reasons, household gas price indices had even slipped 30 percentage points below their level of 1970. In the USA, the rise of the slow risers was somewhat higher than in EUR 3.

4 GDP, INDUSTRIAL OUTPUT, AND TOTAL ENERGY CONSUMPTION

The growth of total energy consumption, GDP in constant prices, and industrial output quantity indices, 1950–1980, are shown in Figure 2, based on Tables 25–28. For sources and methods of compilation, see Part IV. It may be recalled that US energy consumption is calculated from production plus imports minus exports and bunkers. For European countries, these data are further adjusted by movements of stocks and, in the case of the UK, by exclusion of nonenergy uses. Such conceptual differences may not matter so much for the analysis of long-term trends. However, when comparing year-to-year consumption it may be useful to keep in mind that there are variations in the methods for total primary energy compilation, including conversion factors of component energy groups to a single unit of account, e.g., Btu, tce, toe.

For most of the period of observation starting in 1950, the growth indices of total energy consumption and GDP in constant prices have moved along almost identical lines, in the USA, FRG, France, and with some minor exceptions also in the UK, up until the first oil price explosion of 1973. In the ensuing recession of 1974–75, the indices for total energy consumption dipped far deeper than those for real or constant price GDP. In the subsequent recovery, both indices moved upward again while keeping at a distance from each other. The second oil price explosion brought a further widening of the gap. In 1980, regardless of whether real GDP fell (UK), or stagnated (USA), or increased though at a slower rate than before (FRG), or maintained its previous high growth rate (France), the consumption of total energy in primary fuel equivalents fell in all four countries. The fall was greatest in the UK, followed by the FRG, USA, and least in France. The interesting feature is that there was a cutback in consumption, despite the growth in real GDP (FRG, France). Superficially, this looks as if energy conservation has finally come to fruition.

To some extent, it has, and this is discussed further in connection with prices for groups of mineral fuels and electricity. But besides the desire to save gasoline that happened in 1979 in the USA, and 1980 in EUR 3, there were also other factors at work that depressed total energy consumption.

The fact that in EUR 3 and in the USA, more GDP could be obtained with less energy also suggests that there was a shift in the mix of GDP towards more services and less industry, and especially less of the high energy-consuming industries. For EUR 3 this assumption is substantiated by the growing share of value added by services in total GDP that occurred in the FRG, in France, and in the UK between 1970 and 1978 (latest year for which comparable national accounts data compiled by the UN are currently available). In these countries, the assumption of less industry is further substantiated by the indices of industrial output. The indices for total industrial production had once moved mostly along the same lines as total primary energy consumption, and real GDP. After the 1974–75 recession and the "breaking of the energy coefficient" the indices of total industrial production failed to rise as much and remained below those of real GDP in the FRG, France, and the UK.

In the USA the index of total industrial production maintained a slight edge over the growth of real GNP. At the same time, the share of value added by services in total GNP was stabilized. Similar to the European countries, the gap between real GNP and total primary energy consumption began to widen after the 1974 recession. In both USA and EUR 3, there was a shift toward less energy intensive industries that did better than the national average measured by the indices of production, and away from the industries with heavy requirements in energy whose growth has, for several years lagged behind the national average, such as basic metals. Particularly noteworthy is the slump in the steel industry that contributed considerably to the "savings" in energy consumption.

Crude steel production reached its high for the decade in the USA in 1973 with an increase of nearly 15% over 1970 (Table 37). One year later (1974) French and German crude steel output peaked with 14 and 19 percent respectively above 1970. Except for short-lived recoveries, the trend was generally downward since 1973–1974. By the end of the decade the French and German productions were almost back to where they had started from 10 years earlier. The German steel recovery of 1979 that had lifted with it total primary energy consumption through the steel connected coal requirements was only short-lived. But in the USA, the fall from the equally short-lived recovery of 1978–79 was even harder, with the output index dropping nearly 15 percentage points below 1970.

In the UK, total primary energy consumption had shown the greatest restraint. Throughout the decade, the steel industry's high point of 1970 was never reached again, not even at the 1973 recovery when the 1970 = 100 based steel production index stood at 94. The chronically depressed steel production reached a record low in 1980 when output fell to less than half of its 1970 level.

How deeply the steel slump affected the total UK industry sector's consumption of coal, gas, petroleum products, and electricity, shown in Table 8, is discussed later in connection with final energy consumption.

5 ENERGY CONSUMPTION AND ENERGY PRICES ADJUSTED FOR GENERAL INFLATION

5.1 Total Primary Energy Consumption; Total Industry and Total Household Energy Prices

The index numbers 1970 = 100 for total primary energy consumption and industry and household prices adjusted for general inflation are shown in Figure 3 based on Tables 20–23 and 29–32.

From 1950 to 1973, total primary energy consumption went up, and prices adjusted by the GDP deflator went down in all four countries.

After 1973, the picture is reversed. Total energy prices for industry and households, though adjusted for general inflation rose to unprecedented heights. Depending on whether general inflation topped energy price escalations, or vice versa, these prices did not escalate in a straight line. The indices for the inflation-adjusted total industry and total household energy prices showed some stagnation in the USA (1978), a slight dip in France (1978), and a more sizeable fall in the FRG (1977 and 1978) where petroleum could be purchased with strong francs and marks. Also in the UK, there was a drop of the inflation-adjusted energy prices both for industry and for households (1978).

The second oil price explosion of 1979 engendered a new escalation of the inflation-adjusted energy prices, that was particularly steep in the USA, still suffering from the weak dollar. The 1980 fall in energy consumption prompted by the price explosion was the greatest in the UK (9 percentage points) followed by the USA and FRG (about 5 percentage points) and the least in France (2 percentage points). As a result, 1980 total primary energy consumption was cut back in the USA to its level of 1977, in the FRG to its 1978 level; in France to its 1978–79 level. Thus the growth of their total energy consumption in 1980 over 1970 was: 14 percent in the USA: 16 percent in the FRG; and 29 percent in France. Whereas the gain in 1970 over 1960 had been 34 percent in the USA, 37 percent in the FRG, and 46 percent in France.

In the UK 1980 total primary energy consumption was 3–4 percent below 1970. This negative growth is in contrast to the development in the afore-mentioned countries, and to the UK's own growth of energy consumption in 1970 over 1960 as 20 percent.

So much for the growth of total primary energy consumption and inflation-adjusted prices; underlying it is the development in groups of mineral fuels and electricity that will be reviewed below.

5.2 Solid Fuels: Industry and Household Sectors

The growth of total solid fuels consumption, industry and household prices adjusted for general inflation, and the growth of coal consumption by industry and households are shown in Figures 4–6 based on Tables 20–23, 29–33.

In the USA the inflation-adjusted industry coal price index (there is no household coal price index) based on 1970 = 100, was 94 in 1950, then it gradually descended, reaching its lowest point of 75.6 in 1966. That year marked a turning point, after which prices rose steadily, reaching a high point of 186.8 in 1975. The index fell to 170 in 1976 and 1977, picked up a little in 1978 and fell again reaching 160.4 in 1980 (Table 20).

It is interesting to note that the US coal prices adjusted for general inflation increased at a time (1966–1973) when petroleum and gas prices (all adjusted for general inflation) were still on the decline, and coal prices fell again (1976–1980) when petroleum and natural gas prices increased out of all proportion, particularly in 1980.

In EUR 3, the index of industry coal prices adjusted for general inflation also went down starting about 1950. This descent lasted until 1968–69, or a bit longer than in the USA. Thereafter industry coal prices in the FRG, France, and the UK began to rise while oil and gas prices adjusted for general inflation were still falling – similar to what happened earlier in the USA. However, the development during the 1970s is rather different; the inflation-adjusted coal prices rose at about the same speed as petroleum products in both FRG and France; moreover these prices continued their upward climb through 1980 (FRG, France, UK).

For most of the period under consideration, consumption seems to have followed a course that was not affected by prices. In the USA, total coal consumption declined from 1950 to 1960, while industry and household coal consumption have been generally decreasing through 1980 with household coal demand falling more rapidly than that for industry. In fact, in the USA coal has virtually ceased to be a household fuel, so much so that the Bureau of Labor Statistics has discontinued the compilation of a price index for household coal.

In EUR 3, following a short-lived recovery after World War II, total coal consumption was rapidly declining until 1975. Similar to the USA, household coal demand fell the most until 1980, while demand for industry coal picked up slightly in the late 1970s in the FRG and France, but not in the UK where the severe 1980 slump in steel output effected another deep cut in industry coal demand.

Despite the long-term decline in coal demand by industry and household, there was an upturn in *total* coal consumption that started in the USA about 1965, and in EUR 3 about 1975, due to the demand for coal in electricity generation. In the USA, the utilities consumption of solid fuels rose from 177 million short tons in 1960 to 569 million in 1980, about 80 percent of total coal production. Because of the even bigger increase in oil and gas fired plants through the 1960s and part of the 1970s, the utilities demand for coal fell however from nearly 70 percent of total fuels in 1960 to 43 percent in 1973; it has since risen to almost 50 percent in 1980.

The resurgence of coal consumption by the utilities has brought the 1970 = 100 based index of 1980 total coal consumption to 123.4 in the USA. In EUR 3, the resurgence of coal for the utilities has brought the index of total coal consumption to 89.2 in France, 91.4 in the FRG, and 77.5 in the UK. Utilities demand for coal rose the least in the UK, where availability and low price of natural gas has curbed the demand for other fuels.

Based on the price statistics for the cost of fuels used by steam utilities in the USA and UK, shown in Tables 10 and 13, the price gap between the various mineral fuels is evident. Thus in the USA a replacement of natural gas and petroleum by solid fuels seems to be justified for price reasons as well as security of supplies. In the UK, the price gap favors natural gas over petroleum and coal.

Data on the cost of fuels for thermal electricity generation are not as readily available for the FRG and France. However, from the sparse data shown in Tables 11 and 12, and keeping in mind the above-mentioned price escalations for oil and coal, it may be surmised that the price gap alone was not the overriding reason for the switch back from oil to coal.

5.3 Petroleum Products: Industry and Household Sectors

The growth of total primary petroleum consumption (including gasoline), industry and household prices adjusted for general inflation, and consumption by industry and households of petroleum products excluding gasoline, based on Tables 20–23, 29–32 and 34 are shown in Figures 7–9.

From 1950 to 1973, the trends were similar in all four countries. Total petroleum products (primary energy equivalents) consumption grew rapidly – even more rapidly in EUR 3 than in the USA – with prices adjusted for general inflation decreasing. The downward pull of the prices was so strong that the temporary price increase in the mid 1950s after the Korean war, was quickly eroded. In the USA and FRG, where data for final petroleum consumption by industry and households for the pre-1970 years are available, one sees that their growth trends are quite similar to that of total petroleum products (that include gasoline) in the 1950–1973 period.

Price escalations following the events of 1973 were the most spectacular in the USA and the UK. In the USA, the inflation-adjusted industry sector petroleum price index, based on 1970 = 100, shot up to 348 in 1980. Except for a very minor respite in 1978, the ascent to the 1980 pinnacle followed an almost straight line, reflecting the dollar exchange rate. In the UK, the inflation-adjusted price index for petroleum products (heavy fuel oils only, a more comprehensive index being unavailable) rose to 273 in 1980. The road to the top was marked by a dip in 1978, when the inflation-adjusted price index fell to 212.

Household sector petroleum products prices, though following much the same trend, rose to a lower level; the 1980 indices stood at 276 in the USA and 181 in the UK. This was still far above the price index of any other household fuel.

Compared to the UK and the USA, the FRG and French inflation-adjusted price increases for petroleum products were rather low. In 1976 the German and in 1977 the French, petroleum products price rises came to a halt, with the inflation-adjusted price index, based on 1970 = 100, stopping at 134 (FRG) and 130 (France) for industry sector purchases. Both indices fell subsequently. In the FRG, there was even a drop in the *current* price index of petroleum products. The relatively low increase of the prices for petroleum products observed for the FRG and France may be explained to some extent by the fact that these countries, when paying for petroleum imports, were benefitting from a strong currency. However, with the second oil price explosion in 1979, the inflation-adjusted prices began to rise again. With 1970 = 100, the industry sector inflation-adjusted price index climbed in 1980 to 176 in the FRG and to 164 in France. Contrary to what was observed in the USA and in the UK, household sector prices of petroleum products increased more rapidly than industry sector prices. In 1980, the household sector petroleum products price indices, adjusted for inflation, stood at 279 in the FRG and at 272 in France.

It should be kept in mind that the US price increase for petroleum products started at a fairly low base, such that at the beginning of the decade petroleum products sold at a much lower price in the USA than in EUR 3. Consequently, despite the more intense price escalation of the USA industry-used petroleum products, the price in dollars per toe paid in the US market in 1980 was only slightly higher than the prices paid for industry purchases of petroleum products in EUR 3; while household petroleum still sold at a lower

price in the US than in EUR 3, as can be seen in Tables 10–13 that show current prices in dollars per toe at 1980 exchange rates. (For 1981, these relationships may well have changed, under the impact of the dollar appreciation.)

What was the effect of inflation-adjusted price escalations, if any, on consumption? To answer this question, data were compiled for consumption of petroleum products by industry and households (Table 34).

In the USA the first oil price explosion of 1973 caused a drop in consumption by both industry and households that lasted through 1975. Thereafter, the astonishing rise of inflation-adjusted prices for both industry and household petroleum was followed by an equally astonishing growth in consumption by the industry sector through 1979, with a break finally in 1980. Yet the 1980 drop was relatively small, and the 1970 = 100 based index for consumption of petroleum products by industry hit 159 in 1980. Perhaps this growth is less astonishing if one recalls that the price increase for petroleum products purchased by industry started from a relatively low base (as compared to EUR 3).

While industry consumption went up, household demand for petroleum products went down; the slide started with the stagnation in 1973 that developed into a downturn, though prices did not rise as much as for the industry sector. By 1980, the 1970 = 100 based index of household petroleum consumption had slumped to 67. This cutback was caused in part by the displacement of oil by natural gas and electricity.

In EUR 3, the growth of the industry sector's final consumption of petroleum products came to a halt in 1974–75 after the first oil price explosion. Contrary to what happened in the USA, the 1974–75 break did not give way to subsequent recovery, although the inflation-adjusted price indices failed to rise as much as in the USA. Thus, in EUR 3, the 1974–75 break had a more lasting effect as consumption continued on its downward course, the fall was particularly hard in 1980. Consequently, the peak of 1973 or the level of 1970 was never reached again throughout the decade. The 1970 = 100 based index of petroleum products final consumption by the industry sector had slumped in 1980 to 88 in France, 64 in the FRG, and 60 in the UK.

To some extent, the UK cutback in final consumption of petroleum products by the industry sector was caused by bad business conditions, particularly in the steel industry which in 1970 had absorbed 26 percent of total industry demand for these products. By 1973, the share fell to 22 percent, and further to 11 percent in 1980. In terms of tonnage, the steel industry's requirements for petroleum products fell from 5.47 million tons in 1970 to 4.86 million in 1973, and 1.53 million in 1980.

In the FRG and France, the steel industry was also ailing, though not as much as in the UK. Steel production attained the record high for the decade in 1974, when the 1970 = 100 based index of production rose to 116 in France and 120 in the FRG. As stated above, the 1974 level was not reached again, and with output generally falling despite a short-lived German flare-up in 1979, French and German crude steel production were back in 1980 at their 1970 levels. Generally industrial production was more active in the FRG and France than in the UK, thus the cutback in the industry sector demand for final petroleum products cannot be blamed on sluggish business alone; neither do these cutbacks signify net energy savings. In all three countries, the decrease in the industry sector demand for petroleum coincided with an increase of requirements for natural gas, especially in the the FRG and to a lesser extent in the UK.

The household sector demand for petroleum products grew strongly through 1973, when the 1970 = 100 based consumption index rose to 151 in France, 125 in the UK, and 123 in the FRG. Obviously this development marked the switch from coal to oil in home heating. In subsequent years, consumption tended to fall, especially in 1980 when the winter was relatively mild. By 1980, the consumption index hovered at 104 in the FRG (down from 124 the year before when the winter was severe), 88 in France, and 82 in the UK.

Compared to industry, the household sector demand for petroleum products had risen harder through 1973, and subsequently fallen less to the end of the decade. At the same time the inflation-adjusted petroleum price index rose more for household purchases than for industry purchases in the FRG and France, while the opposite held true in the UK. Thus it is questionable whether the price factor alone was responsible for the cutback in petroleum products consumption by the household sector. Moreover, the cutback coincided with a general increase of household demand for gas that grew especially in the UK, but also in the FRG and France, and of electricity especially in France, but also in the FRG. (See also Section 5.4.)

5.4 Natural and Manufactured Gas: Industry and Household Sectors

Industry consumption consists mostly of natural gas, while household consumption includes both natural and manufactured gas. The growth of prices and consumption of gas during the last decade was mentioned previously in the discussion of coal and oil. The main trends of the development during the 1970s are now summarized (see also Figures 10 and 11).

The most spectacular development of (natural) gas consumption occurred in the UK, with the 1970 = 100 based index of gas consumption rising in 1980 to 854 (industry) and 1,343 (household purchases). As can be seen from Table 9 the consumption of gas as a percentage of total final energy rose in the industry sector from 6 in 1970 to 32 in 1980; in the household sector the respective increase was from 21 in 1970 to 49 in 1980. Thus, the declining demand for coal and oil and the barely stagnating demand for electricity were made up by the abundance of natural gas. The switch to gas was helped by the fact that inflation-adjusted gas prices (industry and household) rose far less than those of any other energy used in the UK. The 1970 = 100 based inflation-adjusted price index stood in 1980 at 107 for natural gas used by industry (up sharply from 94 in 1979), and at 69 for town and natural gas purchased by households.

In the FRG and France, gas consumption also rose considerably above 1970 and 1973 levels, although the increase was not as spectacular as in the UK. The 1970 = 100 based index rose in 1980 for gas used by industry to 140 in the FRG and 208 in France; in both countries, 1980 consumption fell somewhat below 1979. At the same time the index of gas demand from the household sector rose from 100 in 1970 to 331 in the FRG and 289 in France, with no dip over 1979.

It may be noted that in both France and FRG the growth of gas consumption by the industry sector coincided with a growth of inflation-adjusted prices that was nearly as steep as for oil. The inflation-adjusted price index for industry-used gas based on 1970 = 100 stood in 1980 at 171 in the FRG and 193 in France. On the other hand, the growth

of household sector gas consumption in the FRG and France coincided with a modest increase of inflation-adjusted gas prices; the 1970 = 100 based index stood in 1980 in the FRG at 99.9, (small decrease from 100.1 in 1979), and in France at 112.7, (an increase from 98.2 in 1980).

The US experience with the industry sector's natural gas consumption during the 1980s is markedly different from that in EUR 3. The 1970 = 100 based index of consumption has been decreasing steadily since 1975, reaching a low of 96 in 1980. This development may not come as a surprise, since the 1970 = 100 based price index inflation-adjusted, rose to a record high of 378 in 1980; higher than any other fuel or electricity used by US industry.

By contrast, household demand for gas composed of natural and manufactured, showed a slight increase over the decade. The 1970 = 100 based index of consumption rose to 109 in 1980. At the same time, the inflation-adjusted price index, based at 1970 = 100 stood in 1980 at 173.

5.5 Electricity Total Generation: Industry and Household Sectors

Total Generation. Figure 12, based on Tables 20–23 and 29–32, shows *total* electricity generation and the household and industry sector prices adjusted for general inflation, 1950–1980. Comprehensive indicators for the price of other electricity using sectors (e.g., railroads) are not available; the price indices for industry and household sectors together convey some idea of the price trends for *total* electricity consumption.

As seen in the case of mineral fuels, inflation-adjusted prices of electricity were decreasing everywhere in the years following World War II. The historical slide generally ended in 1974, stopped by the first oil price explosion of 1973, except for the USA where prices of electricity used by industry began a slight upward movement as early as 1970.

In the period of descending inflation-adjusted prices, consumption grew steadily. A very minor cut brought on by the 1974–75 recession was quickly overcome, as the growth of total electricity consumption continued without lessening of the growth rate in France through 1980; in the USA there was a lessening of the growth rates in 1979 and 1980; in the FRG the growth stopped in 1979, giving way to a small dip. In the UK where growth had been more modest, a more sizeable drop occurred in 1980. In all four countries the growth of electricity consumption in the 1970s was much more vigorous than that of mineral fuels, as the 1970 = 100 based index of total electricity consumption stood in 1980 at 184 in France, 148 in the USA and FRG, and 114 in the UK (see Tables 29–32). Compared to mineral fuels, electricity prices tended to grow at a slower pace and similar to gasoline, the inflation-adjusted prices for industry and household electricity stagnated or slightly decreased in the period between the two oil shocks.

Industry and Household Sectors. For a more detailed analysis of sales to industry and household see Figures 13–14, based on Tables 20–23 and 36. This shows the familiar pattern of inflation-adjusted prices decreasing and sales increasing in the pre-1970 period, for both industry and household sectors. In the 1970s, these trends prevail. Firstly, inflation-adjusted prices for sales to industry increased more than household sector prices in the USA and France, whereas the opposite occurred in the FRG and the UK. Secondly, sales

to households grew faster than industry purchases; this was most pronounced in France, and visible in the FRG; in the UK and the USA the margin in the growth rates of industry and household purchases tended to be smaller.

5.5.1 Industry

In the USA, inflation-adjusted prices for industry purchases of electricity began to rise shortly before the first oil price explosion at the time when the long-term price decline still continued in the FRG and France. Moreover, the US increase in inflation-adjusted prices of electricity for industry continued uninterruptedly through the 1970s and was steeper than that of the inflation-adjusted industry prices for electricity in the FRG, France and the UK where these prices had a tendency to stagnate or decrease in the years between the two oil shocks. Such stagnation was also observed for the US household sector prices but was absent from the price pattern of the industry purchases. The result of this uneven race was that the 1970 = 100 based indices for inflation-adjusted prices of electricity purchased by the industry sector stood in 1980 at 157 in the USA, 114 in the UK, 113 in France, and 102 in the FRG.

What was the effect, if any, on consumption? In the USA, where prices had risen most consumption also rose most. The recession caused a cutback in 1974–75 that was easily overcome when industry purchases resumed without a slackening in the long-term growth rate, through 1979. This is quite similar to what was observed for the consumption of petroleum products by US industry that failed to be discouraged by the increase of inflation-adjusted prices. Only in 1980, when the increase became extraordinarily steep, and the index of industrial production fell sharply, did both petroleum products and electricity purchased by industry decline.

In the FRG, France, and the UK, where inflation-adjusted prices for electricity had risen far less than in the USA, purchases by industry followed much the same pattern. The 1974–75 consumption cut, though somewhat deeper than in the USA, was quickly overcome when sales resumed at the previously observed long-term growth rates. The recovery lasted through 1979 in the FRG and UK, with sales dropping in 1980 markedly in the UK, and very slightly in the FRG. In France, the acute increase in the inflation-adjusted prices seemed to have no effect as electricity sales to industry continued their growth through 1980.

As a result, the 1970 = 100 based index of electricity sales to industry stood in 1980 at 142 in the USA (a drop from 147 in 1979), at 141 in France (an increase from 133 in 1979), at 130 in the FRG (against 131 in 1979), and at 107 in the UK (down from 115 in 1979).

5.5.2 Households

In the USA, the inflation-adjusted price of no other energy commodity grew as little as that of household electricity in the 1970s. The 1970 = 100 based index stood in 1976 at 115; after 4 years of stagnation, it suddenly jumped to 123 in 1980 – this was still below the industry sector price index and far below that of any other household fuels, e.g., household petroleum products for which the index of inflation-adjusted prices had risen to 276 in 1980.

Also, consumption of no other energy commodity, not even that of gasoline, grew as much as household electricity. After the first oil price explosion of 1979, consumption

merely stagnated in 1975, with growth as usual resuming in 1976 through 1979. In 1980, household electricity sales did not drop or stagnate, there was only a slowdown in the growth rates. The 1970 = 100 based index of electricity sales to households stood in 1980 at 160; at the same time the index for household petroleum products consumption had slumped to 67 (while its inflation-adjusted price index had risen to 275). The continued fall in household consumption of petroleum products and the continuous growth of electricity tends to indicate that some of the market for household petroleum had gone to electricity in addition to gas, as observed earlier.

In the FRG and France, where electricity (and petroleum products) were still replacing coal, the growth of household electricity consumption was even more spectacular; from the beginning to the end of the decade, sales of household electricity almost doubled in the FRG and trebled in France. Relatively slow rising prices certainly helped. In France, the inflation-adjusted prices for household electricity suffered only a slight increase in 1974 followed by stagnation and decreases below 1970 (always inflation-adjusted) that lasted through 1979 when the 1970 = 100 based index stood at 95. The second oil price explosion finally brought the index to 102 in 1980. While these prices undoubtedly fostered household electricity consumption its biggest lift may have come from the 1975 promotion of electricity for home heating.

In the FRG, inflation-adjusted household electricity prices rose somewhat more than in France, they also rose more than industry electricity prices as stated above; but altogether the increase was comparatively small. The inflation-adjusted 1970 = 100 based price index for household electricity rose to 109 in 1976; this was followed by a decrease that lasted through 1980, when the index hit 106, a level far below that of the 1970 = 100 based price indices adjusted for general inflation that stood in 1980 at 279 for household petroleum and 140 for household coal.

In the UK, household electricity consumption peaked in 1974, when the 1970 = 100 based consumption index stood at 120.

In contrast to what happened in France, Germany, and the USA, household electricity sales decreased and despite a flare-up in 1978, the consumption index stood at 112 in 1980 with 1970 = 100. Throughout this period, the inflation-adjusted price index for electricity sales to households had risen from 100 in 1970 to 125 in 1976 at which it stagnated through 1978, dropping to 118 in 1979 (a circumstance that may have triggered the consumption revival in 1978) and rising again to 126 in 1980, thus possibly causing electricity sales to drop again in 1980 to their 1977 level. At this point it may be useful to recall the development of household gas. Since 1972, the 1970 = 100 based indices for inflation-adjusted prices for household gas fell uninterruptedly, reaching a low of 69 in 1980; while the household gas consumption index rose from 100 in 1970 to 1,343 in 1980. Surely a sign that in the UK market, gas was displacing electricity as a household fuel.

5.6 Road Transportation, Gasoline

Figure 15 based on Tables 20–23 and 29–32, shows the indices of gasoline consumption and prices adjusted for general inflation 1950–1980.

From 1950 to 1973 the trend in the USA and EUR 3 was for gasoline consumption to go up, and inflation-adjusted prices to go down, similar to the growth of consumption

and prices for industry and household petroleum products. But after 1973, developments differed.

The initial gasoline price jump of 1974 gave way to stagnation or actual decline of the inflation-adjusted prices that lasted from 1975 to 1978 in the USA, FRG, UK, and from 1975 to 1977 in France. The period of inflation-adjusted cheap gasoline ended in 1979, when prices rose in all four countries, followed by an even greater price rise in 1980, especially in the USA.

The 1970 based index for inflation-adjusted gasoline prices jumped from 93 in 1972 to 120 in 1974. This was still comfortably below the same index for industrially used petroleum products that rose over the same period from 99 to 176. Unlike these petroleum products that continued to rise uninterruptedly through 1980, the gasoline price index (always inflation-adjusted) went drastically down, hitting a low of 113 in 1978; this was below its 1974 level of 119, and lower than the inflation-adjusted price index of any other energy commodity group purchased in the USA by industry or household.

Stagnation and decline of inflation-adjusted gasoline prices is also shown in the US DOE compilations of the cost of fuels to end users in 1972 dollars (US DOE 1981 June Monthly Energy Review, p. 14). The price of regular gasoline adjusted by the cost of living index (which differs at times from the GNP deflator) decreased from 45.1 cents per gallon in 1974 to 40.1 cents per gallon in 1978, rising subsequently to 49.4 and 60.5 cents per gallon in 1979 and 1980.

The indices for the inflation-adjusted prices by the GNP deflator 1970 = 100 rose from 113 in 1978 to 141 in 1979 and 180 in 1980 (see Table 20).

The FRG had also a period of decreasing inflation-adjusted gasoline prices that set in after the initial price increase of 1973 and lasted from 1974 to 1978, the years between the first and second oil price shocks.

The gasoline price index based on 1970 = 100 fell from 115 in 1974 to 104 in 1978; it has since risen to 108 in 1979 and 121 in 1980. There was virtually no increase in gasoline taxes in the USA and only a moderate rise of the taxes in the FRG between 1974 and 1978.

In France and the UK gasoline taxes increased greatly since 1974. Yet the inflation-adjusted gasoline prices also fell in the period between the two oil shocks. The UK gasoline prices index based at 1970 = 100 adjusted for inflation fell from 120 in 1975 to 90 in 1978. In France, the inflation-adjusted price indices fell from 112 in 1974 to 103 in 1976. The indices have since risen in the UK to 103 in 1979 and 109 in 1980; in France to 114 in 1979 and 122 in 1980. Nowhere were the 1979 and 1980 price rises as high as in the USA.

In all four countries, the minor dip in 1974 gasoline consumption was quickly overcome, and with the small decrease or stagnation of inflation-adjusted gasoline prices, consumption continued to grow at pre-1973 rates. Only the phenomenal increase in prices of 1979 and 1980 put a stop to this development in the USA where consumption dropped markedly in 1979 and 1980. Subsequently, US gasoline consumption of 1980 has almost returned to its 1974 level. The 1970 = 100 based index for consumption stood in 1980 at 113.

In the FRG, France and the UK the 1970 and 1980 price increases in inflation-adjusted gasoline prices were milder than in the USA; this was met with continued growth of gasoline consumption in the FRG and UK, and stagnation of consumption in France.

For 1981, a more sizeable cutback in gasoline consumption is expected for EUR 3, and a continued decrease for US gasoline should help to further reduce total petroleum and total energy consumption in the four countries.

6 SUMMARY

The growth trends of energy consumption and prices since 1950 and up to 1973 are well known. Prices for total energy paid by the industry, household, and transportation sectors decreased; and where they increased, the rise was less than that of the general price level, as measured in terms of GDP deflators. Hence the inflation-adjusted energy prices were generally declining. At the same time, total primary energy consumption increased, and this at the same rate as constant price GDP. After 1973, and up to and including 1980, the growth of total primary energy consumption began to lag behind GDP.

This *breaking of the energy coefficient* is sometimes seen as an indication of energy savings, prompted by accelerated price increases. However, all energy prices did not escalate at the same intensity, and a closer look at primary and sectoral final energy consumption suggests that other factors were at work to shape the development of energy consumption, ranging from a change in the mix of GDP, to a switch to less energy intensive activities, adverse business conditions (particularly the falling steel output), preferences for given fuels (displacement of coal by oil, and oil by gas, and mineral fuels by electricity), and last not least, the weather.

The analysis has shown that the immediate follow-up of the two oil price explosions was a cut in total energy consumption. It was also seen that in the period between the two price shocks, despite continued increases in inflation-adjusted prices for *most* fuels (not to mention current price rises for *all* fuels) total primary energy consumption, and particularly secondary energy consumption, gasoline and electricity, continued to grow, as did gas. In the US *total* primary energy consumption, overcoming the cutbacks of 1974–75, more or less continued their long-term growth trend until 1979, when there was "no growth" but still no cutback. In the FRG, the 1974–75 setback was also overcome with relative ease; moreover, in 1979 the FRG managed a 6 percent increase of total primary energy consumption due to a revival, though short-lived, of the steel industry. In France primary energy consumption took a severe cut in 1975; but the slump lasted only one year, was quickly overcome and growth continued through 1979. In all three countries, in 1979, total primary energy consumption was well above 1970 and 1973 levels. Only in the UK, where the 1974–75 cutbacks were harder and longer lasting, was the growth of total primary energy consumption arrested. However, the vigorous growth in 1979 with an increase of 6 percent over 1978 brought total primary energy consumption back to its 1973 level and thus above 1970.

However, in the aftermath of the second oil explosion, total primary energy consumption fell in 1980 to the levels of 1977 in the USA, 1978 in the FRG, slightly below 1979 in France, and 1968 in the UK. It is likely that decreases will continue through 1981, bringing total primary energy consumption nearer to their levels of the early or mid 1970s.

The obvious question is whether the second fall in the growth of total primary energy consumption that was registered in 1980, will cut deeper and have a longer lasting effect?

Perhaps an answer to this question, at least for the short term, could be found through the analysis of prices and consumption of mineral fuels and electricity in the industry household and road transportation sectors.

Solid Fuels

Solid fuels consumption, in defiance of the generally accepted relationship between prices and consumption, decreased markedly throughout the years of descending, inflation-adjusted prices, due to the switch from coal to oil. Because of the utilities demand for coal, a new growth developed in the USA in the early 1960s and in the EUR 3 by the mid 1970s. Much of the resurgence of coal consumption came at a time when coal prices were turning upward; except that US coal consumption could benefit from the fact that the coal prices were not rising as much as petroleum products and natural gas – whereas FRG and French renaissance of coal coincided with coal prices rising at similar rates to petroleum products.

Unfortunately, there are no French or German average utility coal prices, except OECD compilations. Using these and other French and German industry coal prices, one can surmise that the price per toe of French and German industry coal was not far behind that of heavy fuel oils (though the gap did widen in 1980).

Petroleum

Petroleum consumption in the USA followed much the same growth trends as total primary energy. From 1950 to 1973, a decrease in inflation-adjusted prices and an increase in consumption prevailed. A short-lived cutback came in 1974–75, followed by a resumption of growth for petroleum used by industry and transportation, and for a while, household consumption. The "business as usual" growth in petroleum consumption is remarkable in the face of the inflation-adjusted (not to mention current) prices that rose steeply for the petroleum products used by industry. Unlike what happened in Europe, petroleum consumption by US industry was not displaced by electricity, though electricity prices rose at a more moderate rate. Electricity and for a while natural gas did however displace petroleum in household energy consumption. It was different for gasoline because of the stagnating or even declining inflation-adjusted prices in the years between the oil shocks that may well have fostered consumption.

The growth of US petroleum consumption was finally stunted in 1979, with a drop over 1978 to 2.6 percent for total petroleum, 6 percent gasoline and 8 percent household, while there was no cut as yet in industry petroleum that still moved up by nearly 20 percent over 1978, along with the rising index of industrial production.

The 1979 cut was amplified in 1980 when consumption of gasoline, after another steep increase in prices, dropped by over 6 percent, household petroleum fell by 5 percent, and finally the industry sector followed with a fall in consumption of 4 percent that coincided with a drop in the industrial production index of 3 percent.

In the FRG and France, the post-1973 increase of inflation-adjusted petroleum prices was smaller than in the USA, with the further difference that household petroleum prices rose at a faster rate than industry petroleum prices, while the reverse was true for the USA and the UK; at the same time, gasoline inflation-adjusted prices tended to stagnate for a while. What we saw was that gasoline consumption by the FRG, France, and also the UK raced ahead, faster than in the USA, and with still no let-up by the FRG and UK in 1980, and only stagnation in France. By contrast, industry and household sector

petroleum consumption decreased – household less than industry despite the fact that in the FRG and France household prices increased more strongly than those for industry.

However, the decrease of FRG, French, and UK petroleum consumption by industry and households coincided with an increase of consumption of natural gas especially in the UK with inflation-adjusted prices holding at below 1970 levels for most of the decade. A jump in the inflation-adjusted price of UK industry used natural gas came only in 1980, when the 1970 = 100 based index rose to 107.

In the FRG and France, the displacement of oil by gas occurred at a time when the inflation-adjusted price of gas for industry rose at about the same rate as petroleum and coal. In the USA, natural gas prices increased at a higher rate than petroleum, and petroleum held its ground in final energy consumption by industry.

Electricity

There was considerable displacement of coal and petroleum by electricity in the European countries, where a complex relationship evolved during the 1970s between the growth of electricity prices and consumption. In France, the spectacular growth in electricity consumption occurred while inflation-adjusted prices lingered at the levels of 1970 (industry sector) or fell below (household sector). In the FRG, the spectacular growth of electricity consumption occurred while inflation-adjusted prices increased far more than in France, especially in the household sector.

In the UK, electricity consumption also rose, but less than in any of the other countries, because of natural gas; moreover the growth was arrested between 1974 and 1977, a period during which the inflation-adjusted prices rose strongly, especially in the household sector. In the USA, the growth of inflation-adjusted electricity prices, especially in the industry sector, was no deterrent to the growth of consumption throughout the decade – by households and industry. Although, electricity did not displace oil for industry in the USA.

For household gas (mixture of natural and other), the growth in consumption was even stronger than that of electricity. Prices of household gas were the slowest to rise, while its use nearly tripled in the FRG and France between 1970 and 1980, and in the UK the increase was more than thousandfold. The USA had a modest growth in the consumption of household gas (mixture of natural and other), despite the very high inflation-adjusted natural gas prices.

The survey of energy consumption by the three sectors, road transportation, households, and industry points to little evidence of energy conservation. Gasoline consumption continued to increase, until finally stopped in 1979 in the USA – while the European chase still continued through 1980 but with prospects of a cutback in 1981.

Total household energy consumption did not grow very much in the USA, with severe cuts in 1979 and 1980. In EUR 3, though population increased at a more moderate rate, total household energy consumption increased more rapidly than in the USA, with a drop finally coming in 1980, possibly brought on in part by a mild winter. To some extent, the European expansion in total household energy consumption may have been caused by the growing number of households that came into existence following the high birth rate of earlier years. Since this "coming of age" will continue through the 1980s, there is not much room for savings. Moreover, the preference of petroleum for coal, and especially of electricity for petroleum most noticeable in the FRG and France, does not by itself constitute a saving in primary energy equivalents.

In the industry sector, the increases and decreases of final energy consumption were linked to contractions and expansions of industrial output. Without much of a time lag, output increase created a rise in final industrial energy consumption, output stagnation gave way to a fall in energy consumption, and a fall in industrial output gave way to a sizeable fall in final energy consumption by the industry sector. The steel industry is a case in point. Moreover, the shifts from energy intensive industries (steel again) to less energy intensive industries amounted for much of the lessening of energy consumption.

The above observation on energy savings by the industry sector relates to the macroeconomic level. This does not exclude that at the level of the firms, the application of better technology and a higher energy consciousness have led to actual savings in fuel input, in the aluminium, glass, and other industries as reported in the USA and the UK. Yet a wider application of better technology to save fuel in industrial production is jeopardized by the high cost of the investment requirements.

There is a fourth sector in the economy that was not sufficiently analyzed in this report due to lack of data – the energy sector itself. It is believed that technological progress occurred throughout the decade leading to greater efficiency and savings in fuel utilization. It may also be safe to assume that the requirements of the energy sector have been increasing and will continue to do so more than before, prompted by the need to "dig deeper for dirtier fuels"; possible switches to coal synthetization; and continuation of the trend for electricity (though the latter may expand at somewhat slower rates than earlier expected).

The experience of the 1970s suggests at first glance that the most effective way to curb consumption was through sudden, steep price increases coupled with a cutback in economic growth, as in the US, FRG, France, and the UK in 1974–75. However, not all of the observed structural changes curbing energy consumption in these countries contributed to a sound development, fostering more energy efficient societies. The "price" of "breaking the energy coefficient" was obviously high. The detailed picture of the reactions in the different sectors indicates that one certainly cannot extrapolate the experience gained through past pricing policies.

PART II TABLES

TABLE 1 Population in the USA and the European countries, 1970–1980. Mid-year estimates ($\times 10^6$).

	USA	EUR 9	EUR 3	FRG	France	UK
1970	204.9	251.5	166.9	60.7	50.8	55.4
1971	207.1	253.4	168.2	61.3	51.3	55.6
1972	208.9	255.1	169.2	61.7	51.7	55.8
1973	210.4	256.6	170.0	62.0	52.1	55.9
1974	211.9	257.8	170.4	62.0	52.5	55.9
1975	213.6	258.4	170.5	61.8	52.7	55.9
1976	215.1	258.8	170.3	61.5	52.9	55.9
1977	216.9	259.2	170.4	61.4	53.1	55.9
1978	218.7	259.8	170.4	61.3	53.3	55.8
1979	220.6	260.4	170.7	61.4	53.5	55.9
1980	222.8	261.1	171.2	61.6	53.7	55.9

SOURCE: US 1980 Statistical Abstract and United Nations 1981 May Monthly Bulletin of Statistics.

TABLE 2 The growth of real GDP in the USA and the European countries, 1970–1980 (10^9 $).

	USA	EUR 9	EUR 3	FRG	France	UK
	GDP at 1975 prices and 1975 exchange rates					
1970	1361	1187	865	379	278	208
1971	1402	1224	893	389	292	212
1972	1482	1269	925	401	308	216
1973	1562	1353	988	426	327	235
1974	1541	1394	996	428	338	232
1975	1527	1374	989	420	339	230
1976	1613	1445	1038	442	356	240
1977	1695	1479	1063	455	366	242
1978	1770	1526	1100	470	379	251
1979	1813	1578	1136	492	391	253
1980	1811	1601	1149	501	398	250
	GDP at 1980 prices and 1980 exchange rates					
1980	2557	2806	1991.3	824.9	651.1	515.3

SOURCE: OECD Main Economic Indicators, August 1979 and May 1981.

TABLE 3 Total primary energy consumption, USA and the European countries, 1970–1980 [in million metric tons of oil equivalents (toe)].

	USA	EUR 9	EUR 3	FRG	France	UK
1970	1581	827	576	220	148	208
1971	1610	864	580	222	153	205
1972	1687	877	604	232	163	209
1973	1757	913	643	248	175	220
1974	1714	895	626	239	176	211
1975	1665	847	593	228	164	201
1976	1755	902	621	242	175	204
1977	1798	898	631	244	178	209
1978	1852*R*	925	649	255	185	209
1979	1860	969	680	267	194	219
1980	1799	929	649	255	192	201

R = Revised

SOURCE:

USA. Domestic energy consumption by primary energy type in DOE Monthly Energy Review March 1981, backdated with Bureau of Mines Tables on total calculated consumption, in US Statistical Abstract.

Data supplied in Btu were converted to toe on the basis of 1 toe = 42.43 × 10^6 Btu.

EEC (EUR 9). 1970–1974 primary energy consumption calculated as production plus imports minus exports, from UN World Energy Supplies 1973–1978 and earlier issues, Standard Table 2. 1975–1980 energy balances from EUROSTAT 1981 October, Energy Balances.

FRG. Primary energy consumption from Gesamtverband des Deutschen Steinkohlenbergbaus, forthcoming publication.

France. Total consumption of primary energy (consommation totale d'energie primaire corrigée); Comité Professionnel du Pétrole, 1978–1979. Updated to 1980 with Ministère de l'Industrie, Lettre 101 of 12 May 1981.

UK. Gross inland consumption of primary fuels and equivalents, 1968–1979; from Digest of UK Energy Statistics 1980, Table 4. Data for 1980 from Energy Trends April 1981, Table 2.

TABLE 4 Energy consumption levels in the USA, FRG, France, and the UK in 1980.

	Energy consumption, primary equivalents						Gasoline supply	Electricity generation
	Total	Solid fuels	Nat. gas	Petroleum	Nuclear	Other		
	10^6 toe						10^6 tons	10^9 kWhr
USA	1,799	370	482	808	64	75	282.7	2,286.0
FRG	255	76	42	121	9	7	24.2	368.7
France	192	34	24	102	13	19	17.8	257.8
UK	194[a]	72	42	71	8	1	19.2	285.0
Total	2,440	552	590	1,102	94	102	343.9	3,197.5
	Percentages							
Share of US in total consumption	74	67	82	73	67	74	82	71

[a] = Energy use only; total consumption 201 × 10^6 toe in primary energy equivalents.

SOURCE: Summarized from Tables 29–32.

TABLE 5 USA. Industry and household energy consumption, 1970–1980.

Mineral fuels by end uses, and purchased electricity	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
	Quadrillion (10^{15}) Btu										
Industry											
Solid fuels	5.021		4.323	4.350	4.057	3.801	3.792	3.494	3.462	3.641	3.320
Natural gas, dry	9.817		10.231	10.397	10.012	8.531	8.768	8.642	8.540	8.554	8.443
Petroleum products	5.627		6.215	6.683	6.506	6.160	6.951	7.692	7.840	9.401	8.857
Electricity (excl. losses)	1.952			2.341	2.337	2.304	2.525	2.635	2.732	2.873	2.781
Total	22.417			23.771	22.912	20.796	22.036	22.463	22.574	24.469	23.401
Households, commerce											
Solid fuels	0.423		0.397	0.291	0.293	0.239	0.227	0.225	0.250	0.210	0.166
Gas	7.031		7.560	7.626	7.518	7.581	7.866	7.461	7.624	7.891	7.637
Petroleum products	6.510		6.747	6.741	6.141	5.792	6.302	6.245	6.268	5.027	4.365
Electricity (excl. losses)	2.803			3.495	3.475	3.588	3.729	3.936	4.100	4.184	4.354
Total	16.767			18.153	17.427	17.200	18.124	17.867	18.242	17.312	16.522
	10^6 toe[a]										
Industry	528			560	540	490	519	529	532	577	552
Households and commerce	395			428	411	405	427	421	430	408	389

[a] Data supplied in Btu were converted to toe on the basis of 1 toe = 42.43×10^6 Btu.

NOTE: Hydroelectricity and net coke imports excluded.

SOURCE: Mineral fuels, 1970–1972 extrapolated on the basis of fuel consumption by type of use 1960–1978 in US Statistical Abstract 1974 and 1976, pp. 669 and 711

Electricity, 1970–1972 extrapolated, on the basis of electricity sales 1950–1978 in US Statistical Abstract, 1979, p. 613

Mineral fuels and electricity, 1973–1980. US DOE Monthly Energy Bulletin, June 1981, pp. 20–21.

TABLE 6 FRG. Industry and household energy consumption, 1970–1980.

Final energy consumption	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980 Prelim-inary
						10^6 tce					
Industry											
District heating	1.4	1.3	1.2	1.3	1.3	1.2	1.3	1.3	1.4	1.5	1.5
Solid fuels	20.7	17.0	15.2	16.5	19.6	15.6	16.1	15.5	15.4	17.2	18.7
Gas	19.4	20.5	21.8	24.4	25.5	23.0	24.8	26.2	26.4	28.2	27.1
Petroleum	35.4	35.2	36.4	37.0	32.3	28.8	29.3	28.0	27.9	26.7	22.5
Electricity	13.9	14.2	15.0	16.4	17.0	15.4	16.8	17.1	17.5	18.5	18.2
Total	90.8	88.2	89.6	95.6	95.7	84.0	88.3	88.1	88.6	92.1	88.0
Households and small-scale users											
District heating	2.9	2.8	3.2	3.3	3.1	3.3	3.7	3.6	4.0	4.2	4.2
Solid fuels	21.8	15.6	13.4	12.6	12.1	9.1	8.0	7.0	6.4	7.4	7.1
Gas	6.5	7.6	10.0	11.8	12.7	13.4	15.9	17.0	18.5	20.3	21.5
Petroleum	54.8	58.9	62.6	67.4	58.5	59.5	65.3	62.6	67.1	67.7	56.7
Electricity	9.7	10.7	12.1	13.1	13.7	14.6	15.6	16.3	17.5	18.1	18.5
Total	95.7	95.6	101.3	108.2	100.1	99.9	108.5	106.5	113.5	117.7	108.0
						10^6 toe[a]					
Industry	59.41	57.71	58.63	62.55	62.62	54.96	57.77	57.64	57.97	60.26	57.58
Households and small-scale users	62.62	62.55	66.28	70.80	65.50	65.36	70.99	69.68	74.39	77.01	70.66

[a] For conversion to toe, the tce were multiplied by 0.6543.

SOURCE: Gesamtverband des Deutschen Steinkohlenbergbaus, Essen, personal communication, 1 Sept 1981.

TABLE 7 France. Industry and household energy consumption, 1970–1980.

Final energy consumption	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Industry[a]	10^6 toe										
Solid fuels											
Iron and steel[a]	10.0	9.1	9.1	9.6	10.5	8.1	8.4	8.0	7.7	8.4	8.5
Other[b]	4.8	3.7	3.1	2.9	2.9	2.1	1.8	1.9	1.8	1.9	2.1
Gas											
Iron and steel	1.1	1.1	1.2	1.4	1.5	1.4	1.6	1.7	1.8	1.8	1.8
Other	4.0	4.6	5.0	5.8	6.2	6.5	7.5	8.1	9.0	10.2	9.9
Petroleum products											
Iron and steel	2.1	2.1	2.4	2.5	2.6	2.1	2.2	2.1	2.1	1.8	1.5
Other	17.6	19.3	20.7	23.1	24.2	20.4	21.0	21.2	20.9	20.6	19.4
Electricity											
Iron and steel	2.3	2.3	2.4	2.6	2.9	2.5	2.7	2.6	2.7	2.8	2.8
Other	14.1	14.7	15.4	16.5	17.1	15.9	17.0	17.6	18.0	19.0	19.1
Total[a,b]	56.0	56.9	59.3	64.4	67.9	59.0	62.2	63.2	64.0	66.5	65.1
Households and services (excl. transport, communication)											
Coal	7.8	6.5	5.9	5.4	5.9	4.5	4.3	4.1	3.9	3.6	3.0
Gas	3.9	4.4	5.3	6.1	6.9	7.0	7.9	9.0	9.4	10.3	11.1
Petroleum	25.3	27.3	29.7	32.2	29.6	26.5	28.0	28.3	28.2	26.8	23.9
Electricity	9.6	10.6	11.9	13.4	14.4	16.1	17.9	19.4	21.7	22.5	23.6
Total	46.6	48.8	52.8	57.1	56.8	54.1	58.1	60.8	63.2	63.2	61.6

[a] includes some of the blast furnace gas shipped from steel to other industries.
[b] includes consumption of fuel for (self-generated) electricity.
SOURCE: Comité Professionnel du Pétrole, 1979, 1980; and Ministère de l'Industrie, Les Chiffres Clés Energie 1981. Paris, 1981.

TABLE 8 UK. Industry and household energy consumption, 1970–1980.

Final consumers, Heat supplied basis	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Industry	10^6 therms										
Solid fuels[a]											
Iron and steel	4,248	3,693	3,451	3,756	3,154	2,818	3,190	2,823	2,607	2,864	1,447
Other industries	5,261	4,247	3,237	3,315	3,051	2,700	2,479	2,525	2,397	2,566	2,167
Gas											
Iron and steel[b]	244	343	437	396	395	371	438	484	446	538	451
Other industries[b]	1,172	2,131	3,251	4,201	4,692	4,701	5,241	5,458	5,574	5,687	5,614
Petroleum products											
Iron and steel	2,328	2,185	2,089	2,066	1,648	1,357	1,279	1,205	1,161	1,168	653
Other industries	8,945	8,982	9,294	9,324	8,264	7,434	7,441	7,520	7,402	7,403	6,120
Electricity											
Iron and steel	373	350	349	378	370	370	420	417	448	455	316
Other industries	2,118	2,156	2,149	2,355	2,217	2,202	2,339	2,383	2,419	2,533	2,405
Total	24,689	24,067	24,257	25,791	23,791	21,953	22,827	22,815	22,454	23,214	19,173
Households and public administration											
Solid fuels	8,243	7,000	6,142	6,029	5,738	4,855	4,553	4,624	4,254	4,338	3,774
Town gas	3,104	2,668	2,398	1,765	1,139	542	160	50	22	24	22
Natural gas	639	1,496	2,473	3,562	4,785	5,946	6,721	7,286	8,053	9,109	9,365
Petroleum products	3,077	3,226	3,473	3,554	3,165	3,100	3,184	3,360	3,247	3,223	2,692
Electricity	3,034	3,171	3,398	3,565	3,576	3,498	3,381	3,421	3,440	3,599	3,476
Total	18,097	17,561	17,884	18,475	18,403	17,941	17,999	18,741	19,016	20,293	19,329
						10^6 toe[c]					
Total industry	58.02	56.56	57.00	60.61	55.91	51.59	53.64	53.62	52.77	54.55	45.06
Total households and public administration	42.67	41.27	42.03	43.42	43.25	42.16	42.30	44.04	44.69	47.69	45.42

[a] includes coke oven gas and creosote/pitch mixtures.

[b] industry consumption of town gas decreased for iron and steel from 129 × 10^6 therms in 1970 to zero in 1978; for other industries it decreased from 557 × 10^6 therms in 1970 to 5 × 10^6 therms in 1980.

[c] for conversion to toe, the therms were multiplied by 0.00235.

SOURCE: UK Department of Energy, 1979 and 1981 Digest of Energy Statistics, London, 1979 and 1981.

TABLE 9 US, FRG, France, UK. The structure of industry and household energy consumption, 1970–1980 (in percentages).

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
USA											
Industry											
Solid fuels	22.4			18.3	17.7	18.3	17.2	15.6	15.3	14.9	14.2
Natural gas	43.8			43.7	43.7	41.0	39.9	38.5	37.9	35.0	36.1
Petroleum products	25.1			28.1	28.4	29.6	31.5	34.2	34.7	38.4	37.8
Electricity	8.7			9.8	10.2	11.1	11.4	11.7	12.1	11.7	11.9
Households, comerce											
Solid fuels	2.5			1.6	1.7	1.4	1.3	1.3	1.4	1.2	1.0
Gas	41.9			42.0	43.7	44.1	43.3	41.7	41.8	45.6	46.2
Petroleum products	38.9			37.1	35.7	33.6	34.8	35.0	34.3	29.0	26.4
Electricity	16.7			19.3	19.9	20.9	20.6	22.0	22.5	24.2	26.4
FRG											
Industry											
Solid fuels[a]	24.3	20.7	18.3	18.6	21.8	20.0	19.7	19.1	19.0	20.3	23.0
Gas	21.4	23.2	24.3	25.5	26.6	27.4	28.1	29.7	29.8	30.6	30.7
Petroleum products	39.0	39.9	40.6	38.7	33.8	34.3	33.2	31.8	31.4	29.0	25.6
Electricity	15.3	16.2	16.8	17.2	17.8	18.3	19.0	19.4	19.8	20.1	20.7
Households, small-scale users											
Solid fuels[a]	25.8	19.2	16.4	14.7	15.1	12.4	10.8	10.0	9.1	9.9	10.5
Gas	6.8	7.9	9.9	10.9	12.7	13.4	14.7	16.0	16.4	17.2	19.9
Petroleum products	57.3	61.6	61.8	62.3	58.5	59.6	60.1	58.7	59.1	57.5	52.5
Electricity	10.1	11.3	11.9	12.1	13.7	14.6	14.4	15.3	15.4	15.4	17.1

TABLE 9 *(continued)*

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
France											
Industry[b]											
Solid fuels	26.4	22.5	20.5	19.4	19.7	17.3	16.4	15.7	14.8	15.5	16.3
Gas	9.1	10.0	10.5	11.2	11.3	13.4	14.6	15.5	16.9	18.0	18.0
Petroleum products	35.2	37.6	39.0	39.8	39.5	38.1	37.3	36.8	36.0	33.7	32.1
Electricity	29.3	29.9	30.0	29.6	29.5	31.2	31.7	32.0	32.3	32.8	33.6
Household, tertiary											
Solid fuels	16.7	13.3	11.2	9.5	10.4	8.3	7.4	6.7	6.2	5.7	4.9
Gas	8.4	9.0	10.0	10.7	12.1	12.9	13.6	14.8	14.9	16.3	18.0
Petroleum products	54.3	56.0	56.3	56.3	52.1	49.0	48.2	46.6	44.6	42.4	38.8
Electricity	20.6	21.7	22.5	23.5	25.4	29.8	30.8	31.9	34.3	35.6	38.3
UK											
Industry											
Solid fuels	38.5	32.9	27.6	27.4	26.0	25.2	24.8	23.4	22.3	23.4	18.8
Gas	5.7	10.3	15.2	17.8	21.4	23.1	24.9	26.1	26.8	26.8	31.6
Petroleum products	45.7	46.4	46.9	44.2	41.7	40.0	38.2	38.2	38.1	36.9	35.4
Electricity	10.1	10.4	10.3	10.6	10.9	11.7	12.1	12.3	12.8	12.9	14.2
Households, other final users											
Solid fuels	45.3	39.8	34.4	32.6	31.2	27.0	25.3	24.7	22.4	21.4	19.5
Gas	20.5	23.7	27.2	28.9	32.2	36.2	38.2	39.1	42.4	45.0	48.6
Petroleum products	17.5	18.4	19.4	19.2	17.2	17.3	17.7	17.9	17.1	15.9	13.9
Electricity	16.7	18.1	19.0	19.3	19.4	19.5	18.8	18.3	18.1	17.7	18.0

[a] Solid fuels includes district heat.

[b] Gross final energy consumption; includes some of the blast furnace gas shipped from steel to other industries, and fuels used for electricity generated by industries.

SOURCE: See Tables 5–8.

TABLE 10 USA. Mineral fuels, price levels, 1970–1980.

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Industry and wholesale prices	Prices in current dollars per toe										
Bituminous coal (*1*)	10.8		13.5	15.1	28.2	35.2	35.6	38.0	41.5	45.6*E*	50.4*E*
Anthracite coal (*1*)	20.0		22.5	21.3	41.8	58.5	62.6	65.6	68.9		
Natural gas, liquid (*1*)	21.5		23.8	30.7	53.0	49.5	59.8	73.8			
Natural gas, dry (*1*)	7.0		7.0	7.8	9.0	12.6	18.5	24.1	32.8		
Nat. gas, wellhead av.val. (*2*)	7.3*A*	7.8*A*	7.9*A*	9.2	12.9	18.9	24.6	33.5	38.4	50.0	63.2
Heating oil No. 2, wholesale (*3*)							100.0	113.0	119.0	163.0	253.0
Heavy fuel oil (OECD) (*4*)	18.4	28.1	27.6	34.0	65.0	95.0	97.5	114.0	109.8	130.3	
Steam-electr. utility, cost of fuels											
Coal (*5*)				17.2	30.1	34.5	36.0	40.2	47.3	51.9	57.4
Unwashed coal (OECD) (*4*)	10.6	12.3	14.3	15.7	24.9	34.0	38.5	39.0	39.5	47.0	
Natural gas (*5*)				14.3	20.4	32.0	43.9	55.2	61.0	74.4	90.3
Nat. gas for el. plants (OECD) (*4*)	10.1	10.7	11.4	13.7	19.5	35.0	39.0	41.0	45.5	57.8	
Residual oil (*5*)				33.0	81.0	85.0	83.0	93.5	90.1	127.0	182.0
Household prices											
Nat. gas, average res. heat (*2*)				46.0	53.0	65.0	78.0	96.0	111.0	137.0	166.0
Domestic town gas (OECD) (*4*)	43.6	45.9	48.6	51.5	57.3	68.3	79.1				
Heating oil No. 2, retail (*3*)	56.8*A*	60.3*A*	60.6*A*	69.9*A*	110.6*A*	119.8*A*	125.0*A*	141.0	152.0	202.0	300.0
Domestic gas/diesel oil (OECD) (*4*)	35.0	36.9	37.0	46.5	95.0	114.9	123.5	136.4	149.0		

SOURCE:

(*1*) Bituminous and anthracite coal near the mine: natural gas liquid and dry, from US Statistical Abstract 1979, p. 604, Table 1017.
Note: Prices in cents per 10^6 Btu multiplied by 0.42427 for conversion to prices in $ per toe.

(*2*) Natural gas, average wellhead values and for residential heat, see DOE 1981 April Monthly Energy Review, p. 88.
Note: Prices in cents per 10^3 cubic feet multiplied by 0.42427 for conversion to prices in $ per toe.

(*3*) Heating oil No. 2 wholesale and retail from DOE 1981 April Energy Review, p. 76–77.
Note: Prices in cents per US gallon multiplied by 3.07242 for conversion of prices in $ per toe.

(*4*) OECD price as of 1 January, see OECD 1980 Energy Statistics 1974–1978. Paris.
Note: Prices for 1 January 1979, personal communication.

(*5*) Cost of coal, natural gas, and residual oil delivered to steam electric utility plants, from DOE April 1981 Monthly Energy Review, p. 89.

E = Estimated on the basis of the index implicit in the price of coal delivered to steam electric utility plants.
1973 = 100; 1978 = 275; 1979 = 302; 1980 = 334.

A = American Petroleum Institute, Basic Petroleum Data Book, Petroleum Industry Statistics, Vol. 1, No. 2, Washington D.C., April 1980 (Reproduction of Department of Labor, BLS prices).

TABLE 11 FRG. Mineral fuels, price levels, 1970–1980.

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1980
Industry and wholesale prices		Prices in DM per toe										$ per toe[a]
Hard coal, Ruhr Ess-Nuss 2 (*1*)	151	159	165	175	218	257	272	272	295	306	366*E*	201*E*
Hard coal, Ruhr Fett Nuss 4 (*1*)		140	148	154	191	231	249	249	273	383	339	186
Industry coal A/Gas-flamm (*1*)	107	123	130	136	168	199	226	226	249	256	292	161
Steam coal (OECD) (*3*)	115	130	143	150	168	219	242	243	265	272		
Brown coal briqu. Hausbrand (*1*)			76	83	89	100	108	108	122	128	138	76
Extra light heating oil (*1*)	135	143	127	217	310	295	320	321	310	549	645	355
Heavy fuel oil to the trades[b] (*1*)	91	119	99	106	204	205	220	226	210	266	356	196
Heavy fuel oil, (OECD) (*3*)	79	99	97	92	158	227	204	273	293	221		
Electric power plants prices paid for: Fettkohle, for electric power plants (*1*)					175	208	234	234	257	266	305	168
Coal, unwashed (OED) (*3*)	104	118	123	165	187	243	240	237	262	269		
Household prices paid for:												
Anthracite Eierbriquettes (*3*)	312	380	403	380	460	532	568	576	605	642	755	415
Brown coal briquettes (*2*)	211	229	248	270	304	333	351	361	386	417	455	250
Anthracite 5–10mm (OECD) (*3*)	203	231	251	261	316	421	465	403	445	579		
Natural gas (OECD) (*3*)	540	540	588	579	580	687	814	945	947	1,040		
Town gas (OECD) (*3*)	792	720	755	754	755	970	1,141	1,205	1,200	1,800		
Extra light fuel oil, from tanks (*2*)	186	209	198	263	347	334	369	366	357	637	721	397

E = Estimated.

[a] converted at 1980 average exchange rates from IMF June 1981 International Financial Statistics, 1$ = DM1.8177.

[b] user tax (Verbrauchersteuer) included.

(*1*) Industry producer prices for solid fuels and petroleum products, 1970–1979 see FRG Statistisches Jahrbuch 1975, p. 438 and 1981, p. 495. 1980 prices see FRG Preise und Preisindizes für Industrielle Produkte (Erzeugerpreise) Fachserie 17, Reihe 2; Jan–Dec. 1980. Prices exclude value added tax, but for petroleum products they include "Verbrauchersteuer".

(*2*) Household prices for solid fuels and light fuel oil 1970–1979 see FRG Statistisches Jahrbuch 1975, p. 451 and 1981, p. 495. For 1980 prices see FRG Preise und Preisindizes für die Lebenshaltung Fachserie 17, Reihe 7; June 1981.

(*1*) + (*2*) Note: Coal prices given in DM per ton, multiplied by 1.528 for conversion to DM per toe.
Oil prices given in DM per hectoliter (100 liter), multiplied by 11.631 for conversion to DM per toe.

(*3*) Prices as of 1 January, see 1980 OECD Energy Statistics 1974–1978, Paris. Note: Prices for January 1979, personal communication.

TABLE 12 France. Mineral fuels, price levels, 1970–1980.

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1980
Industry and wholesale prices		Prices in francs per toe										$/toe[a]
French noix anthracite 30/50 (*1*)									673	956	1,314	311
Fines lavées flambants gras (*2*)	157	181	181	196	293	272	276	296	365	450	711*E*	168*E*
Steam coal, washed (OECD) (*3*)	139	171	181	183	203	261	283	344	366	416		
Heavy fuel oil No. 2 (*1*)	173	208	197	187	360	419	430	496	513	631	921	218
Heavy fuel oil No. 2 (OECD) (*3*)				270	357	328	384	422	422			
Natural gas (*1*)								435	521	555	851	201
Electric power plants, prices paid for:												
Coal, unwashed (OECD) (*3*)	115	131	137	123	156	332	327	356	402	400		
Natural gas (OECD) (*3*)	56	68	78	77	91	225	224	288	367	383		
Heavy fuel oil (OECD) (*3*)	88	98	92	92	195	240	215	349	389	405		
Household prices												
French noix anthracite 30/50 (*2*)		700	716	724	1,015	1,090	1,101	1,132	1,258	1,434	1,974	467
Anthracite, 5–10mm (OECD) (*3*)	306	294	361	359	417	547	560	636	658	862	1,040*E*	246*E*
Natural gas (OECD) (*3*)	803	875	936	978	1,040	1,429	1,429	1,548	1,642	1,696		
Town gas (OECD) (*3*)	1,117	1,133	1,133	1,136	1,250	1,680	1,678	1,690	1,800	1,854		
Fuel oil, household (*1*)								918	1,001	1,276	1,877	444

[a] converted at 1980 average exchange rate, from IMF June 1981 International Financial Statistics, 1$ = 4.2260 Fr.

E = Estimated.

(*1*) Prix Energetiques et Industriels and Prix de Vente en Detail in the Paris area in the INSEE 1981 May Bulletin Mensuel de Statistique, Tables 11 and 12.
Note: Coal prices given in francs per ton multiplied by 1.528 for conversion to francs per toe.
Oil prices given per 1,000 liters multiplied by 1.1631 for conversion to francs per toe. Natural gas prices given per m^3 multiplied by 1,201 for conversion to francs per toe.

(*2*) For industry see industrial products, wholesale prices; for household see retail prices in the Paris area from INSEE 1980 Annuaire Statistique de la France, p. 588 and 593.

(*3*) Prices as of 1 January, see OECD 1980 Energy Statistics 1974–1978, Paris.
Note: Prices for 1 January 1979, personal communication.

TABLE 13 UK. Mineral fuels, price levels, 1970–1980.

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1980
Large industrial consumers excl. iron and steel	Prices in £/toe											$/toe[a]
Coal (*1*)	10.7	12.8	13.8	14.4	15.7	23.6	29.2	34.8	37.8	44.0	57.0	132.6
Gas (*1*)	19.2	13.9	12.6	13.0	12.6	18.1	27.5	39.3	49.7	58.1	74.6	173.5
Heavy fuel oil[b] (*1*)	9.4	14.1	13.5	13.2	31.3	39.4	45.1	57.2	53.7	66.7	94.6	220.0
Electric power plants, prices of fuel used												
Coal (*2*)	8.7	10.1	10.6	10.9	15.1	23.1	27.5	32.1	35.8	41.3	51.9	120.7
Gas (publ. supply) (*2*)	7.6	7.1	7.4	8.4	16.3	20.7	24.6	32.5	38.0	45.7	55.2	128.4
Oil for gas turbines[b] (*2*)	13.4	17.4	17.2	19.3	41.4	52.3	58.3	73.9	75.8	79.4	95.3	221.6
Oil for burning[b] (*2*)	10.8	11.3	10.8	11.7	28.0	36.3	41.5	51.5	49.3	56.9	85.7	199.3
Households, typical retail prices												
House coal (group 2) (*2*)								74	83	99	124	288.4
Anthracite grains 1 A (*2*)								88	98	119	128	297.7
Anthracite 5–10mm (OECD) (*3*)	27.5	26.2	27.1	29.4	29.5	36.6	46.9	59.1	69.7	73.3		
Natural gas (OECD) (*3*)	48	48	54	57	61	70	81	87	97	97		
Town gas (OECD) (*3*)	58	58	72	76	82	86	95	115	117	117		
Burning oil, standard grade (*2*)								101	101	154	182	423.3
Gas/diesel oil (OECD) (*3*)	15	16	13	19	36	64	70	86	94	84		

[a] converted at 1980 average exchange rates from IMF June 1981 International Financial Statistics, 1$ = £0.430.

[b] duties on hydrocarbon oils included.

SOURCE:

(*1*) Prices in pence per therm from UK 1981 Digest of Energy Statistics, p. 124, Table 87.

(*2*) Prices from UK 1981 Digest of Energy Statistics, p. 125, Table 88 for public supply electric industry, and p. 120 Table 83 for typical retail prices, London.
Note: Prices given in pence per therm multiplied by 4.247 for conversion to £ per toe.
Prices given in £ per ton of coal multiplied by 1.630 for conversion to £ per toe.
Prices given in pence per liter multiplied by 11.631 for conversion to £ per toe.

(*3*) Prices as of 1 January, see OECD 1980 Energy Statistics 1974–1978, Paris.
Note: Prices for 1 January 1979, personal communication.

TABLE 14 USA, FRG, France, UK. Gasoline prices and taxes, 1970–1981. Prices including taxes, and taxes per liter.

	USA Gasol. price	Tax	FRG Gasol. price	Tax	France Gasol. price	Tax	UK Gasol. price	Tax
	National currencies							
	Cents		DM		Fr		£	
1970	9.50	2.90	0.56	0.4040	1.07	0.7945	0.068[a]	0.0495
1971	9.76	2.90	0.59	0.4060	1.10	0.7960	0.070[a]	0.0495
1972	10.03	3.17	0.61	0.4074	1.11	0.8020	0.073[a]	0.0495
1973	10.55*	3.17	0.69	0.4504	1.16	0.8035	0.075[a]	0.0495
1974	14.04	3.17	0.83	0.5150	1.62	0.8485	0.110	0.0495
1975	14.96	3.17	0.832	0.5210	1.69	0.9568	0.156	0.0807
1976	15.57	3.17	0.889		1.85		0.165	
1977	16.41	3.17	0.865		2.16		0.174	
1978	16.52	3.17	0.890	0.532	2.58	1.3256	0.162	0.0851
1979	22.61	3.17	0.960	0.535	2.69	1.7473	0.218	0.0848
1980	31.42	3.17*E*	1.132	0.559	3.20	1.8257	0.276	0.1149
1981:								
Jan.	32.66	3.17*E*	1.213	0.582	3.43	1.8828	0.286	0.1373
Feb.	34.85	3.17*E*	1.247		3.49			
March	35.67		1.280		3.51			
April	35.46		1.360				0.332	
	US cents[b]							
1980	31.42	3.17	62.3	30.8	75.7	43.2	64.2	26.7

Notes to Table 14

E = Estimated.
* = October.
[a] as of January
[b] converted at 1980 average exchange rates from IMF 1981 June International Financial Statistics, 1$ = DM 1.8177; franc 4.2260; £0.430.
SOURCE:
USA 1970–1973 average retail dealer motor gasoline selling price in US 1976 Statistical Abstract; 1974–1981 US city average retail price, tax included, regular leaded gasoline full serve in US DOE June 1981 Monthly Energy Review.
Gasoline taxes see US 1976 and 1979 Statistical Abstract.
Note: Prices and taxes per gallon were converted on the basis of 1 US Gallon = 3.79 liters.
FRG 1970–1978 retail price, tax included, Normalbenzin, Markenware in Statistisches Jahrbuch 1979, p. 491 and earlier issues. 1979–1981 see Statistisches Bundesamt, Preise Fachserie 17, Reihe 7, (Monthly) April 1981 and earlier issues. The prices for 1979–1981 relate to Normalbenzin, Markenware, self-service.
France 1970–1972 retail price, tax included, regular gasoline (essence auto ordinaire) sold in the Paris agglomeration from Annuaire Statistique de la France 1978, p. 587 and earlier issues 1978–1981, see essence ordinaire, Paris agglomeration, INSEE Bulletin Mensuel de Statistique, December 1979 and April 1981.
UK 1970–1979. See typical retail prices of 2 Star (regular) petrol in UK Department of Energy (Annual) *Digest of Energy Statistics* 1980; see the same series continued for 1980 and 1981 in the UK Department of Energy (Monthly Energy Trends, May 1981.
Note: Prices converted to liter on the basis of 1 imperial gallon = 4.549 liter.

Gasoline taxes FRG, France, UK see EUROSTAT 1975 Energy Statistics 1970–1974; EUROSTAT 1980 January and 1981 April Hydrocarbons, Monthly Bulletin.

TABLE 15 USA, FRG, France, UK. Electricity price levels, 1970–1980.

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1980
USA	Prices in cents/kWhr											US cents per kWhr[a]
Industry												
Average sales revenue per kWhr sold (*1*)				1.25	1.69	2.07	2.21	2.50	2.79	3.05	3.69	3.69
Monthly consumption (*2*):												
60,000 kWhr	2.0	2.1	2.3	2.4	2.8	3.7	3.9	4.3	4.7			
200,000 kWhr	1.8	1.9	2.1	2.2	2.6	3.4	3.7	4.1	4.5			
Households (Residential)												
Average sales revenues per kWhr sold (*1*)				2.54	3.10	3.51	3.73	4.05	4.31	4.64	5.36	5.36
Monthly consumption 500 kWhr (*2*)	2.1	2.2	2.4	2.5	2.8	3.6	3.9	4.2	4.4			
FRG	Prices in Pfenning/kWhr											
Industry												
High voltage income per kWhr sold (*3*)	7.57	7.79	8.15	8.29	8.59	10.33	10.49	10.66	10.75			
Monthly consumption 167,000kWhr (*4*)				9.97	10.39	12.63	12.85	13.00	14.25	14.54	14.36	8.00
Households												
Low voltage, income per kWhr sold (*3*)	13.60	13.55	14.10	14.56	15.72	17.52	17.93	17.96	17.73			
Monthly consumption 292 kWhr (*4*)				11.85	13.17	15.31	16.23	16.42	16.71	18.25	18.04	10.04
Average consumption 75kWhr, Basic fee incl. (*5*)	13.34	13.70	15.08	15.97	17.33	20.30	21.30	21.40	21.10	21.70	22.30	12.27
France	Prices in centimes/kWhr											
Industry												
High voltage, income per kWhr sold (*3*)	8.04	8.66	9.11	9.25	10.45	13.33	15.06	16.19	18.28			
Monthly consumption 167,000kWhr (*4*)				11.44	11.82	15.96	15.96	18.55	19.76	21.76	28.34	6.71
Households												
Low voltage, income per kWhr sold (*3*)	23.67	24.57	24.81	25.38	27.22	30.48	33.70	35.94	36.23			
Monthly consumption 292kWhr (*4*)				20.56	21.31	27.04	27.04	32.04	34.12	36.56	46.58	11.02

UK	Prices in pence/kWhr											
Industry												
High voltage, income per kWhr sold (*3*)	0.682	0.749	0.770	0.773	1.047	1.381	1.607	1.839	2.046			
Electricity delivered to large industrial consumers (*6*)	0.654	0.721	0.737	0.740	0.932	1.240	1.489	1.718	1.900	2.100	2.366	5.50
Monthly consumption 167,000kWhr (*4*)				0.804	0.861	1.249	1.565	1.875	2.185	2.271	2.783	6.47
Households												
Low voltage, income per kWhr sold (*3*)	0.865	0.933	0.990	1.000	1.200	1.694	2.142	2.449	2.708			
Monthly consumption 300kWhr (*4*)				1.163	1.219	1.490	2.076	2.478	2.787	2.909	3.489	8.11

[a] converted at 1980 average exchange rates from IMF 1981 June International Financial Statistics, 1$ = DM 1.8177; francs 4.2260; £0.430.

SOURCE:

(*1*) Average retail electricity prices, in US DOE 1981 April Monthly Energy Review, p. 89.

(*2*) Average bill, cents per kWhr, in US 1979 Statistical Abstract, p. 493 table 807.

(*3*) Public Supply undertakings, average income per kWhr in EUROSTAT 1980 March Electrical Energy Monthly Bulletin, Annex 2 and EUROSTAT (1976) Energy Statistics, Yearbook 1970–1975.

(*4*) Selling price as of the beginning of the year, tax included, for the FRG Western Region, Paris, and London in EUROSTAT 1980 Electricity Prices, 1973–1978, 1979–1981 updated by personal communication.

Note the following categories were selected:

Industry: Ie

Households: Dc

(*5*) Annual average price including VAT and basic fee, 75kWhr consumption in FRG Statistisches Jahrbuch, 1981, Table 22.15.

(*6*) UK Department of Energy (Annual). 1981 Digest of Energy Statistics, p. 124, Table 87.

TABLE 16 USA. The growth of current energy prices, by groups of fuels and electricity, 1950–1980 (index numbers, 1970 = 100).

		Industry sector prices					Household sector prices					Transport prices
Year	GNP deflator	Total energy	Solid fuels	Natural gas	Petroleum products	Elec-tricity	Total energy	Solid fuels	Gas	Petroleum products	Elec-tricity	Gasoline
1950	58.7	82.0	55.4		84.2				67.4	66.4	85.5	68.0
1951	62.7	85.0	56.6		90.8				67.0	70.2	86.2	70.0
1952	63.5	84.8	56.8		89.6				68.3	71.9	87.0	71.8
1953	64.5	87.2	58.9		91.6				70.4	75.7	88.2	76.0
1954	65.3	85.6	55.5		89.2				71.8	76.1	88.5	78.1
1955	66.8	85.9	54.8		91.0				74.6	78.7	89.6	79.2
1956	68.9	88.5	59.8		96.2				74.9	82.5	89.9	81.9
1957	71.2	93.3	64.9		103.0		84.2		77.1	86.7	90.3	85.2
1958	72.3	89.7	64.2	73.5	93.9	94.2	84.4		81.7	81.8	91.4	84.1
1959	73.9	89.7	64.0	80.0	93.4	94.5	85.8		84.4	82.9	92.3	85.1
1960	75.2	90.5	63.6	84.2	94.6	95.6	88.0		90.1	81.4	94.0	87.6
1961	75.8	91.5	62.9	85.1	96.1	96.0	88.2		91.2	84.7	94.3	86.6
1962	77.2	91.1	62.3	86.1	95.1	96.4	88.5		91.2	84.8	94.3	87.0
1963	78.4	90.7	62.4	88.6	94.1	95.7	88.8		91.2	86.6	94.3	86.9
1964	79.6	88.2	62.4	87.6	89.7	94.8	88.4		91.5	84.6	93.8	86.6
1965	81.4	89.9	62.1	89.6	92.8	94.5	90.0		91.8	86.4	93.3	89.9
1966	84.0	92.1	63.5	93.3	96.3	94.1	91.4		92.4	88.7	93.3	91.9
1967	86.5	94.2	66.5	96.5	98.9	94.4	92.7		92.2	91.5	94.2	94.7
1968	90.4	93.1	69.0	89.5	97.0	95.3	94.0		93.1	94.4	95.0	96.0
1969	94.9	95.0	74.9	90.1	98.5	96.1	95.8		94.8	96.4	96.8	99.1
1970	100.0	100.0	100.0	100.0	100.0	100.0	100.0		100.0	100.0	100.0	100.0
1971	105.1	108.5	121.1	104.7	106.1	109.7	106.9		107.1	106.3	106.6	100.7
1972	109.5	111.7	128.9	110.1	107.8	114.7	111.3		112.7	106.7	112.0	101.9
1973	115.8	126.5	145.1	122.3	127.4	122.1	119.0		117.9	123.1	117.6	111.9
1974	125.7	196.1	221.2	156.6	221.2	154.0	148.9		132.6	194.9	138.9	151.4
1975	137.4	230.8	256.7	209.2	255.0	182.6	170.3		159.0	211.0	157.3	161.7
1976	144.5	250.1	245.4	276.8	271.2	196.1	187.5		185.4	226.2	167.2	168.5
1977	152.9	284.6	259.1	373.8	302.5	219.9	211.9		220.6	256.4	178.3	178.2
1978	164.1	303.7	286.2	413.0	321.0	236.7	229.3		242.4	271.6	191.4	185.9
1979	178.0	384.3	300.0	523.9	444.6	255.2	265.4		281.6	381.3	206.3	251.5
1980	193.9	539.9	311.0	732.1	674.5	303.7	323.8		335.4	534.2	238.7	349.5

SOURCE:
All industry sector energy prices are from the series of producer price indices by major commodity groups, total, and its components. "Producer price paid by industry" is synonymous with "wholesale price", the same index for "total fuels and related products" appearing as "producer price" in the Economic Report of the President, and as "wholesale price" in the Statistical Yearbook, etc.
All household energy prices are the Bureau of Labor Statistics (BLS) consumer price indices by classes of expenditure.
The following price indices were used:

	Series	*Energy groups*	*Source*
Industry sector			
Total energy	Producer price indices by major commodity groups	Total fuels and related products and power including crude oil and electricity	Economic Report of the President 1981, p. 298
Solid fuels	"	Coal; coke (foundry by-product)	US Statistical Abstract; Survey of Current Business
Natural gas	"	Gas fuels	
Petroleum products	"	Refined petroleum	
Electricity	"	Electric power	
Household sector			
Total energy	BLS consumer price indices by expenditure classes; US city average; all urban consumers	Total household fuels including gas and electricity; fuel oil, coal and bottled gas	Economic Report of the President 1981, p. 290 Bureau of Labor Statistics 1975 Reference Edition and Monthly Labor Review April 1981 and earlier issues
Solid fuels	"	Separate index no longer published	
Natural gas	"	Utility piped gas	
Petroleum products	"	Fuel oil No. 2	
Electricity	"	Household electricity	
Transport sector	"	Gasoline, private transportation	Economic Report of the President 1981, p. 291

TABLE 17 FRG. The growth of current energy prices, by groups of fuels and electricity, 1950–1980 (index numbers, 1970 = 100).

		Industry sector prices					Household sector prices					Transport prices
Year	GDP deflator	Total energy	Solid fuels	Natural gas	Petroleum products	Electricity	Total energy	Solid fuels	Gas	Petroleum products	Electricity	Regular gasoline
1950	52.3		41.0	68.2	79.8	68.8						
1951	55.4											
1952	59.2											
1953	60.0											
1954	60.8		63.9	96.5	105.8	96.5						
1955	62.3		64.3	96.5	107.5	96.5						
1956	63.8		68.1	96.5	109.0	96.5						117.9
1957	66.2		73.9	99.8	116.2	99.8						112.5
1958	68.5		77.8	101.8	109.5	101.8						112.5
1959	69.2		77.6	102.3	105.5	102.3						110.7
1960	71.1		77.5	102.4	107.9	102.4						107.1
1961	74.1		77.5	102.0	101.1	102.0						103.6
1962	77.2		78.9	101.4	108.2	101.4						103.6
1963	79.6		80.9	100.9	107.4	100.9						101.8
1964	81.3	94.7	83.0	100.8	99.6	100.8						101.8
1965	84.7	95.5	87.1	102.3	95.7	102.3						101.8
1966	87.7	95.6	87.0	103.0	95.3	103.0	89.3					96.4
1967	88.8	98.9	87.1	103.0	105.8	103.0	90.5					103.6
1968	90.1	95.6	82.5	102.2	102.4	101.4	95.8					110.7
1969	93.4	93.6	85.2	100.5	96.2	99.9	95.7	87.8	100.4	94.7	99.5	101.2
1970	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1971	107.9	110.8	111.9	101.6	109.5	102.7	105.4	108.7	101.1	110.4	102.4	105.4
1972	114.2	112.7	118.4	108.8	106.7	109.6	110.1	116.0	106.7	102.3	111.3	108.9
1973	120.9	122.4	124.2	110.6	129.8	114.7	128.2	125.2	108.8	168.8	117.6	123.2
1974	129.3	184.3	154.7	123.6	181.8	123.3	149.8	147.8	119.0	220.5	128.3	148.2
1975	139.7	205.9	191.2	185.1	181.4	144.1	165.5	169.0	136.1	211.8	151.3	148.6
1976	144.3	220.6	205.5	207.5	193.4	150.8	176.4	178.5	148.1	233.3	157.9	158.8
1977	147.4	221.6	205.7	220.3	191.2	152.3	178.4	182.6	151.8	232.8	159.1	154.5
1978	153.0	217.8	221.5	228.3	189.5	158.6	183.6	192.8	157.3	227.9	166.0	158.9
1979	158.8	246.5	231.0	221.7	238.4	162.7	220.1	206.1	158.9	406.2	169.7	171.4
1980	166.9	317.3	264.9	285.7	293.0	170.0	242.7	233.7	166.8	465.9	176.4	202.1

NOTE: The discrepancy within the industry prices between total energy and energy commodity groups may be explained by differences in the weighting of fuel oils.

SOURCE:

For industry sector prices, the FRG has two detailed series. One are the producer prices (Erzeugerpreise) for industrial products, published by the Statistische Bundesamt in Preise und Preisindizes für industrielle Produkte (Erzeugerpreise), Fachserie 17, Reihe 2; the other are the basic materials' prices, published in Index der Grundstoffpreise, Fachserie 17, Reihe 3. Both are monthly publications, with annual data published in Statistisches Jahrbuch.

For household sector prices, the "cost of living price series, relating to total private households" was selected. These should be distinguished from the retail price series that in general rose at a higher pace in the 1970s than the cost of living series.

The following price indices were used:

	Series	*Energy groups*	*Source*
Industry sector			
Total energy	Basic materials (Grundstoff) prices	Combination of two separate indices, using 1970 weights: 1. coal, petroleum products; 2. electricity, gas, water	Statistisches Bundesamt, Fachserie 17, Reihe 3; Statistisches Jahrbuch and Wirtschaft und Statistik
Solid fuels	Producer prices (Erzeugerpreise) for industrial products	Coal mining products (coal; coke and briquettes)	Fachserie 17, Reihe 2 Statistisches Jahrbuch and Wirtschaft und Statistik
Natural gas	"	Natural gas	"
Petroleum products	"	Petroleum products	"
Electricity	"	Total electricity	"
Household sector			
Total energy	Prices and price indices for the cost of living	Total electricity, gas, coal and liquid fuels, excluding gasoline	Fachserie 17, Reihe 7 Statistisches Jahrbuch and Wirtschaft und Statistik
Solid fuels	"	Coal and other solid fuels	"
Natural gas	"	Gas (city and natural)	"
Petroleum products	"	Liquid fuels excluding gasoline	"
Electricity	"	Electricity	"
Transport sector	Prices per liter of Normalbenzin, Markenware	Einzelhandel Verbraucherpreise für ausgewählte Waren	Statistisches Jahrbuch 1979 and earlier issues, Fachserie 17, Reihe 7

TABLE 18 France. The growth of (current) energy prices, by groups of fuels and electricity, 1950–1980 (index numbers, 1970 = 100).

		Industry sector prices					Household sector prices					Transport price
Year	GDP deflator	Total energy	Solid fuels	Natural gas	Petroleum products	Electricity	Total energy (incl. gasoline)	Solid fuels	Gas	Petroleum products	Electricity	Regular gasoline
1950	38.0											40.4
1951	39.3											50.7
1952	43.7											56.2
1953	45.9	55.8			61.3	61.7						59.9
1954	46.7	56.0			61.6	61.7						59.9
1955	47.4	56.2	49.4		63.0	61.1						60.0
1956	49.6	58.2	50.0		65.4	60.9						60.0
1957	52.6	64.9	53.5		79.0	60.2						68.3
1958	62.2	71.3	60.9	102.0	86.6	64.0						86.6
1959	64.4	79.0	68.8	118.6	91.0	74.6						89.3
1960	65.0	79.0	68.1	118.7	90.3	75.5						92.5
1961	67.2	79.4	70.1	102.5	89.7	76.7						91.6
1962	70.4	79.5	69.2	99.9	88.8	76.7	76.1	73.9	81.6		73.8	90.7
1963	74.6	80.2	70.4	100.6	88.2	79.9	78.2	77.2	80.4		76.8	88.8
1964	77.6	80.1	70.9	106.4	86.4	82.9	79.8	79.4	80.0		79.9	88.8
1965	79.5	79.8	71.3	100.6	85.1	84.2	80.1	80.2	79.9		80.4	87.9
1966	81.9	80.4	71.3	101.2	85.0	84.7	83.0					87.9
1967	84.2	81.6	71.0	100.4	86.2	86.0	85.0					89.7
1968	88.0	85.7	73.1	100.0	90.8	91.1	88.1	86.0	89.2		86.0	89.7
1969	95.1	92.6	76.3	100.0	97.2	97.0	94.8	93.6	94.8		93.6	98.1
1970	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1971	105.9	111.1	125.4	113.5	108.6	104.4	106.7	106.4	106.3		104.7	102.8
1972	112.6	113.4	128.0	126.6	108.8	109.3	109.7	112.1	110.5		109.1	103.7
1973	121.3	117.6	132.2	131.5	112.6	114.0	114.1	118.1	115.5		113.8	108.4
1974	135.3	170.7	194.0	194.5	176.6	133.6	156.8	145.0	139.0		132.8	151.4
1975	152.5	191.6	229.4	218.7	190.1	154.6	169.2	166.3	163.4		143.4	157.9
1976	167.4	210.5	252.9	237.6	207.4	173.1	187.3	184.3	174.4		162.6	172.9
1977	181.9	232.9	269.9	257.7	236.8	185.9	209.2	198.7	185.5		174.0	201.9
1978	200.1	251.4	286.9	296.7	255.7	202.5	227.3	230.9	200.3	359.2	187.6	241.1
1979	220.4	290.1	318.8	320.4	304.2	226.1	263.6	308.2	216.4	456.8	209.1	251.4
1980	246.0	373.0	392.3	474.2	402.5	277.5	331.9	396.1	277.3	670.2	251.3	299.1

NOTE: The discrepancy within the household sector energy prices for total energy and its components may be explained by the inclusion of gasoline in total household energy.
SOURCE:
Wholesale price index numbers, including tax, are compiled by the Institut National de la Statistique et des Etudes Economiques (INSEE), based on 1962 = 100. The household sector prices are from the series of prices paid by modest households in all of France, index numbers based on 1970 = 100.
The following price indices were used:

	Series	*Energy groups*	*Source*
Industry sector			
Total energy	Wholesale prices including tax	Total energy products, incl. coal; refined petroleum products; electricity; "Gaz de France"; natural gas (crude oil seems to be excluded)	INSEE Bulletin Mensuel de la Statistique and Annuaire Statistique de la France
Solid fuels	"	Coal, total	"
Natural gas	Producer prices	Natural gas and "ORT" 1958–1961; natural gas since 1962	"
Petroleum products	"	Petroleum products	"
Electricity	"	Electricity	
Household sector			
Total energy	Prices paid by modest householders in all of France	Total of coal, gas, electricity and gasoline; petroleum products added since 1978	"
Solid fuels	"	Coal	"
Natural gas	"	City distributed gas	"
Petroleum products	"	Liquid fuels	"
Electricity	"	Total electricity	"
Transport sector	Prices in national currency per 100 liters	Retail prices, tax included, of regular gasoline (essence ordinaire) sold in the Paris agglomeration	1971–1977 see Annuaire Statistique de la France 1978, p. 587, backdated with Comité Professionnel du Petrole, Petrole 78. For updating to 1980 see INSEE Bulletin Mensuel de la Statistique April 1981.

TABLE 19 UK. The growth of current energy prices, by groups of fuels and electricty, 1950–1980 (index numbers, 1970 = 100).

		Industry sector prices					Household sector prices					Transport
Year	GDP deflator	Total energy	Solid fuels	Natural gas	Petroleum products (heavy fuel oils)	Elec-tricity	Total energy	Solid fuels	Gas	Petroleum products (heating oils)	Elec-tricity	Motor spirit
1950	49.0											
1951	49.3											
1952	53.7											
1953	55.1											
1954	55.9											
1955	58.1		61.1	118.8	96.4	75.4						65.9
1956	61.0		70.3	129.4	116.9	80.3	53.3					69.0
1957	63.2		74.9	135.8	121.3	83.3	56.7					69.0
1958	65.4		79.1	142.0	102.2	85.0	59.2					70.6
1959	66.1		79.1	141.2	93.3	81.3	60.2					72.1
1960	66.1		80.8	142.5	88.9	80.0	61.6					73.1
1961	68.3		83.7	144.9	81.8	84.3	65.5					73.4
1962	70.8		86.6	148.0	91.1	85.9	68.6	62.3	81.7		70.5	77.6
1963	72.5	79.6	86.6	148.2	86.1	87.5	72.8	64.8	83.3		74.7	81.4
1964	74.7	81.0	86.6	148.0	80.6	87.0	75.0	66.0	86.5		78.1	84.9
1965	78.5	86.4	86.6	146.2	75.3	91.0	78.6	68.5	87.3		84.2	84.9
1966	82.1	89.8	88.1	147.8	79.6	94.2	83.0	75.3	89.7		87.0	89.6
1967	84.5	91.8	85.1	146.9	92.5	96.5	85.3	78.4	90.5		89.7	89.1
1968	88.2	94.2	82.1	147.6	101.1	98.6	91.8	82.1	96.8		100.0	94.5
1969	93.1	96.3	83.6	129.4	100.0	98.5	94.6	86.4	100.8		100.0	97.1
1970	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1971	109.4	110.6	117.8	72.3	148.7	110.2	110.3	112.3	109.4		111.5	103.0
1972	117.7	114.0	128.1	65.5	142.4	112.7	118.9	124.3	115.3		117.9	107.2
1973	125.8	119.0	132.0	65.0	139.2	114.0	122.3	128.4	116.5	126.0	120.5	110.7
1974	144.1	164.9	141.0	65.7	329.3	142.5	143.2	142.8	122.4		146.8	161.7
1975	184.1	208.3	223.0	94.5	409.8	189.6	190.7	192.4	141.2		213.3	220.0
1976	211.0	296.0	266.0	149.0	474.0	239.0	236.0	236.0	171.0	309.0	264.0	234.0
1977	240.5	363.0	317.0	204.0	600.0	275.0	274.0	275.0	200.0	384.0	301.0	250.8
1978	266.1	384.0	345.0	252.0	564.0	303.0	295.0	305.0	206.0	389.0	332.0	238.6
1979	305.7	450.0	413.0	287.0	710.0	336.0	324.0	357.0	213.0	493.0	360.0	313.7
1980	363.2	592.0	520.0	390.0	993.0	413.0	406.0	456.0	249.0	659.0	458.0	397.0

SOURCE:
The following price indices were used:

	Series	*Energy groups*	*Source*
Industry sector			
Total energy	1963–1970: Index numbers of wholesale prices of materials purchased by selected broad sectors of industry; 1970–1980: Current fuel price index numbers	1963–1970: "Fuel" includes coal, heavy fuel oil, gas, electricity; 1970–1979: "Fuel" includes coal, fuel oil, gas and electricity (may exclude crude oil)	UK Annual Abstract of Statistics 1980 edition, p. 463, Table 18.2 and earlier issues; UK Department of Energy, Energy Trends; May 1981
Coal; gas; heavy fuel	1955–1970	Coal prices in £ per ton; gas prices in pence per therm; heavy fuel oil prices in £ per ton; electricity prices in pence per kWhr;	UK Department of Energy: Digest of UK Energy Statistics 1979, Table 87 Prices of fuels used by industry. For backdating see also earlier issues and Doblin 1976
	1970–1980	Current fuel price index numbers; domestic sector	UK Department of Energy, Energy Trends, May 1981
Household sector			
Total energy (fuel and light)	1955–1970	General index of retail prices	UK Department of Energy: Digest of UK Energy Statistics 1979,
Coal; gas; heating oils and premium kerosene; electricity	1970–1980	Current fuel price index numbers; domestic sector	p. 119, table 84 and Monthly Digest of Statistics March 1980; UK Energy Trends May 1981
Transport sector	1955–1969 1970–1973	Prices in national currency per liter regular gasoline	Extrapolated, see Doblin 1976; Digest of UK Energy Statistics, 1980
	1974–1979	Motor spirit, current fuel price index numbers; domestic sector	Digest of UK Energy Statistics, 1980
	1980	Prices in national currency per liter regular gasoline	Extrapolated, UK Energy Trends, May 1981

TABLE 20 USA. The growth of energy prices in 1975 $, by groups of fuels and electricity, 1950–1980 (index numbers, 1970 = 100).

		Industry sector prices					Household sector prices					Transport prices
Year	GNP deflator	Total energy	Solid fuels	Natural gas	Petroleum products	Elec-tricity	Total energy	Solid fuels	Gas	Petroleum products	Elec-tricity	Gasoline
1950	58.7	139.7	94.4		143.4				114.8	113.1	145.6	
1951	62.7	135.6	90.3		144.8				106.9	111.9	137.4	
1952	63.5	133.6	89.5		141.2				107.6	113.3	137.1	
1953	64.5	135.3	91.4		142.1				109.2	117.4	136.8	
1954	65.3	131.6	84.9		136.6				109.9	116.5	135.5	
1955	66.8	128.7	82.0		136.3				111.8	117.9	134.3	
1956	68.9	128.6	86.8		139.6				110.2	119.9	130.6	
1957	71.2	131.1	91.2		144.7		118.3		108.4	121.9	126.9	119.9
1958	72.3	124.1	88.8	101.6	129.8	130.2	116.6		112.9	113.1	126.4	116.4
1959	73.9	121.4	86.6	108.3	126.3	127.9	116.1		114.2	112.1	125.5	115.3
1960	75.2	120.4	84.6	112.0	125.8	127.1	117.1		119.8	108.3	125.0	116.6
1961	75.8	120.7	83.0	112.2	126.8	126.6	116.3		120.3	111.7	124.3	114.2
1962	77.2	117.9	80.7	111.5	123.1	124.9	114.6		118.0	109.8	124.7	112.9
1963	78.4	115.7	79.6	113.1	120.0	122.1	113.3		116.4	110.5	120.3	111.0
1964	79.6	110.9	78.4	110.0	112.7	119.1	111.1		115.0	106.3	117.8	104.3
1965	81.4	110.5	76.4	110.1	114.1	116.2	110.6		112.8	106.2	114.7	109.3
1966	84.0	109.6	75.6	111.1	114.7	111.9	108.8		109.9	105.5	111.1	108.4
1967	86.5	108.9	76.9	111.6	114.4	109.2	107.2		106.6	105.8	108.9	108.9
1968	90.4	103.0	76.3	99.0	107.4	105.4	104.0		103.0	104.5	105.1	106.0
1969	94.9	100.1	78.9	94.9	103.8	101.3	100.9		99.8	101.6	102.0	104.3
1970	100.0	100.0	100.0	100.0	100.0	100.0	100.0		100.0	100.0	100.0	100.0
1971	105.1	103.2	115.2	99.6	101.0	104.4	101.7		101.9	101.2	101.4	95.8
1972	109.5	102.0	117.8	100.6	98.5	104.8	101.6		102.9	97.5	102.3	93.1
1973	115.8	109.2	125.3	105.6	110.0	105.4	102.8		101.6	106.2	101.8	96.6
1974	125.7	156.0	176.0	124.5	176.0	122.5	118.5		105.5	155.1	110.5	120.4
1975	137.4	168.0	186.8	152.3	185.6	132.9	123.9		115.7	153.6	114.5	117.7
1976	144.5	173.1	169.8	191.6	187.7	135.7	129.8		128.3	156.5	115.7	116.6
1977	152.9	186.1	169.5	244.5	197.8	143.8	138.6		144.3	167.7	116.6	116.5
1978	164.1	185.1	174.4	251.7	195.6	144.2	139.7		147.7	165.6	116.6	113.3
1979	178.0	215.9	168.5	294.3	249.8	143.4	149.1		158.2	214.2	115.9	141.3
1980	193.9	278.4	160.4	377.6	347.9	156.6	167.0		173.0	275.5	123.1	180.2

SOURCE: Energy prices shown in Table 16 adjusted for general price increase with GNP deflator.

TABLE 21 FRG. The growth of energy prices in 1975 DM, by groups of fuels and electricity, 1950–1980 (index numbers, 1970 = 100).

		Industry sector prices					Household sector prices					Transport prices
Year	GDP deflator	Total energy	Solid fuels	Natural gas	Petroleum products	Elec-tricity	Total energy	Solid fuels	Gas	Petroleum products	Elec-tricity	Regular gasoline
1950	52.3		78.4		152.6	131.5						
1954	60.8		105.1	158.7	174.0	158.7						
1955	62.3		103.2	154.9	172.6	154.5						
1956	63.8		106.7	151.3	170.8	151.3						184.8
1957	66.2		111.6	150.8	175.5	150.8						169.9
1958	68.5		113.6	148.6	159.9	148.6						164.2
1959	69.2		112.1	147.8	152.5	147.8						160.0
1960	71.1		109.0	144.0	151.8	144.8						150.6
1961	74.1		104.6	137.7	136.4	137.7						139.8
1962	77.2		102.2	131.3	140.2	131.3						134.2
1963	79.6		101.6	126.8	134.9	126.8						127.9
1964	81.3	116.5	102.1	124.0	122.5	124.0						125.2
1965	84.7	112.8	102.8	120.8	113.0	120.3						120.0
1966	87.7	109.0	99.2		108.7	117.4						109.9
1967	88.8	111.4	98.1		119.1	116.0	101.9					116.7
1968	90.1	106.1	91.6	113.4	113.7	112.5	106.3					122.9
1969	93.4	100.2	91.2	107.6	103.0	107.0	102.5	93.8	107.5	101.4	106.5	108.4
1970	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1971	107.9	102.7	103.7	94.2	101.5	95.2	97.7	100.7	93.7	102.3	94.9	97.7
1972	114.2	98.7	103.7	95.3	93.4	96.0	96.4	101.1	93.4	89.6	97.5	95.4
1973	120.9	101.2	102.7	91.5	107.4	94.9	106.0	103.6	90.0	139.6	97.3	101.9
1974	129.3	142.5	119.6	95.6	140.6	95.4	115.9	114.3	92.0	170.5	99.2	114.6
1975	130.7	147.4	136.9	132.5	129.8	103.1	118.5	121.0	97.4	151.6	108.3	106.4
1976	144.3	152.3	142.4	143.8	134.0	104.5	122.2	123.7	102.6	161.7	109.4	110.0
1977	147.4	150.3	139.6	149.5	129.7	103.3	121.0	123.9	103.0	157.9	107.9	104.8
1978	153.0	142.4	144.8	149.2	123.9	103.7	120.0	126.0	102.8	149.0	108.5	103.9
1979	158.8	155.2	145.5	139.6	150.1	102.5	138.6	129.8	100.1	255.8	106.9	107.9
1980	166.9	190.1	158.7	171.2	175.6	101.9	145.4	140.0	99.9	279.1	105.7	121.1

SOURCE: Energy prices shown in Table 17 adjusted for general price increase with GDP deflator.

TABLE 22 France. The growth of energy prices in 1975 Fr, by groups of fuels and electricity, 1950–1980 (index numbers, 1970 = 100).

		Industry sector prices					Household sector prices					Transport prices
Year	GDP deflator	Total energy	Solid fuels	Natural gas	Petroleum products	Electricity	Total energy (incl. gasoline)	Solid fuels	Gas	Petroleum products	Electricity	Regular gasoline
1950	38.0											106.3
1951	39.3											129.0
1952	43.7											128.6
1953	45.9	121.6			133.6	134.4						130.5
1954	46.7	119.9			131.9	132.1						128.3
1955	47.4	118.6	104.2		132.9	128.9						126.6
1956	49.6	117.3	100.8		131.9	122.8						121.0
1957	52.6	123.4	101.7		150.2	114.4						129.8
1958	62.2	114.6	97.9	164.0	139.2	102.9						139.2
1959	64.4	122.7	106.8	184.2	141.3	115.8						138.7
1960	65.0	121.5	104.8	182.6	138.9	116.2						142.3
1961	67.2	118.2	104.3	152.5	133.5	114.1						136.3
1962	70.4	112.9	98.3	141.9	126.1	108.3	108.1	105.0	115.9		104.8	128.8
1963	74.6	107.5	94.4	134.3	118.2	107.1	104.8	103.5	107.8		102.9	119.0
1964	77.6	103.2	91.4	137.1	111.3	106.8	102.8	102.3	103.1		103.0	114.4
1965	79.5	100.4	89.7	126.5	107.0	105.9	100.8	100.9	100.5		101.1	110.6
1966	81.9	98.2	87.1	123.6	103.8	103.4	101.3					107.3
1967	84.2	96.9	84.3	119.2	102.4	102.1	101.0					106.5
1968	88.0	97.4	83.1	113.6	103.2	103.5	100.1	97.7	101.4		97.7	101.9
1969	95.1	97.4	80.2	105.2	102.2	102.0	99.7	98.4	99.7		98.4	103.2
1970	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1971	105.9	104.9	118.4	107.2	102.5	98.6	100.8	100.5	100.4		98.9	97.1
1972	112.6	100.7	113.7	112.4	96.6	97.1	97.4	99.6	98.1		96.9	92.1
1973	121.3	96.9	109.0	108.4	92.8	94.0	94.1	97.4	95.2		93.8	89.4
1974	135.3	126.2	143.4	143.8	130.5	98.7	115.9	107.2	102.7		98.2	111.9
1975	152.5	125.6	150.4	143.4	124.7	101.4	111.0	109.0	107.1		94.0	103.5
1976	167.4	125.7	151.1	141.9	123.9	103.4	111.9	110.1	104.4		97.1	103.3
1977	181.9	128.0	148.4	141.7	130.2	102.2	115.0	109.2	102.0		95.7	111.0
1978	200.1	125.6	143.4	148.4	127.8	101.2	113.6	115.4	100.1	179.5	93.8	120.5
1979	220.4	131.6	144.6	145.4	138.0	102.6	119.6	139.8	98.2	207.3	94.9	114.1
1980	246.0	151.6	159.5	192.8	163.6	112.8	134.9	161.0	112.7	272.4	102.2	121.6

SOURCE: Energy prices shown in Table 18 adjusted for general price increases with GDP deflator.

TABLE 23 UK. The growth of energy prices in 1975 £, by groups of fuels and electricity, (index numbers, 1970 = 100).

		Industry sector prices					Household sector prices					Transport
Year	GDP deflator	Total energy	Solid fuels	Natural gas	Petroleum products (heavy fuel oils)	Electricity	Total energy	Solid fuels	Gas	Petroleum products	Electricity	Motor spirit
1955	58.1		105.2	204.5	165.9	129.8						113.4
1956	61.0		115.2	212.1	191.6	131.6	87.4					113.1
1957	63.2		118.5	214.9	191.9	131.8	89.7					109.2
1958	65.4		120.9	217.1	156.3	130.0	90.5					108.0
1959	66.1		119.7	213.6	141.1	123.0	91.1					109.1
1960	66.1		122.2	215.6	134.5	121.0	93.2					110.6
1961	68.3		122.5	212.2	119.8	123.4	96.0					107.5
1962	70.8		122.3	209.0	128.7	121.3	96.9	88.0	115.4		99.6	109.6
1963	72.5	109.8	119.4	204.4	118.8	120.7	100.4	89.4	114.9		103.0	112.3
1964	74.7	108.4	115.9	198.1	107.9	116.5	100.4	88.4	115.8		104.6	113.7
1965	78.5	110.1	110.3	186.2	95.9	115.9	100.1	87.3	111.2		107.3	108.2
1966	82.1	109.6	107.3	180.0	97.0	114.7	101.1	91.7	109.3		106.0	109.1
1967	84.5	108.6	100.7	173.8	109.5	114.2	100.9	92.8	107.1		106.2	105.4
1968	88.2	106.8	93.1	167.3	114.6	111.7	104.1	93.1	109.8		113.4	107.1
1969	93.1	103.4	89.8	139.0	107.4	105.8	101.6	92.8	108.3		107.4	104.3
1970	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1971	109.4	101.1	107.7	66.1	135.9	100.7	100.8	102.7	100.0		101.9	94.1
1972	117.7	114.0	108.8	65.5	142.4	112.7	118.9	124.3	115.3		117.9	91.1
1973	125.8	94.6	104.9	51.7	110.7	90.6	97.2	102.1	92.6	100.2	95.8	88.0
1974	144.1	114.4	97.8	45.6	228.5	98.9	99.4	99.4	84.9		101.9	112.2
1975	184.1	113.1	121.1	51.3	222.6	103.0	103.6	104.5	76.7		115.9	119.5
1976	211.0	140.3	126.1	70.6	224.6	113.3	111.8	111.8	81.0	146.4	125.1	110.9
1977	240.5	150.9	131.8	84.8	249.5	114.3	113.9	114.3	83.2	159.7	125.2	104.3
1978	266.1	144.3	129.7	94.7	212.0	113.9	110.9	114.6	77.4	146.2	124.8	89.7
1979	305.7	147.2	135.1	93.9	232.3	109.9	106.0	116.8	69.7	161.3	117.8	102.6
1980	363.2	163.0	143.2	107.4	273.4	113.7	111.8	125.6	68.6	181.4	126.1	109.3

SOURCE: Energy prices shown in Table 19 adjusted for general price increases with GDP deflator.

TABLE 24 USA, FRG, France, UK. 1980 energy prices for mineral fuels and electricity, purchased by industry (I) and households (HH), (index numbers 1970 = 100).

USA		Current	1975 $
Natural gas	I	732	378
Petroleum prod.	I	675	348
Petroleum prod.	HH	534	276
Gasoline		350	180
Gas	HH	335	173
Solid fuels	I	311	160
Electricity	I	304	157
Electricity	HH	238	123

FRG		Current	1975 DM
Petroleum prod.	HH	466	279.1
Petroleum prod.	I	293	175.6
Natural gas	I	286	171.2
Solid fuels	I	265	158.7
Solid fuels	HH	233	140.0
Gasoline		202	121.1
Electricity	HH	176	105.7
Electricity	I	170	101.9
Gas	HH	167	99.9

France		Current	1975 Fr
Petroleum prod.	HH	670	272.4
Natural gas	I	474	192.8
Petroleum prod.	I	403	163.6
Solid fuels	HH	396	161.0
Solid fuels	I	392	159.5
Gasoline		299	121.6
Electricity	I	278	112.8
Gas	HH	277	112.7
Electricity	HH	251	102.2

UK		Current	1975 £
Petroleum prod.	I	993	273.4
Petroleum prod.	HH	659	181.4
Solid fuels	I	520	143.2
Electricity	HH	458	126.1
Solid fuels	HH	456	143.2
Electricity	I	413	113.7
Gasoline		397	109.3
Natural gas	I	390	107.4
Gas	HH	249	68.6

SOURCE: Summarized from Tables 16–23.

TABLE 25 USA. The growth of GNP, industrial output and energy consumption, 1950–1980.

	GNP (Constant prices)	Industrial output	Energy consumption (Total primary)
	Index numbers, 1970 = 100		
1950	48.7	41.7	50.9
1951	53.1	45.2	55.0
1952	54.6	46.9	54.5
1953	56.5	50.8	56.2
1954	56.1	48.1	54.2
1955	60.3	54.3	59.5
1956	61.3	56.7	62.6
1957	62.3	57.4	62.5
1958	61.7	53.7	61.8
1959	65.2	60.1	64.8
1960	66.6	61.4	66.3
1961	67.9	61.9	67.5
1962	72.3	67.0	70.6
1963	75.2	71.0	73.4
1964	79.2	75.8	76.3
1965	84.2	83.3	79.4
1966	89.8	90.7	84.0
1967	92.2	92.8	86.8
1968	96.9	98.6	92.0
1969	99.5	103.1	96.8
1970	100.0	100.0	100.0
1971	103.4	101.7	101.8
1972	109.2	111.0	106.7
1973	115.6	120.4	111.2
1974	115.0	119.9	108.4
1975	113.7	109.3	105.3
1976	119.8	121.1	111.0
1977	126.4	128.2	113.7
1978	132.4	135.5	116.4
1979	136.6	141.5	117.7
1980	136.4	136.5	113.6
1980	2626.5×10^9 \$[a] (1980 prices)		1799×10^9 toe

[a] US Department of Commerce, 1981 April Survey of Current Business.

SOURCE: GNP and industrial output (Federal Reserve Board Index of Industrial Production Quantities) from 1981 January Economic Report of the President. Energy Consumption see Tables 3 and 29.

TABLE 26 FRG. The growth of GDP, industrial output and energy consumption, 1950–1980.

	GDP (Constant prices)	Industrial output	Energy consumption (Total primary)
	Index numbers, 1970 = 100		
1950	29.3		36.8
1951	32.1		42.4
1952	34.9		45.3
1953	37.5		45.2
1954	39.8		46.6
1955	45.2	40.5	51.9
1956	48.6	43.8	56.9
1957	51.6	46.4	58.2
1958	53.7	47.7	56.1
1959	56.7	51.0	57.6
1960	62.0	57.2	62.8
1961	65.4	60.7	64.0
1962	62.1	63.3	68.6
1963	70.4	68.1	73.9
1964	75.1	73.4	76.3
1965	79.4	78.0	78.6
1966	81.7	78.2	79.2
1967	81.5	76.2	79.2
1968	87.2	83.4	85.7
1969	94.3	94.2	93.5
1970	100.0	100.0	100.0
1971	102.6	101.0	100.8
1972	105.7	105.8	105.2
1973	111.9	112.7	112.3
1974	112.9	110.7	108.6
1975	110.5	104.6	103.2
1976	116.7	112.7	109.9
1977	119.9	116.0	110.5
1978	123.7	118.5	115.5
1979	128.8	124.8	121.2
1980	131.9	124.8	115.9
1980	1479.5×10^9 DM (1980 prices)		255×10^6 toe

SOURCE: GDP (Brutto Inlands Produkt) see Statistische Bundesamt: Wirtschaft und Statistik, April 1981; and Statistisches Jahrbuch 1980 and earlier years. Industrial output represented by index of net production of producing trades (Netto Produktion für das Produzierende Gewerbe) excluding construction, seasonally adjusted in Wirtschaft und Statistik and Statistisches Jahrbuch. Energy consumption, see Tables 3 and 30.

TABLE 27 France. The growth of GDP, industrial output and energy consumption, 1950–1980.

	GDP (Constant prices)	Industrial output	Energy consumption (Total primary)
	Index numbers, 1970 = 100		
1950	37.3		36.7
1951	38.0		42.2
1952	40.2		44.2
1953	41.1		41.2
1954	43.2		44.2
1955	45.6	42.0	45.0
1956	48.4	45.3	50.4
1957	51.2	49.3	53.3
1958	51.9	51.3	52.9
1959	52.6	52.0	53.0
1960	56.9	56.7	54.9
1961	59.9	59.0	56.1
1962	63.9	63.0	58.6
1963	67.6	70.0	65.0
1964	72.1	74.0	69.4
1965	75.4	76.0	73.4
1966	79.6	80.0	75.5
1967	83.6	82.0	80.5
1968	87.7	85.0	83.6
1969	94.5	95.0	90.3
1970	100.0	100.0	100.0
1971	105.1	106.0	103.0
1972	110.7	111.0	109.9
1973	117.6	120.0	117.9
1974	121.6	123.0	118.5
1975	121.9	115.0	110.8
1976	128.1	124.0	117.8
1977	131.3	126.0	120.3
1978	136.7	129.0	124.4
1979	141.5	134.0*P*	131.1
1980	143.1[a]	133.0*P*	129.3
1980	2754.9×10^9 Fr[a] (1980 prices)		192×10^6 toe

P = Preliminary

[a] Personal communication, INSEE Observatoire Economique de Paris, June 1981.

SOURCE: GDP represents the Gross Domestic Product (Produit Interieure Brut, PIBE) compiled by INSEE. 1980 data, personal communication of the INSEE Observatoire Economique de Paris, 23 June 1981. For the index numbers in constant prices, see Table 2. Industrial output represents the general index of industrial production, excluding construction. Preliminary data 1979 and 1980 are from INSEE Bulletin Mensuel de Statistique, April 1981, backdated with Annuaire Statistique de la France 1980 and earlier issues.

Energy consumption, see Tables 3 and 31.

TABLE 28 UK. The growth of GDP, industrial output and energy consumption 1950–1980.

	GDP (Constant prices)	Industrial output	Primary energy consumption Gross inland	Energy use only
	Index numbers, 1970 = 100			
1950	58.3			67.7
1951	59.9			70.0
1952	59.5			69.9
1953	62.2			71.0
1954	64.5			74.1
1955	66.3	67.2		75.4
1956	67.6	67.2		76.6
1957	68.7	68.0		74.5
1958	69.8	67.2		75.0
1959	72.1	70.4		74.3
1960	75.8	76.0		80.0
1961	77.9	76.0		80.1
1962	79.0	77.0		82.7
1963	82.2	80.0		85.9
1964	86.8	86.0		86.5
1965	88.8	89.0		90.1
1966	90.6	91.0		89.1
1967	92.7	92.0	90.5	89.8
1968	95.9	97.0	94.0	93.2
1969	97.6	100.0	97.5	96.7
1970	100.0	100.0	100.0	100.0
1971	101.7	100.0	98.4	98.3
1972	103.8	102.0	100.6	100.4
1973	113.0	111.0	105.5	105.0
1974	111.5	108.0	101.1	100.2
1975	110.6	102.0	96.4	96.5
1976	115.2	104.8	98.1	98.0
1977	116.4	109.8	100.3	100.5
1978	120.6	113.1	100.6	100.9
1979	121.7	117.3	105.2	105.7
1980	120.0	109.1	96.3	97.2
1980	223.04×10^9 £ (1980 prices)		201×10^6 toe	193.5×10^6 toe

SOURCE: GDP represents the GDP at market prices; 1980 at 1980 prices from CSO Monthly Digest of Statistics (30), April 1981. For the index numbers in constant prices, see Table 2. Industrial output represented by index of industrial production all industries other than construction, 1975–1980 see CSO Monthly Digest of Statistics, April 1981; for backdating see UN The Growth of World Industry, Vol. I, 1973 and 1975 editions, and OECD Main Economic Indicators, January 1980 and earlier issues. Energy consumption, see Table 3 and 32.

TABLE 29 USA. The growth of energy consumption, by groups of fuels, gasoline, and electricity, 1950–1980.

	Primary energy					
	Total energy consumption	Solid fuels	Natural gas	Petroleum	Gasoline	Electricity (Total generation)
	Index numbers, 1970 = 100					
1950	50.9	101.7	26.0	46.3	45.2	20.7
1951	55.0	104.1	33.0	51.0	49.0	26.5
1952	54.5	93.3	35.4	52.6	51.8	28.3
1953	56.2	93.8	37.3	55.0	54.8	31.4
1954	54.2	80.5	38.9	55.0	56.1	33.3
1955	59.5	92.2	42.4	59.4	60.4	38.5
1956	62.6	94.0	44.9	63.6	63.0	41.9
1957	62.5	89.5	47.4	63.3	64.0	43.8
1958	61.8	79.4	49.8	63.6	65.9	44.3
1959	64.8	79.1	54.3	67.1	68.1	48.7
1960	66.3	79.9	57.6	68.0	69.4	51.5
1961	67.5	78.1	60.0	69.3	69.8	53.7
1962	70.6	80.2	64.1	72.0	72.4	57.7
1963	73.4	84.2	67.3	74.2	75.0	61.6
1964	76.3	88.7	71.1	75.8	77.7	66.1
1965	79.4	93.6	73.1	78.7	80.6	70.6
1966	84.0	98.6	78.8	82.7	86.7	76.2
1967	86.8	96.3	82.7	85.8	86.4	80.3
1968	92.0	99.6	88.8	91.5	91.7	87.6
1969	96.8	100.3	95.5	96.3	95.9	94.7
1970	100.0	100.0	100.0	100.0	100.0	100.0
1971	101.8	94.8	102.0	103.5	103.8	104.8
1972	106.7	98.1	103.0	111.6	110.3	113.1
1973	111.2	104.7	102.2	117.9	114.3	119.8
1974	108.4	101.9	98.7	113.3	112.0	120.2
1975	105.3	101.4	90.6	110.8	114.3	123.5
1976	111.0	108.2	92.4	119.1	119.3	131.2
1977	113.7	110.0	90.5	125.7	122.9	136.8
1978	116.4	109.0	90.8	128.5	126.9	142.1
1979	117.7	119.0	93.8	125.7	120.5	144.7
1980	113.7	123.4	92.8	116.0	112.8	147.2
	10^6 toe				10^6 tons	10^9 kWhr
1980	1799[a]	370	482	808	282.7[b]	2286

[a] Includes 64×10^6 toe nuclear and 75×10^6 toe other energy.

[b] Converted from 6583×10^3 barrels per *day* to metric tons per *year* on the basis of 1 metric ton = 8.50 barrels of gasoline.

SOURCE: *Primary energy*, see domestic energy consumption by primary energy type 1973–1980, in, DOE Monthly Energy Review March 1981; for backdating to 1950, see Bureau of Mines tables on total calculated consumption contributed by each mineral energy fuel and electrical energy from water and nuclear power, published in US Statistical Abstract.

Gasoline, see Motor Gasoline total product supplied 1973–1980 in DOE Monthly Energy Review, March 1981; for backdating to 1950 see Domestic Product Demand for Gasoline from the US Survey of Current Business, Biennial supplements.

Electricity represents total generation by utilities and industry from all sources; 1950–1972 from US Statistical Abstract 1978 and Historical Statistics of the United States Colonial Times to 1970, Vol. II. 1973–1980, see net electricity production from DOE Monthly Energy Review, March 1981.

TABLE 30 FRG. The growth of energy consumption, by groups of fuels, gasoline, and electricity, 1950–1980.

	Primary energy					
	Total energy	Solid fuels	Natural gas	Petroleum	Gasoline	Electricity (Total generation)
	Index numbers, 1970 = 100					
1950	36.8	92.3		2.7	6.3	18.8
1951	42.4	105.8		2.1	9.4	22.0
1952	45.3	112.7		3.1	9.4	24.0
1953	45.2	110.9		5.2	11.3	25.6
1954	46.6	111.7		7.4	14.5	28.8
1955	51.9	122.2		9.5	17.0	32.0
1956	56.9	132.1		11.9	18.9	35.6
1957	58.2	130.3	3.3	12.1	21.4	38.0
1958	56.1	120.5	3.3	15.7	24.5	41.2
1959	57.6	117.7	3.8	19.8	29.6	44.4
1960	62.8	123.7	4.9	24.8	35.8	49.2
1961	64.0	119.9	5.5	30.0	38.4	52.8
1962	68.6	122.4	7.1	37.3	43.4	56.4
1963	73.9	125.0	9.3	45.1	49.7	61.2
1964	76.3	121.4	13.7	52.2	56.6	66.4
1965	78.6	113.3	19.0	60.4	63.5	70.8
1966	79.2	102.4	23.6	68.2	73.6	74.0
1967	79.2	97.3	30.6	71.1	77.4	76.4
1968	85.7	99.5	50.3	79.6	83.0	84.0
1969	93.5	103.3	71.6	89.7	89.9	92.8
1970	100.0	100.0	100.0	100.0	100.0	100.0
1971	100.8	93.9	131.1	103.8	110.7	106.4
1972	105.2	89.8	167.2	109.8	117.0	114.8
1973	112.3	92.1	210.9	116.8	119.5	119.6
1974	108.6	92.5	254.1	105.3	116.4	124.8
1975	103.2	79.2	268.1	101.1	127.0	120.8
1976	109.9	85.0	284.2	109.5	132.7	133.6
1977	110.5	80.1	303.3	108.4	140.2	134.1
1978	115.5	82.5	330.1	113.6	147.7	141.4
1979	121.2	89.4	360.7	115.6	149.4	148.9
1980	115.9	91.4	351.4	103.7	152.1	147.5
	10^6 toe				10^6 tons	10^9 kWhr
1980	255[a]	76[b]	42	121	24.187	368.7

[a] includes 9.1×10^6 toe nuclear and 6.5×10^6 toe other energy.

[b] includes 50.4×10^6 toe hard coal and 25.6×10^6 toe brown coal.

SOURCE: *Primary energy* 1950–1980 from Gesamtverband des Deutschen Steinkohlenbergbaus, forthcoming publication.

Gasoline consumption 1970–1980 represents inland deliveries from the EUROSTAT Monthly Bulletin of Hydrocarbons, April 1981 and earlier issues. The figues agree with the data on gasoline production plus imports minus exports compiled from the UN World Energy Supplies 1973–1978 and earlier issues. The UN source was used for backdating.

Electricity consumption represents total generation; data for 1970–1980 from EUROSTAT Electrical Energy, Monthly Bulletin, May 1981 and earlier issues. Backdated to 1950 with total generation from all sources compiled from UN World Energy Supplies 1950–1974.

TABLE 31 France. The growth of energy consumption, by groups of fuels, gasoline, and electricity, 1950–1980.

	Primary energy					
	Total energy consumption	Solid fuels	Natural gas	Petroleum	Gasoline	Electricity (Total generation)
	Index numbers, 1970 = 100					
1950	36.7	123.9	1.9	11.6	20.4	23.6
1951	42.2	129.2	2.9	14.4	22.8	27.1
1952	44.2	133.8	2.9	15.3	25.8	29.3
1953	41.2	120.7	1.9	16.0	28.4	29.3
1954	44.2	124.8	2.9	18.5	30.7	32.1
1955	45.0	121.8	2.9	19.7	34.4	35.7
1956	50.4	140.0	2.9	22.7	36.5	38.6
1957	53.3	147.2	3.8	24.4	35.6	41.4
1958	52.9	140.2	6.7	26.4	39.3	44.3
1959	53.0	133.8	15.4	27.2	41.1	46.4
1960	54.9	130.5	26.9	28.9	44.1	51.4
1961	56.1	126.1	38.5	32.0	48.3	55.0
1962	58.6	126.1	45.2	36.0	51.8	58.6
1963	65.0	129.4	47.1	45.0	56.4	63.6
1964	69.4	133.4	49.0	50.1	62.6	68.6
1965	73.4	126.4	50.1	56.3	68.1	72.9
1966	75.5	122.0	53.8	59.9	73.9	77.9
1967	80.5	116.7	60.6	68.2	80.5	81.4
1968	83.6	106.2	73.1	75.7	87.0	85.0
1969	90.3	102.2	87.4	85.6	92.4	93.6
1970	100.0	100.0	100.0	100.0	100.0	100.0
1971	103.0	91.6	117.2	108.4	106.4	105.9
1972	109.9	81.6	138.7	121.9	116.0	117.9
1973	117.9	80.1	161.3	133.2	126.4	130.0
1974	118.5	82.9	172.0	128.8	121.6	134.3
1975	110.8	72.2	188.2	116.5	127.2	132.1
1976	117.8	84.8	202.2	124.7	134.4	145.0
1977	120.3	82.4	216.1	120.5	136.1	150.6
1978	124.4	85.0	223.7	124.6	141.0	161.9
1979	131.1	91.9	251.6	124.5	141.9	172.4
1980	129.3	89.2	253.8	117.0	142.2	184.1
	10^6 toe				10^6 tons	10^9 kWhr
1980	192[a]	34	24	102	17.777	257.8

[a] includes 12.9 × 10^6 toe nuclear, 16.0 × 10^6 toe hydroelectricity, 3.2 × 10^6 toe new energies.
SOURCE:
Primary energy, 1950–1969 based on supply compiled from production plus imports minus exports in UN World Energy Supplies 1950–1974, Table 2. 1970–1977 see "Consommation totale d'energie primaire corrigé", bilan général in Comité Professionnel du Pétrole (1978–1980), and Ministère de l'Industrie, Lettre 101 No. 152 of 11 May 1981.
Gasoline consumption 1970–1980 represents motor spirit, inland deliveries from EUROSTAT, Hydrocarbons Monthly Bulletin, April 1981 and earlier issues; backdated to 1950 with United Nations World Energy Supplies 1950–1974.
Electricity consumption represents total generation; data for 1970–1980 from EUROSTAT, Electricial Energy, Monthly Bulletin May 1981, and earlier issues. Backdated to 1950 with total generation from all sources compiled from UN World Energy Supplies, 1950–1974.

TABLE 32 UK. The growth of energy consumption, by groups of fuels, gasoline, and electricity, 1950–1980.

	Primary energy						
	Gross inland consumption	Consumption for energy use only[a]					Electricity (total generation)
		Total	Solid fuels	Natural gas	Petroleum	Gasoline	
	Index numbers, 1970 = 100						
1950		67.7	130.2		15.3	38.0	26.4
1951		70.0	133.5		17.2	42.3	29.2
1952		69.9	132.2		17.9	42.3	30.0
1953		71.0	133.1		19.5	44.4	31.6
1954		74.1	137.5		21.6	44.4	34.4
1955		75.4	138.2		24.0	48.6	37.6
1956		76.6	138.6		26.1	47.2	40.4
1957		74.5	134.4		25.5	45.8	42.4
1958		75.0	128.6	0.6	32.7	47.9	45.2
1959		74.3	120.8	0.6	38.9	58.5	48.4
1960		80.0	126.2	0.6	45.4	59.2	54.8
1961		80.1	123.2	0.6	48.9	62.7	58.4
1962		82.7	123.6	0.6	53.9	61.3	64.4
1963		85.9	125.5	1.1	58.6	64.8	69.6
1964		86.5	120.8	2.2	64.1	73.9	73.2
1965		90.1	119.5	7.3	70.8	79.6	78.8
1966		89.1	112.7	6.7	76.5	81.0	81.2
1967	90.5	89.8	105.7	11.7	81.7	88.7	84.0
1968	94.0	93.2	106.6	26.8	86.3	91.4	89.8
1969	97.5	96.7	104.6	52.5	93.1	94.4	96.0
1970	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1971	98.4	98.3	88.8	160.9	100.8	105.1	102.8
1972	100.6	100.4	78.0	228.5	108.1	111.7	105.8
1973	105.5	105.0	84.8	246.3	109.4	118.9	112.8
1974	101.1	100.2	75.1	295.5	101.7	115.8	109.2
1975	96.4	96.5	79.0	309.5	91.0	113.3	108.8
1976	98.1	98.0	79.8	328.5	89.5	118.6	110.8
1977	100.3	100.5	78.2	350.8	91.1	122.1	113.2
1978	100.6	100.9	76.4	363.7	92.9	129.2	115.1
1979	105.2	105.7	82.6	398.3	92.7	131.6	120.0
1980	96.3	97.7	77.5	394.4	80.9	134.6	114.0
	10^6 toe					10^6 tons	10^9 kWhr
1980	200.7	193.5	71.5	41.6	71.4	19.1	285.0

[a] excludes feedstocks for petrochemical plants and industrial and white spirit, bitumen, and wax.
[b] includes 7.8×10^6 toe nuclear and 1.2×10^6 toe hydroelectricity.

SOURCE:

Primary energy. Gross inland consumption: 1967–1979 from UK Department of Energy: Digest of UK Energy Statistics 1980, Table 5 and earlier issues, updated to 1980 with Energy Trends April 1981. Consumption for energy use only: not temperature corrected, 1950–1978 from Economic Trends, annual supplement 1980, Table 81 updated to 1980 with Energy Trends, April 1981.

Gasoline. 1950–1967 gasoline consumption compiled from production plus imports minus exports, in UN World Energy Supplies 1950–1974, Table 21. 1968–1980 see motor spirit, inland deliveries in Digest of UK Energy Statistics, Table 53, p. 84 and EUROSTAT Hydrocarbons Monthly Bulletin, April 1981.

Electricity consumption represents total generation; data for 1970–1980 from EUROSTAT, Electrical Energy, Monthly Bulletin, May 1981 and earlier issues. Backdated to 1950 with total generation from all sources compiled from UN World Energy Supplies, 1950–1974.

TABLE 33 USA, FRG, France, UK. The growth of solid fuels consumption by industry and households, 1950–1980.

	USA		FRG		France		UK	
	Industry	Households[a]	Industry	Households[b]	Industry	Households[c]	Industry	Households
	Index numbers, 1970 = 100							
1950	119.8	687.5	143.0[d]					
1955	115.0	412.5	195.2[d]					
1960	93.6	231.3	186.5[d]					
1965	107.5	162.5	139.1[d]					
1970	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1971			82.1	71.6	86.9	82.9	83.0	86.0
1972	86.1	93.8	73.4	61.5	82.8	75.9	69.4	75.6
1973	86.6	63.8	79.7	57.8	84.2	70.1	72.9	74.5
1974	80.8	64.2	94.7	55.5	90.5	74.4	64.9	70.9
1975	75.7	52.4	75.4	41.7	69.7	57.3	57.0	60.9
1976	75.5	49.8	77.8	36.7	69.7	55.5	58.4	56.2
1977	69.5	49.3	74.9	32.1	67.0	53.0	55.2	57.1
1978	68.9	54.8	74.4	29.4	64.3	50.4	51.9	52.3
1979	72.5	46.1	83.1	33.9	69.7	46.4	56.5	53.4
1980	66.9	42.7	90.3	32.6	71.8	38.8	37.6	46.4
	10^6 toe							
1980	78	4	13.0	7.4	10.6	3.0	8.5	8.9

SOURCE: See Tables 5–8.

[a] includes commerce.

[b] includes agriculture and small-scale users.

[c] includes services.

[d] extrapolated.

TABLE 34 USA, FRG, France, UK. The growth of petroleum products consumption by industry and households, 1950–1980.

	USA		FRG		France		UK	
	Industry	Households[a]	Industry	Households[b]	Industry	Households[c]	Industry	Households
	Index numbers, 1970 = 100							
1950	46.0	46.6	0.6[d]					
1955	59.0	61.3	2.3[d]					
1960	67.0	75.6	10.3[d]					
1965	77.0	86.7	25.9[d]					
1970	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1971			99.4	107.5	89.9	128.7	99.1	99.0
1972	110.5	103.6	102.8	114.2	97.5	138.9	101.0	114.1
1973	118.8	103.6	104.5	123.0	102.2	150.5	101.0	124.9
1974	115.7	94.4	91.2	106.8	114.6	139.3	87.9	111.0
1975	109.5	89.0	80.8	108.6	90.2	123.7	78.0	107.4
1976	130.7	96.9	84.2	119.2	91.6	130.8	77.4	107.5
1977	136.7	95.9	79.1	114.2	91.9	131.8	77.4	108.6
1978	139.4	96.3	78.8	122.4	96.6	131.8	76.0	107.3
1979	167.2	77.3	75.4	123.5	94.5	128.2	76.0	105.2
1980	158.5	67.2	63.6	103.5	88.2	97.7	60.1	81.9
	10^6 toe							
1980	209	103	14.7	37.1	20.9	23.9	15.9	6.3

SOURCE: See Tables 5–8.

[a] includes commerce.

[b] includes agriculture and small-scale users.

[c] includes services.

[d] extrapolated.

TABLE 35 USA, FRG, France, UK. The growth of gas* consumption by industry and households, 1950–1980.

	USA		FRG		France		UK	
	Industry	Households[a]	Industry	Households[b]	Industry	Households[c]	Industry	Households
	Index numbers, 1970 = 100							
1950	34.1	23.0	34.0[d]					
1955	45.1	39.9	59.8[d]					
1960	57.5	59.8	69.6[d]					
1965	75.5	77.5	64.9[d]					
1970	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1971			105.7	116.9	114.3	115.5	290.4	226.8
1972	104.2	107.5	112.4	153.8	110.7	137.9	454.9	365.6
1973	105.9	108.5	125.8	181.5	128.6	158.6	603.4	514.4
1974	102.0	107.0	131.4	195.4	141.7	165.5	688.9	693.0
1975	86.9	107.8	118.6	206.2	140.5	179.3	702.3	860.6
1976	89.3	111.9	127.8	244.6	166.7	201.7	796.1	964.8
1977	88.0	106.1	135.1	261.5	175.0	232.8	835.4	1044.0
1978	86.9	108.5	136.1	284.6	191.7	244.8	847.0	1155.0
1979	87.0	112.3	145.4	312.3	213.0	268.3	875.8	1308.6
1980	86.2	108.6	139.7	330.8	207.6	289.1	853.5	1342.9
	10^6 toe							
1980	199	180	17.7	14.1	11.7	11.1	14.3	22.1

[a] includes commerce.
[b] includes agriculture and small-scale users.
[c] includes services.
[d] extrapolated.
SOURCE: See Table 5–8.
*Natural gas consumption for industry, manufactured and natural gas consumption for households.

TABLE 36 USA, FRG, France, UK. The growth of electricity sales to industry and households, 1950–1980.

	USA		FRG		France			UK	
	Industry	Households	Industry	Households	Industry	Households	Households services[c]	Industry	Households
	Index numbers, 1970 = 100								
1950	24.8[a]	15.6[a]	20.1[b]	11.3[b]					
1955	45.0[a]	27.9[a]	38.1[b]	19.6[b]					
1960	60.2	43.8	58.9	30.1	55.0	35.3		66.0	43.6
1965	75.6	62.7	77.3	55.4	76.6	59.3		83.4	74.1
1970	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1971			102.5	112.7	102.9	110.5	110.4	100.3	104.5
1972			107.5	129.2	107.2	120.9	124.0	100.2	112.5
1973	119.7	129.2	117.0	139.6	114.5	142.6	139.6	109.7	119.1
1974	119.5	129.0	120.0	148.2	119.2	155.8	150.0	104.2	119.8
1975	117.8	130.4	110.2	157.4	110.2	180.4	167.7	102.2	115.2
1976	129.1	134.6	119.5	168.3	119.3	202.6	186.5	108.7	109.8
1977	134.7	143.1	119.8	174.5	120.2	224.3	202.1	109.6	111.3
1978	140.7	149.8	123.7	187.2	124.2	254.2	226.0	111.3	111.1
1979	146.9	152.5	130.7	193.0	133.4	274.5	234.4	115.0	116.1
1980	142.2	160.0	129.9	198.1	140.9	290.1	245.8	107.2	111.5
	10^9 kWhr								
1980	815	717	165.6	85.4	113.0	61.5	70.8	98.4	86.1

[a] extrapolated with energy sales to industry and residential or domestic customers, from US Statistical Abstract 1979, p. 613, Table 1034.
[b] extrapolated with final energy consumption by industry and households, including small-scale users; source see Table 6.
[c] electricity consumption from final energy consumption by industry and households, including services; source, see Table 7.
SOURCE:
US DOE Monthly Energy Review, June 1981, Table 63.
FRG, France, UK Electricity availabilities on the internal market to industry and households, 1975–1980 see EUROSTAT Electric Energy Monthly Bulletin, June 1977; 1980; 1981.
Backdated to 1950 with EUROSTAT, Energy Statistics, 1975.

TABLE 37 USA, FRG, France UK. Crude steel production, 1970–1980 (10^6 metric tons).

	USA	FRG	France	UK
1970	119.3	44.9	23.8	28.3
1971	109.3	40.3	22.9	24.2
1972	120.9	43.7	24.0	25.3
1973	136.8	49.5	25.3	26.6
1974	132.2	53.2	27.0	22.4
1975	105.8	40.4	21.5	20.1
1976	116.1	42.4	23.2	22.3
1977	113.2	39.0	22.1	21.7
1978	123.9	41.3	22.8	20.3
1979	124.3	46.0	23.4	21.5
1980	100.8	43.8	23.2	11.3

SOURCE: UN 1981 May Monthly Bulletin of Statistics, New York 1981.

TABLE 38 FRG. Total primary energy consumption, 1950–1980, by sources of compilation.

	Steinkohlenbergbau Gesamtverband 10^6 tce	UN (Aggregate consumption) 10^6 tce	UN (Supply) 10^6 tce	Steinkohlenbergbau Gesamtverband Index numbers, 1970 = 100	UN (Aggregate consumption) 10^6 tce	UN (Supply) 10^6 tce
1950	135.5	124.4	127.8		37.9	36.8
1951	149.8	143.6	147.3		43.7	42.4
1952	158.2	152.7	157.1		46.5	45.3
1953	155.5	149.2	157.0		45.4	45.2
1954	167.2	159.4	161.7		48.4	46.6
1955	183.4	177.8	180.2		54.1	51.9
1956	195.2	192.1	197.6		58.4	56.9
1957	196.1	194.0	200.4	58.2	59.0	57.7
1958	190.7	186.1	203.5	56.1	56.6	58.6
1959	194.0	185.3	206.6	57.6	56.4	59.5
1960	211.5	204.8	206.6	62.8	62.3	59.5
1961	215.7	207.3	215.4	64.0	63.1	62.1
1962	231.3	223.9	230.0	68.6	68.1	66.3
1963	248.9	243.0	267.6	73.9	73.9	77.1
1964	257.1	252.4	268.3	76.3	76.8	77.3
1965	264.6	258.4	276.9	78.6	78.6	79.8
1966	266.7	258.8	279.2	79.2	78.7	80.4
1967	266.8	259.1	269.8	79.2	78.8	77.7
1968	288.5	278.9	290.2	85.7	84.8	83.6
1969	315.0	305.1	316.2	93.5	92.8	91.1
1970	336.8	328.7	347.1	100.0	100.0	100.0
1971	339.4	333.8	359.0	100.8	101.6	103.4
1972	354.3	336.8	364.5	105.2	102.5	105.0
1973	378.5	361.2	382.0	112.3	109.9	110.1
1974	365.9	353.5	364.3	108.6	107.5	105.0
1975	347.7	334.4	360.1	103.2	101.7	103.7
1976	370.3	363.7	382.8	109.9	110.6	110.3
1977	372.3	355.1	377.6	110.5	108.0	108.8
1978	389.0	368.8	382.7	115.5	112.2	110.3
1979	408.2			121.2		
1980	390.2			115.9		

SOURCE:

Aggregate consumption see UN World Energy Supplies, 1973–1978, Table 4, col. 9; and earlier issues.

Supply compiled as production plus imports minus exports from UN World Energy Supplies, 1973–1978, Table 4, col. 1, 6, 7.

TABLE 39 FRG. Energy price indices in the industry sector by sources of compilation, 1970–1980 (1970 = 100).

	Basic materials			Producer prices	
	Coal and Petroleum products +	Electricity gas, water =	Combined coal, oil, electricity, gas, (incl. water)	Petroleum products	Fuel oil
1970	100.0	100.0	100.0	100.0	100.0
1971	113.6	103.7	110.8	109.5	131.1
1972	113.4	110.9	112.7	106.7	107.9
1973	125.3	115.5	122.4	129.8	115.2
1974	209.2	124.1	184.3	181.8	229.4
1975	231.2	144.8	205.9	181.4	228.3
1976	247.9	154.7	220.6	193.4	248.2
1977	248.4	157.0	221.6	192.0	251.4
1978	241.0	161.8	217.8	189.5	237.8
1979	279.8	166.0	246.5	238.3	370.1
1980	372.7	183.5	317.3	293.0	465.9
1981:					
Jan.	431.8	208.1	366.3	324.9	540.6
Feb.	445.4	209.7	376.4	333.6	561.9
March	456.1	210.2	384.0	350.4	601.1

SOURCE:
Basic materials indices. Coal and petroleum products and electricity, gas, water see Statistisches Bundesamt, Index der Grundstoffpreise, Fachserie 17, Reihe 3; and Wirtschaft und Statistik.
The two indices were combined by using 1970 weights:
Coal and petroleum products: 105.18
Electricity, gas, water: 43.53
Producer prices for petroleum products and fuel oil, see Statistisches Bundesamt, Preise und Preisindizes für Industrielle Produkte (Erzeugerpreise) Fachserie 17, Reihe 2.

TABLE 40 France. Petroleum consumption, total and for nonenergy use, 1970–1980.

	Petroleum consumption (Primary energy basis)	
	Total, excluding nonenergy 10^6 toe	Nonenergy products 10^6 toe
1970	49.72	7.50
1971	87.34	7.78
1973	106.40	10.07
1974	116.35	9.87
1975	112.43	8.52
1976	101.70	9.84
1977	108.86	10.08
1978	108.80*R*	10.29
1979	108.70	
1980	102.10	8.90

R = Revised.
SOURCE: Compiled from Comité Professionnel du Pétrole (1978–1979), and Ministère de l'Industrie, Lettre 101, No. 152, Paris 12, May 1981.

TABLE 41 UK. Total primary energy consumption 1968–1980, by sources of compilation.

	UK Department of Energy (*1*): Inland energy consumption (Primary energy basis)		UN (*2*) Aggregate consumption commercial energy (10^6 tce)	UN (*3*) supply (10^6 tce)
	Total gross inland (10^6 tce)	Energy use only[a] (10^6 tce)		
1968	329.0	313.7	284.0	300.9
1969	342.2	325.5	297.9	303.7
1970	353.7	336.7	304.2	313.2
1971	348.0	331.0	303.6	340.5
1972	356.0	338.0	299.4	323.2
1973	373.3	353.5	303.2	323.6
1974	357.7	337.5	290.2	312.4
1975	341.1	324.8	278.5	299.7
1976	347.0	329.8	279.3	301.6
1977	354.9	338.4	285.0	300.2
1978	355.8	339.8	290.9	311.4
1979	372.1	355.9		
1980	340.5	328.9		
	10^6 toe	10^6 toe		
1980	200.7	193.5		

[a] excludes feedstocks for petrochemical plants and industrial and white spirits, bitumen, and wax.

SOURCE:

(*1*) *Inland consumption* representing production, plus net trade, bunkers and stock movements. Compiled from Digest of UK Energy Statistics 1980 updated with UK Energy Trends April 1981.

(*2*) *Aggregate consumption*, see UN World Energy Supplies 1973–1978 Table 4, col. 9; and earlier issues.

(*3*) *Supply*, see production, imports, and exports in UN World Energy Supplies 1973–1978, Table 4, col. 1, 6, 7, and earlier issues.

TABLE 42 UK. Price indices for energy used by the industry sector by sources of compilation, 1970–1980 (1970 = 100).

	UK Department of Energy	UK Department of Industry	
	Industry sector prices	Wholesale prices	
		Broad sectors of industry	Manufacturing industries
	Total fuel (*1*)	Fuel (*2*)	Input, fuel (*3*)
	(includes coal; heavy fuel oil; gas; electricity)	(includes coal and petroleum products.; may exclude electricity)	(includes coal, gas, electricity; excludes petroleum products)
1976	296	250.2	227.2
1977	363	304.1	264.7
1978	384	320.6	292.7
1979	450		328.9
1980	592		

SOURCE:
(*1*) UK Department of Energy. Energy Trends May 1980.
(*2*) CSO Annual Abstract of Statistics 1979 Edition, Table 18.2, p. 463; updated.
(*3*) UK Digest of Energy Statistics 1978, Table 91, p. 125; updated.

TABLE 43 USA. Electricity generation, concepts and sources, 1970–1980 (10^9 kWhr).

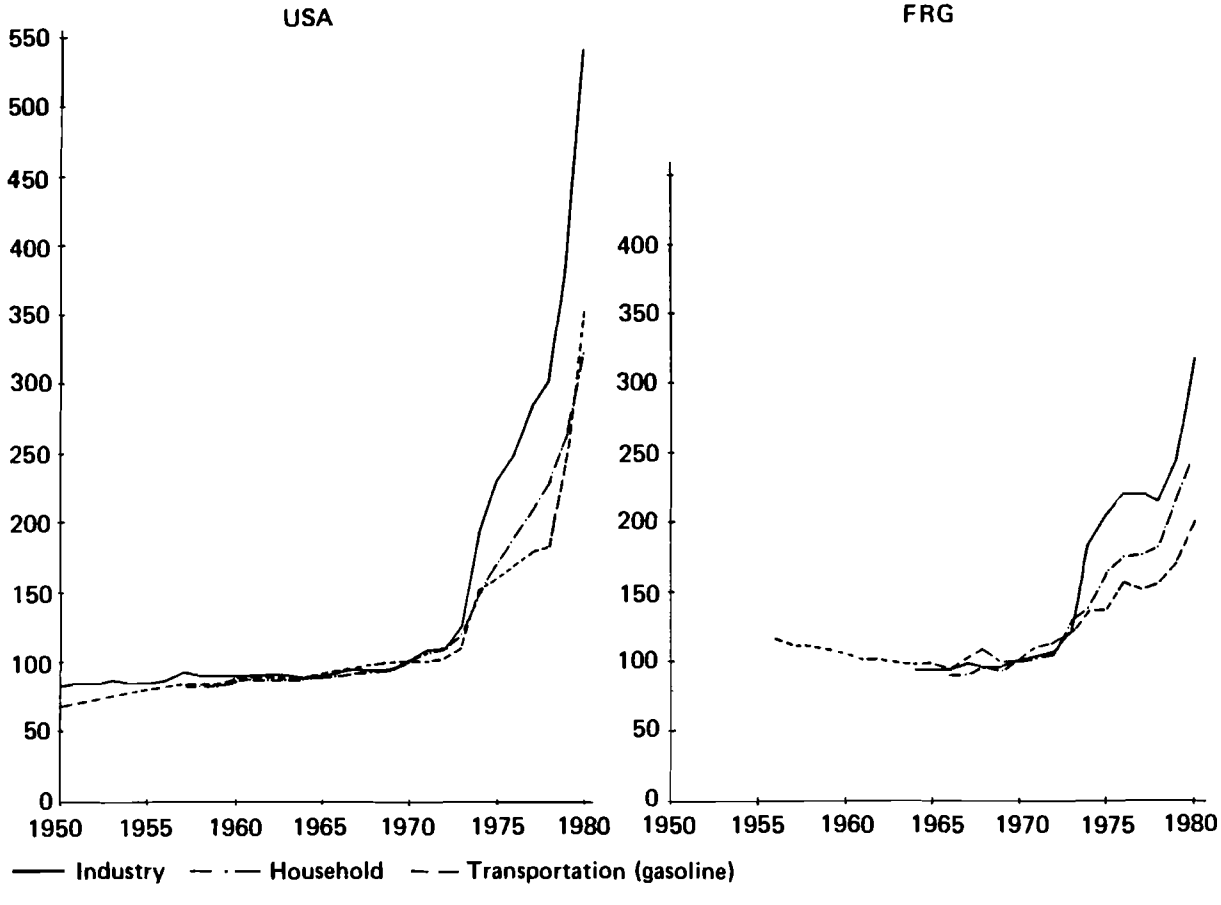
	Production of electric energy (utility and industry)		Total generation (public utilities and industry)	Net electricity production (utility and industry)	Electric utilities (total production)	Electricity sales to ultimate consumers (residential, commercial, industrial and others)	
	Historical statistics Vol. II	US Statistical Abstract	UN World Energy Supplies	DOE Monthly Energy Review	Survey of Current Business	DOE Monthly Energy Review	Survey of Current Business
1970	1,639.8	1,636	1,640				
1973		1,965	1,965	1,861		1,713	
1974		1,968	1,967	1,867		1,706	
1975		2,003	2,003	1,918		1,730	
1976		2,125	2,123	2,038		1,836	
1977		2,212	2,211	2,124	2,124	1,929	1,951
1978		2,286	2,328	2,207	2,204	2,005	2,018
1979				2,247	2,247	2,071	2,079
1980				2,286		2,094	

TABLE 44 USA. Electricity sales to all ultimate consumers, 1973–1980 (10^9 kWhr).

	Total	Industry	Residential	Commercial	Others (incl. street lighting, transportation)
1973	1713	686	579	388	60
1974	1706	685	578	385	58
1975	1730	675	585	402	68
1976	1836	740	603	424	69
1977	1929	722	641	445	71
1978	2005	801	671	460	73
1979	2071	842	683	473	73
1980	2094	815	717	488	74

SOURCE: DOE Monthly Energy Review March 1981, p. 63.

PART III FIGURES


USA
FRG
550
500
450
400
350
300
250
200
150
100
50
0
1950
1955
1960
1965
1970
1975
1980
Industry
Household
Transportation (gasoline)

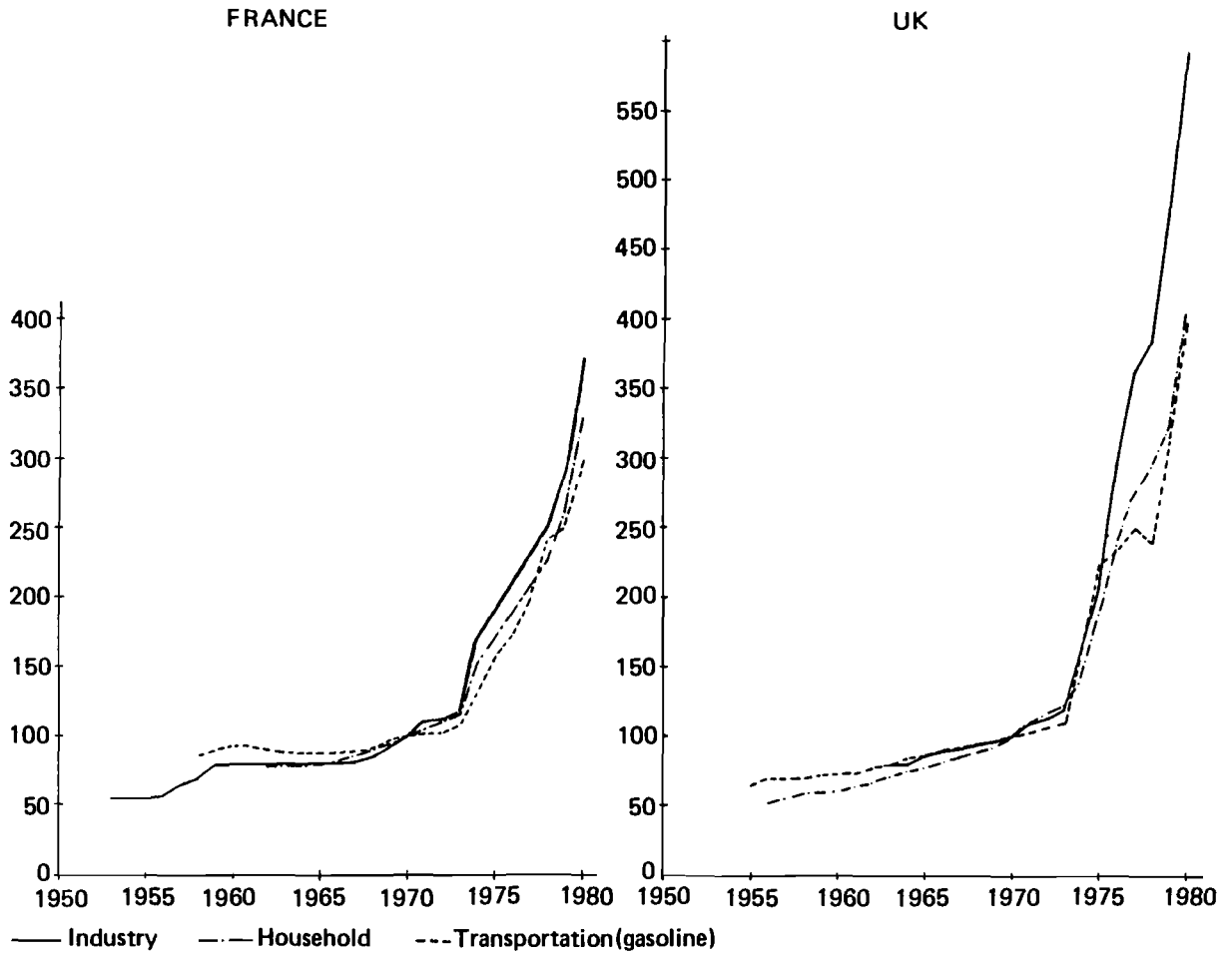


FIGURE 1 The growth of current energy prices for industry, households, transportation (gasoline), 1950–1980 (index numbers, 1970 = 100).

USA
FRG
150
100
50
0
1950
1955
1960
1965
1970
1975
1980
Energy consumption
Industrial output
GDP

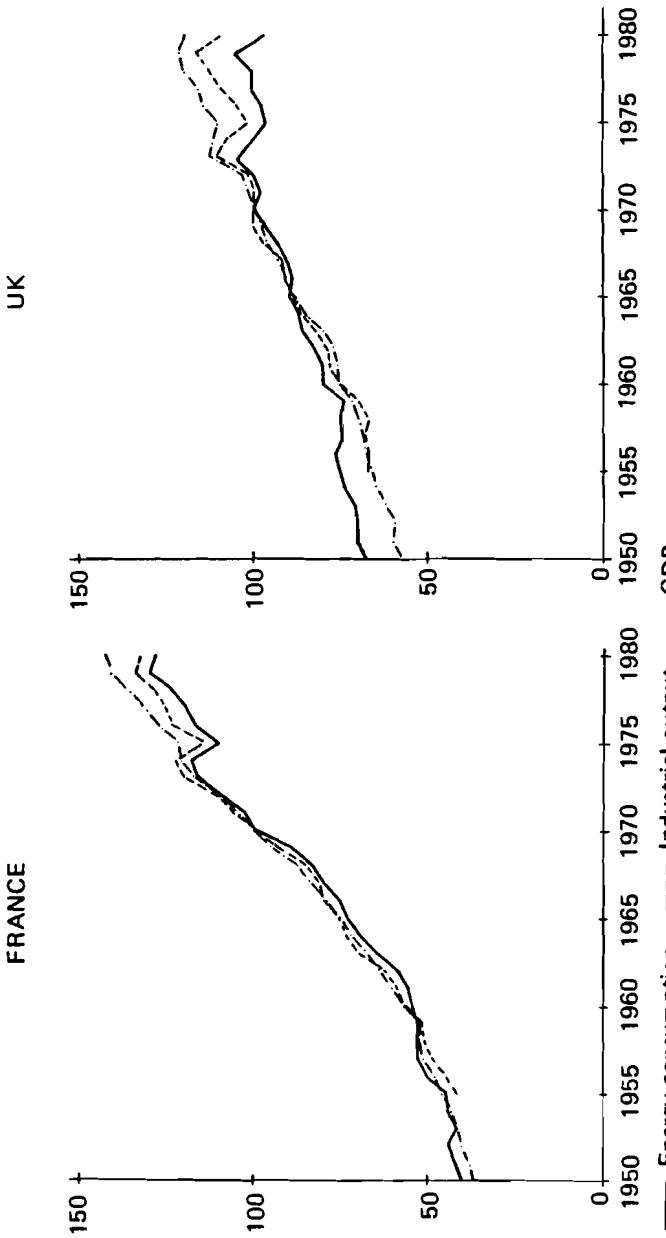
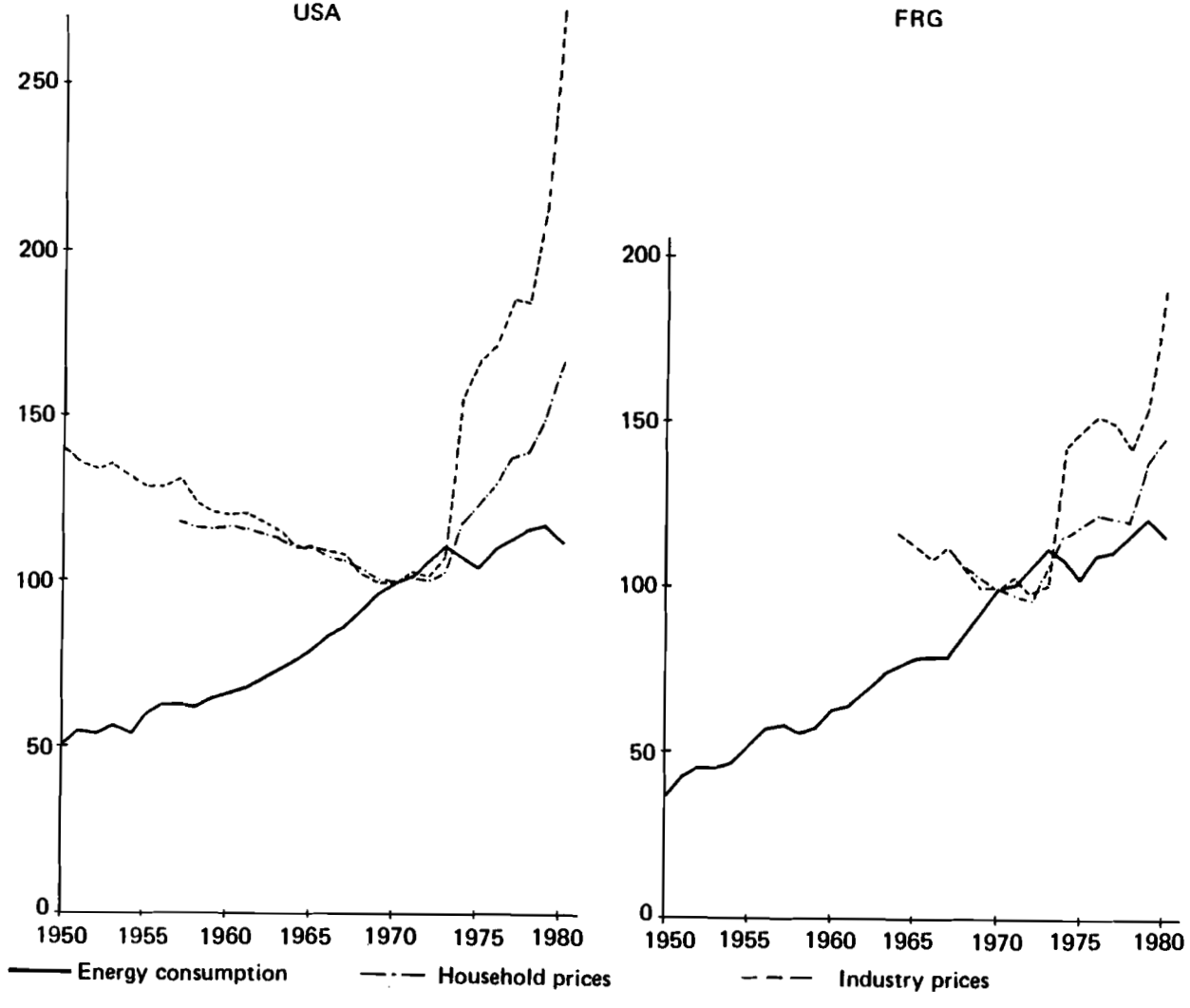


FIGURE 2 Real GDP, industrial output, primary energy consumption, 1950–1980 (index numbers, 1970 = 100).


USA
FRG
250
200
150
100
50
0
1950
1955
1960
1965
1970
1975
1980
Energy consumption
Household prices
Industry prices

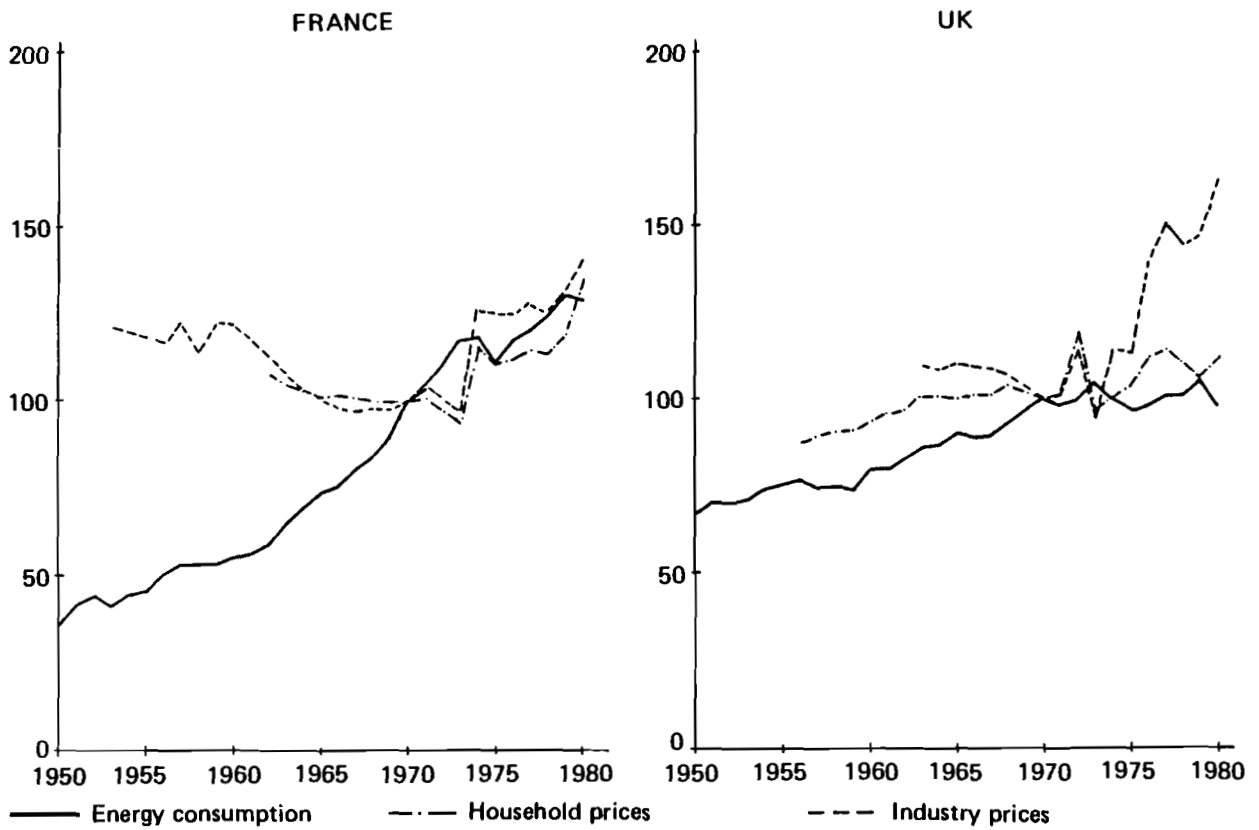


FIGURE 3 Total primary energy consumption and inflation-adjusted industry and household prices, 1950–1980 (index numbers, 1970 = 100).

USA
FRG
200
150
100
50
0
1950
1955
1960
1965
1970
1975
1980
Consumption — · — Household prices - - - Industry prices

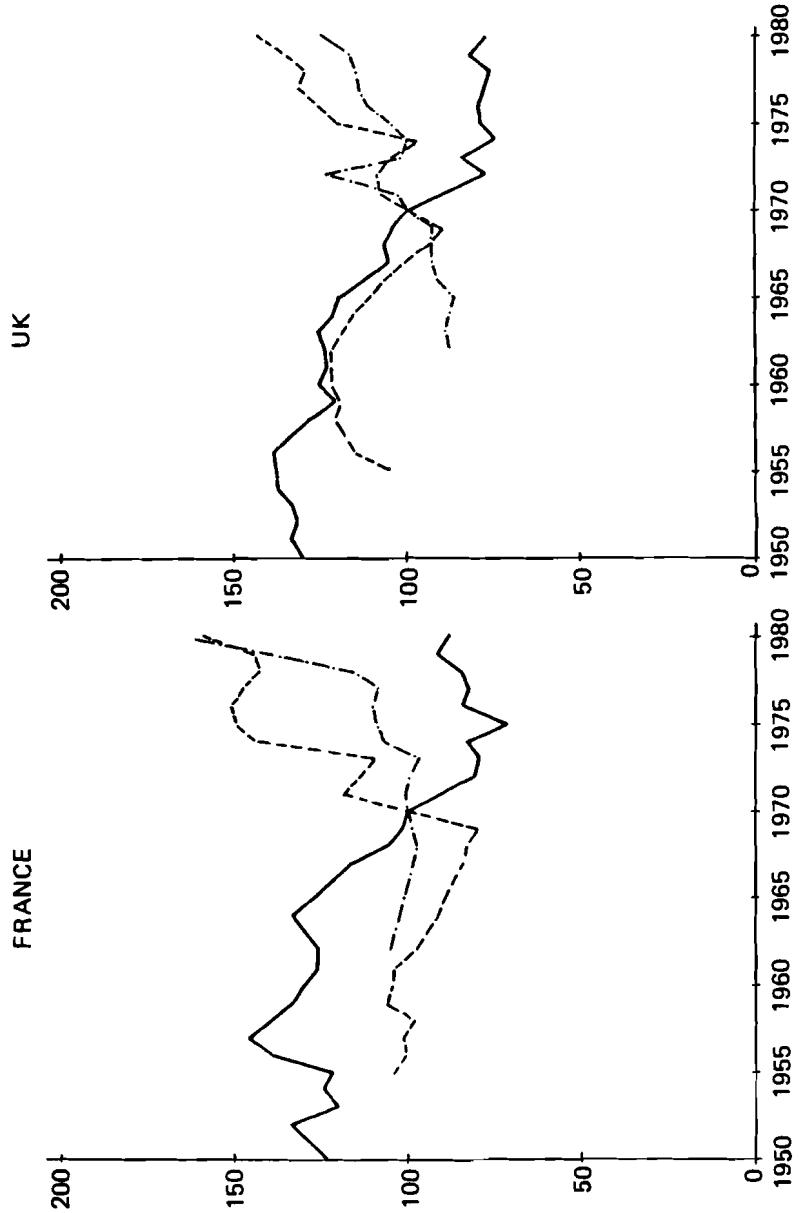


FIGURE 4 Coal total consumption and inflation-adjusted industry and household prices, 1950–1980 (index numbers, 1970 = 100).

USA
FRG
200
150
100
50
0
1970
1975
1980
Consumption
Prices

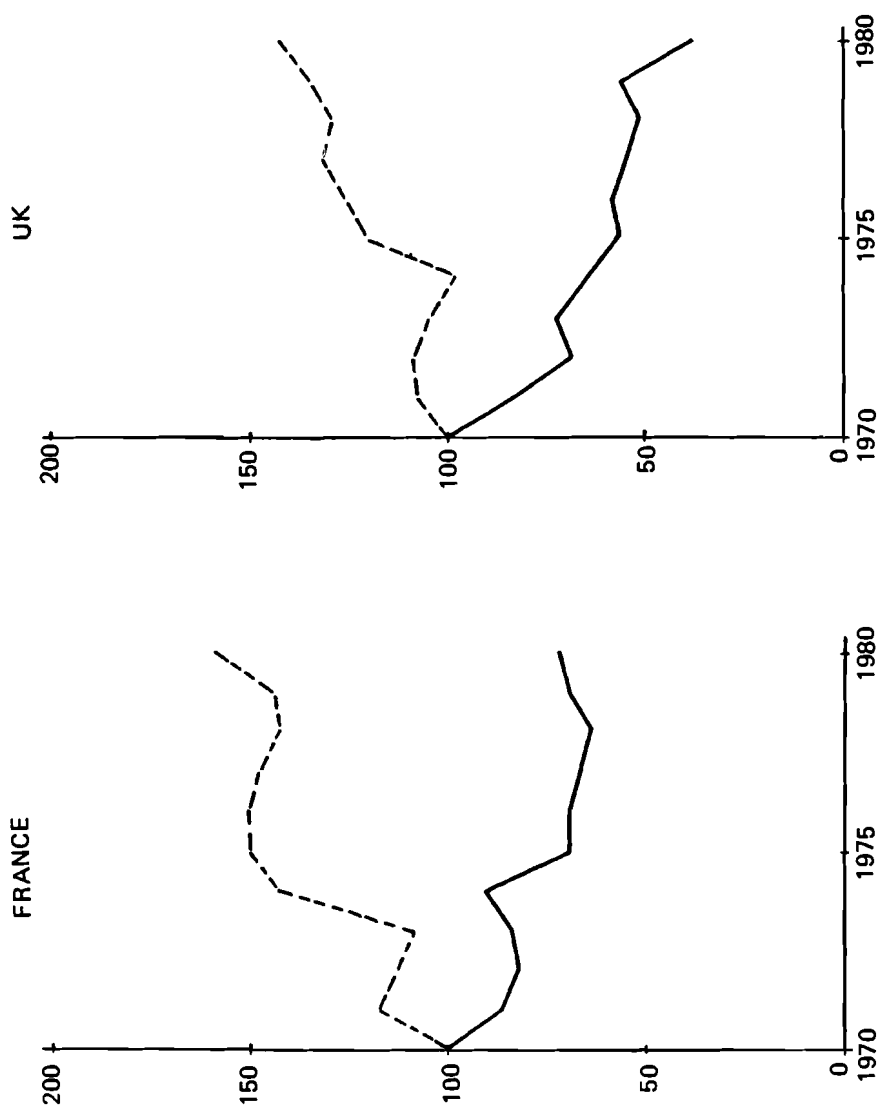


FIGURE 5 Coal industry sector consumption and inflation-adjusted prices, 1970–1980 (index numbers, 1970 = 100).

FRG
USA
150
100
50
0
1970
1975
1980
Consumption
Prices

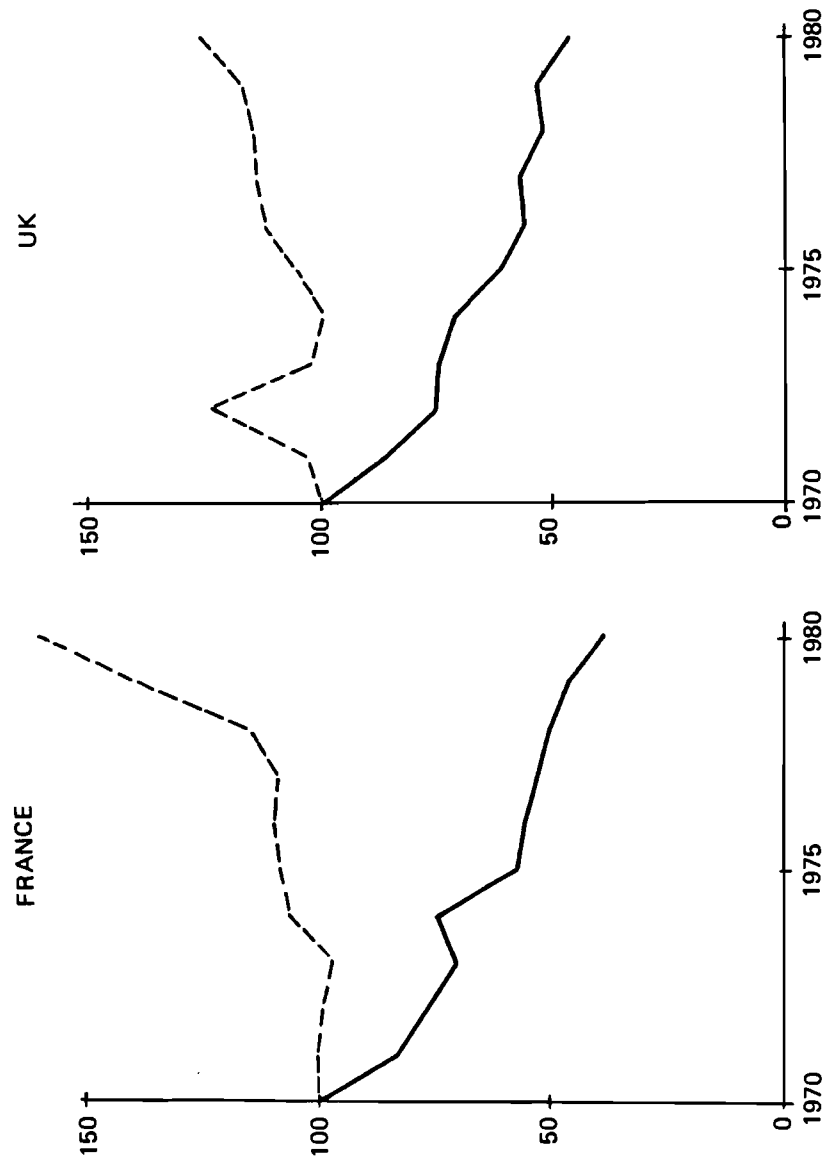
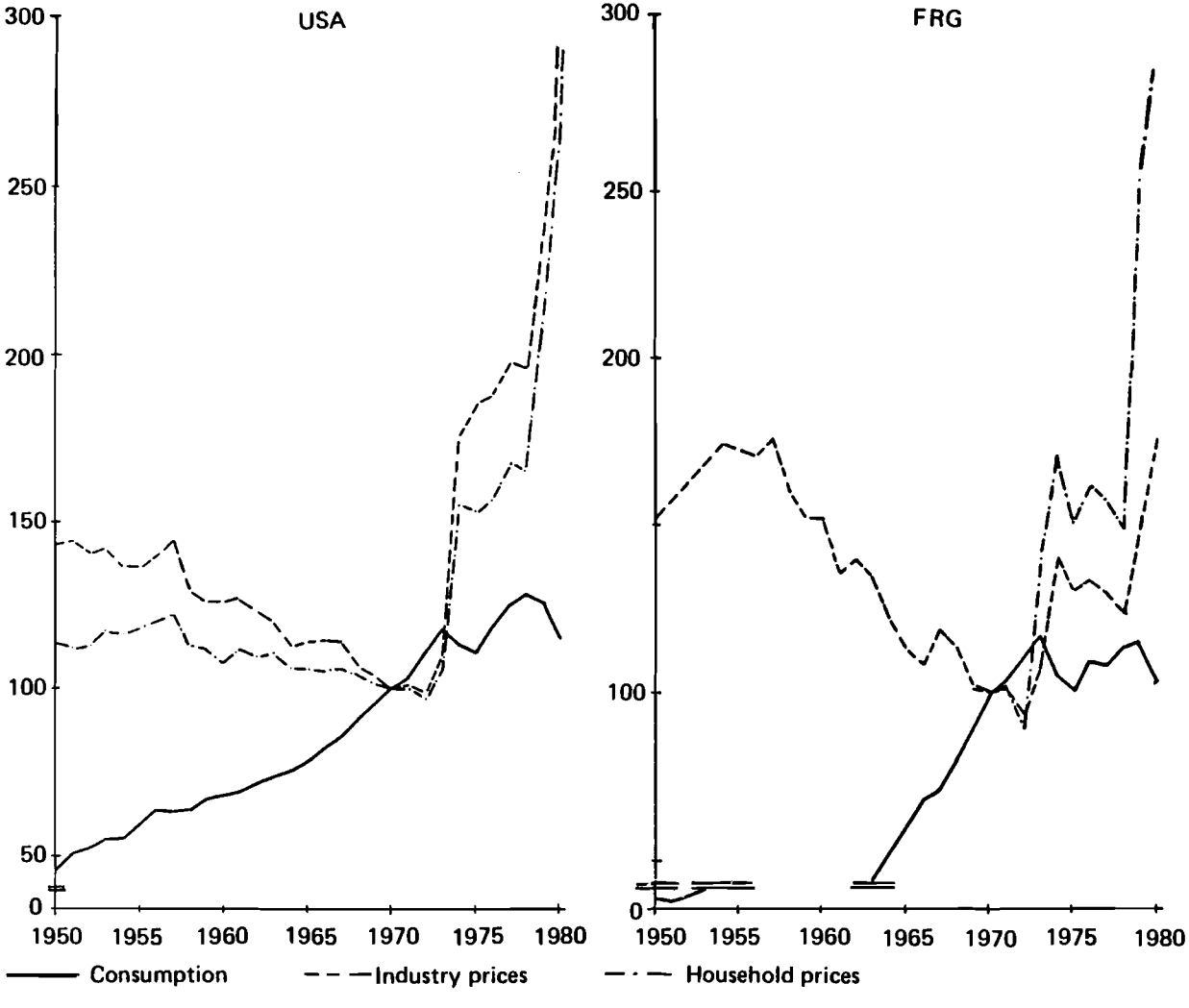


FIGURE 6 Coal household sector consumption and inflation-adjusted prices, 1970–1980 (index numbers, 1970 = 100).


USA
FRG
300
250
200
150
100
50
0
1950
1955
1960
1965
1970
1975
1980
Consumption
Industry prices
Household prices

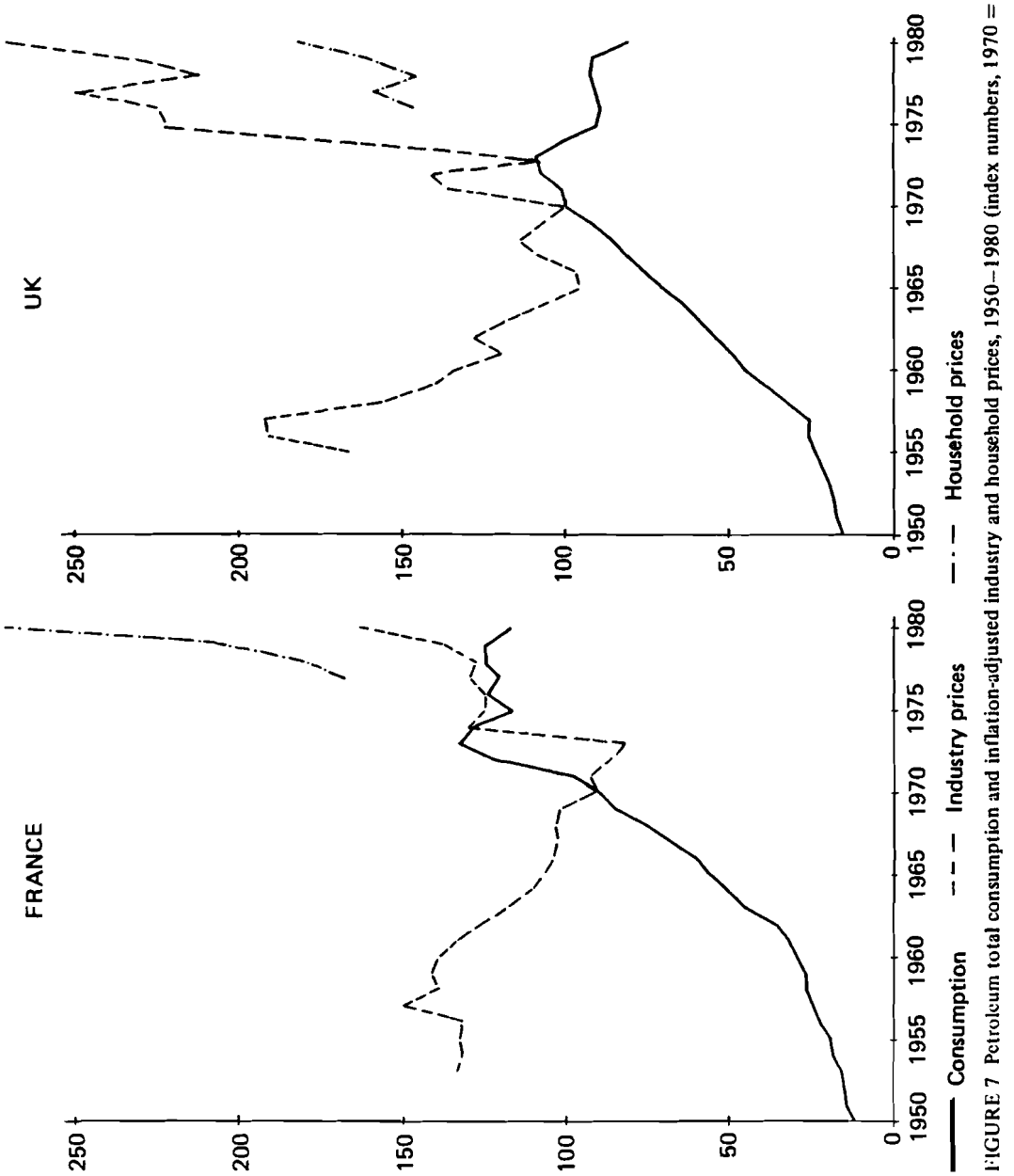
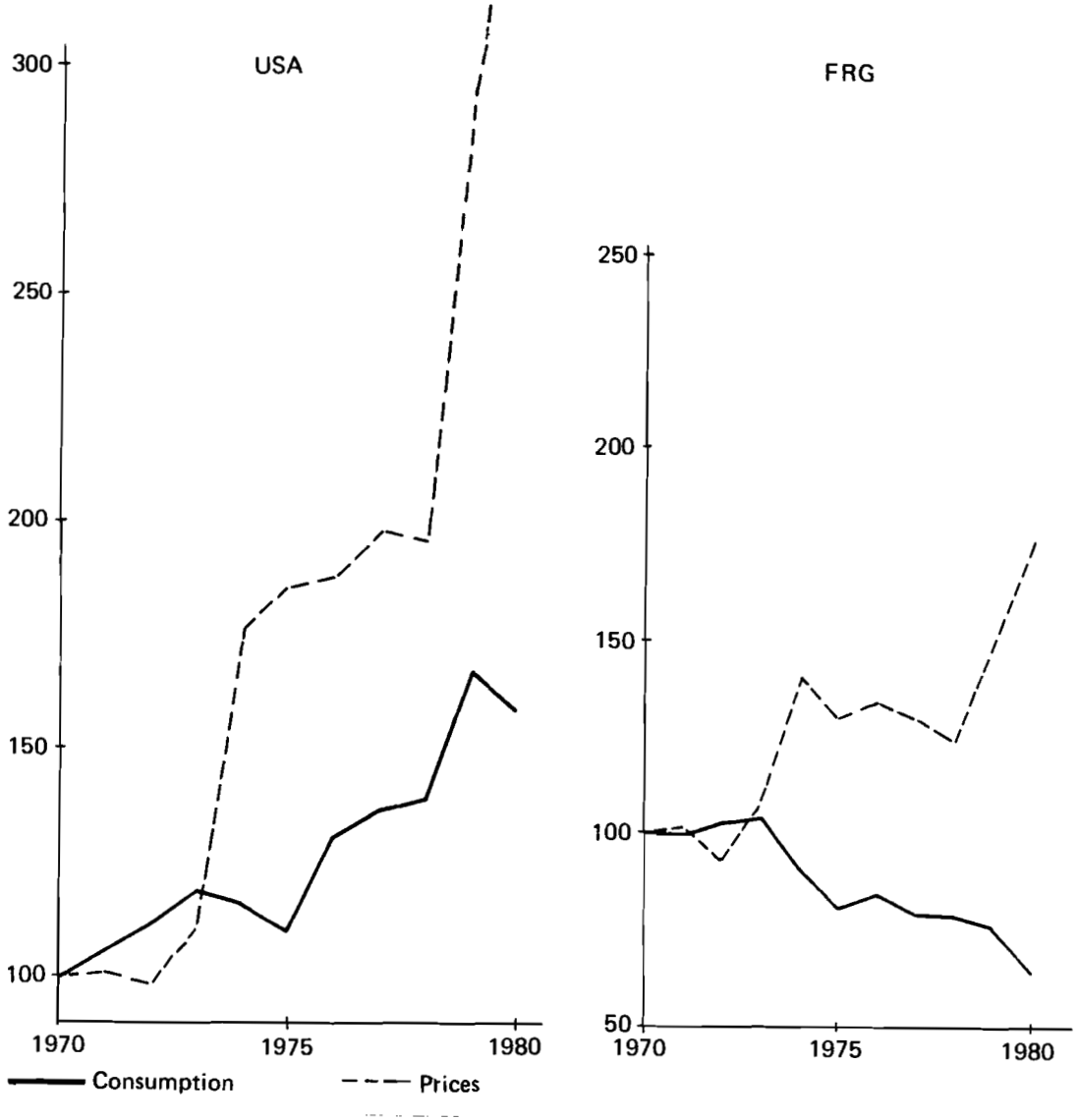


FIGURE 7 Petroleum total consumption and inflation-adjusted industry and household prices, 1950–1980 (index numbers, 1970 = 100).


USA
FRG
300
250
200
150
100
250
200
150
100
50
1970
1975
1980
1970
1975
1980
Consumption
Prices

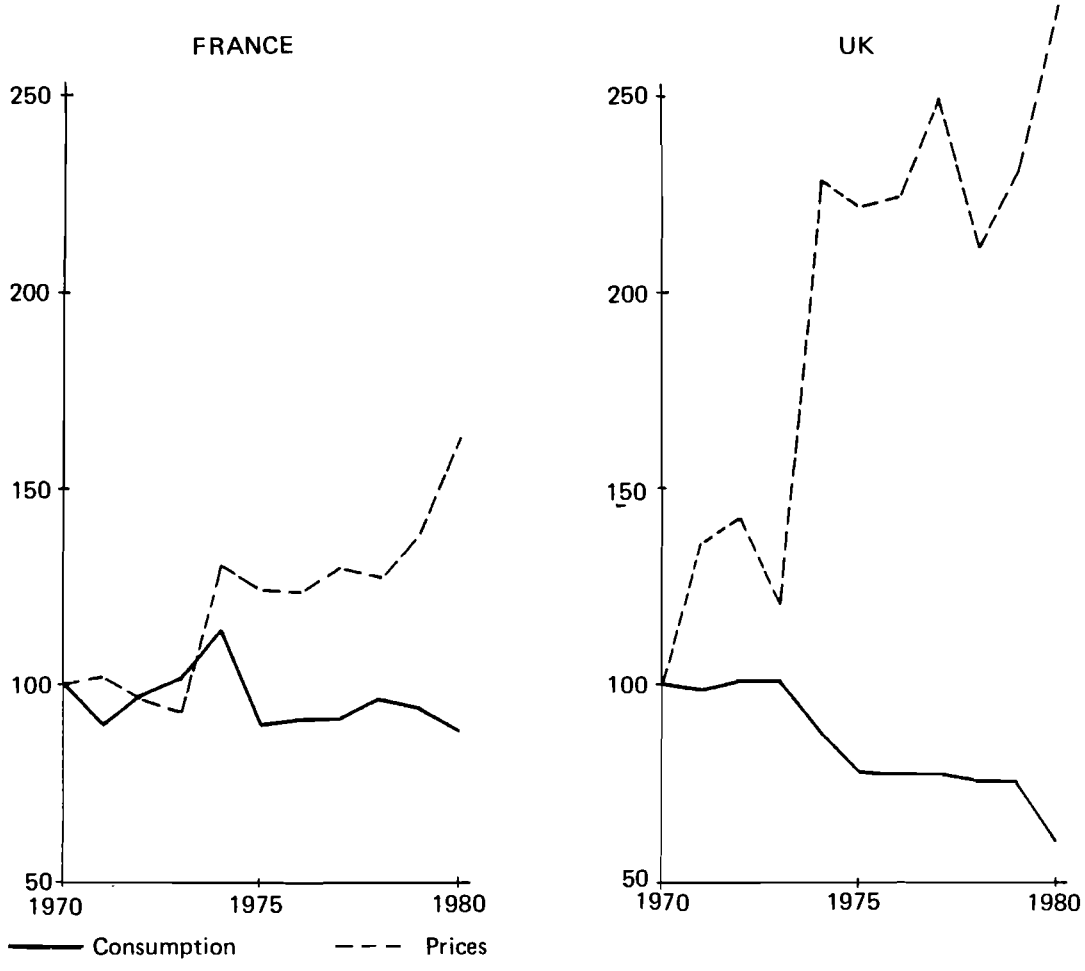
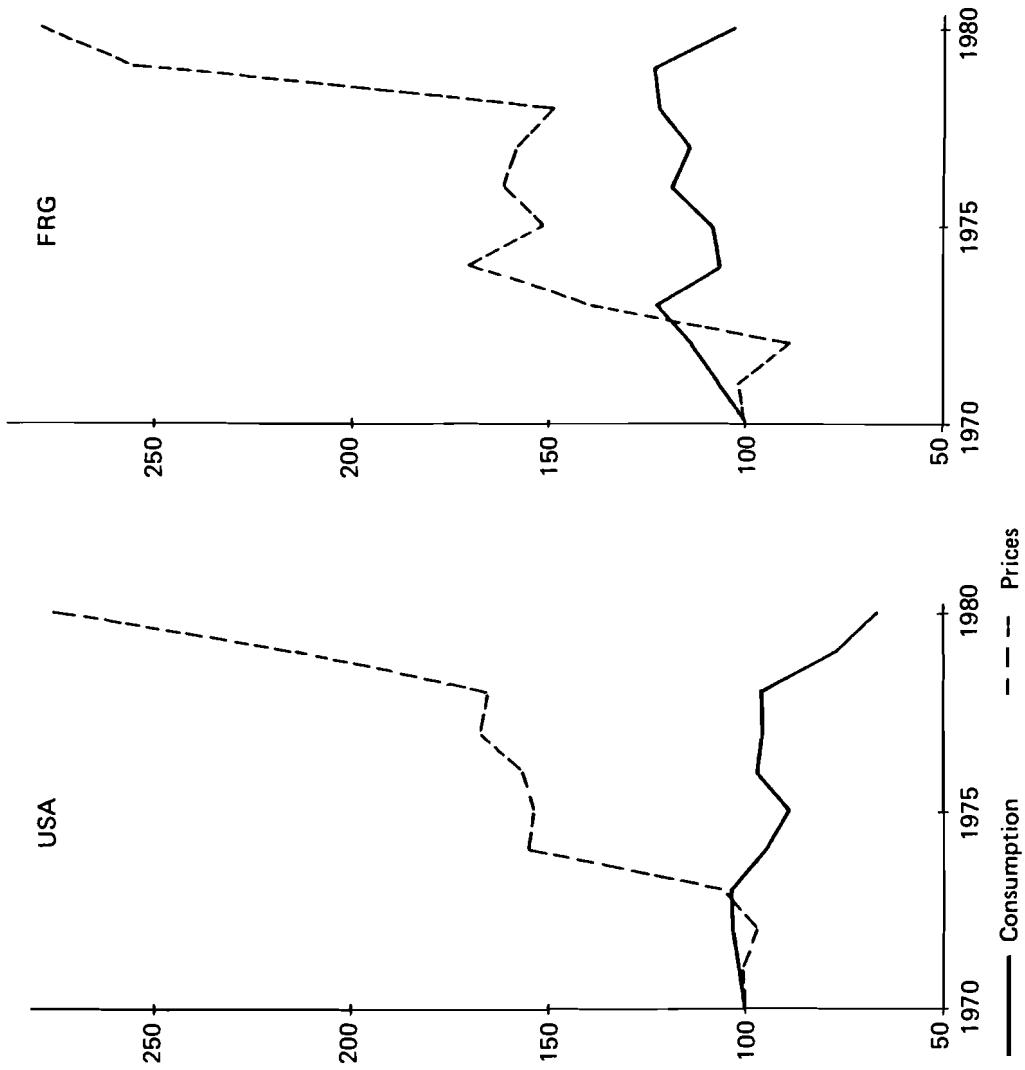


FIGURE 8 Petroleum products industry sector consumption and inflation-adjusted prices, 1970–1980 (index numbers, 1970 = 100).


FRG
USA
250
200
150
100
50
1970
1975
1980
Consumption
Prices

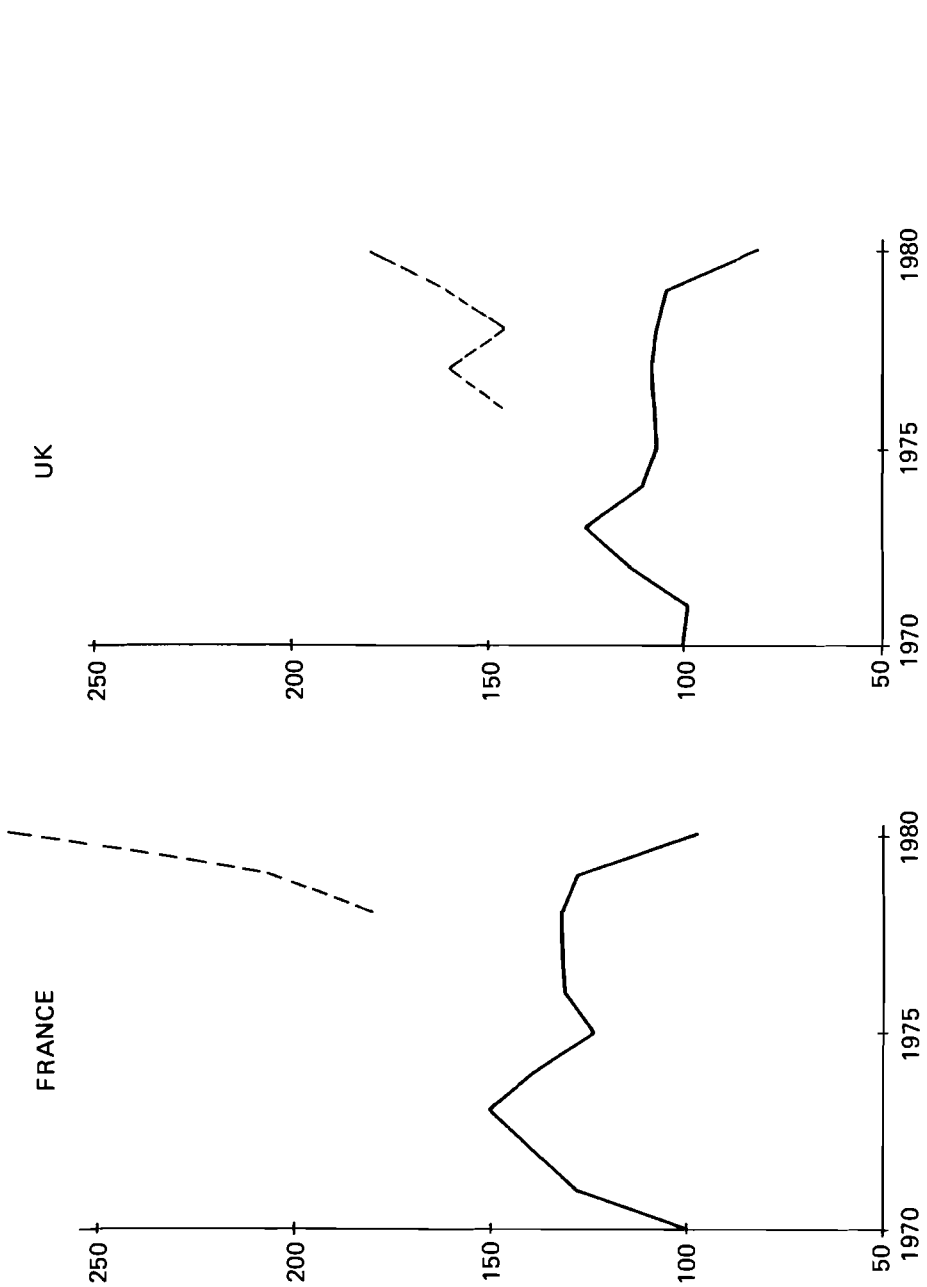
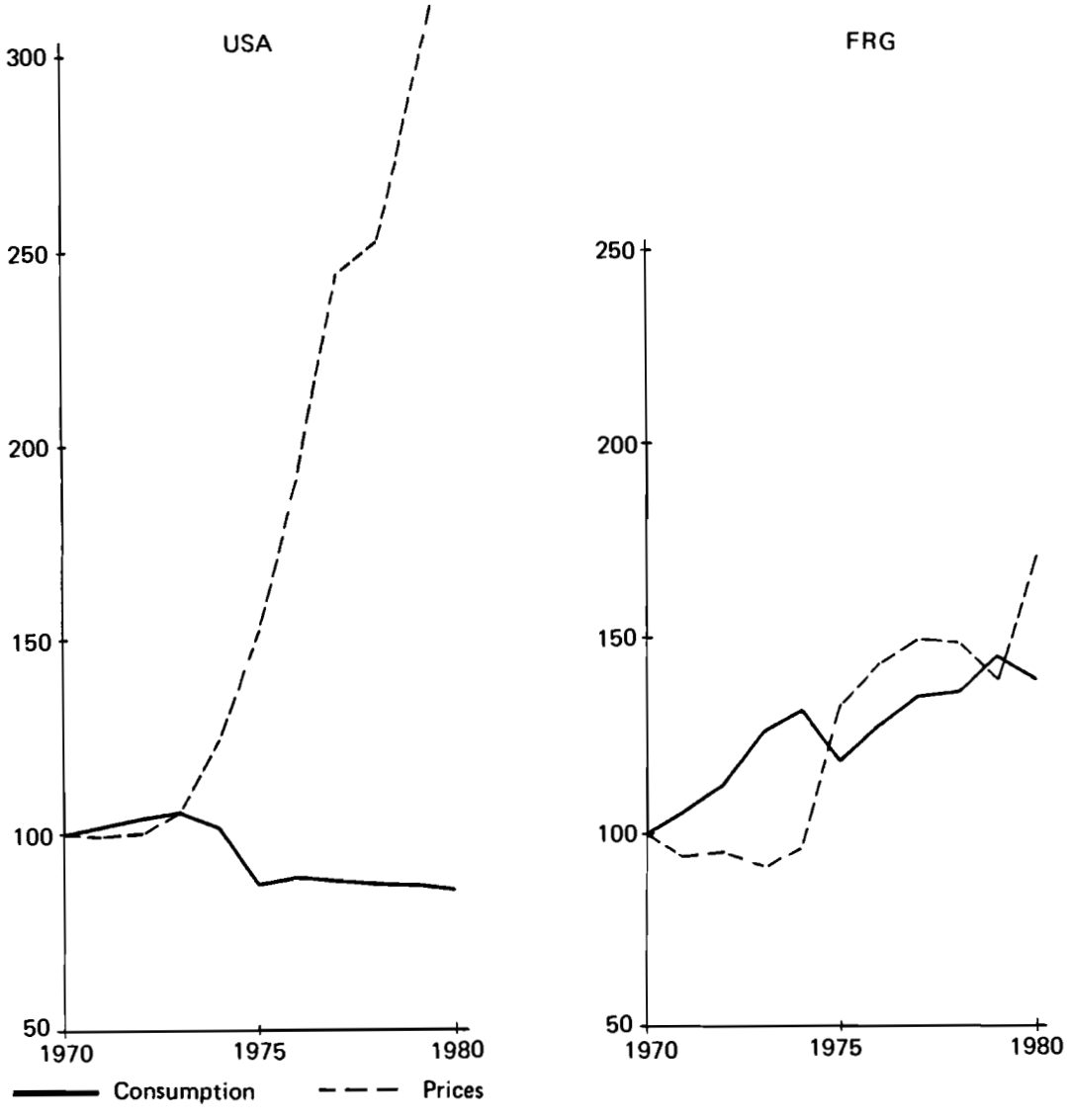


FIGURE 9 Petroleum products household sector consumption and inflation-adjusted prices, 1970–1980 (index numbers, 1970 = 100).


USA
FRG
300
250
200
150
100
50
1970
1975
1980
Consumption
Prices

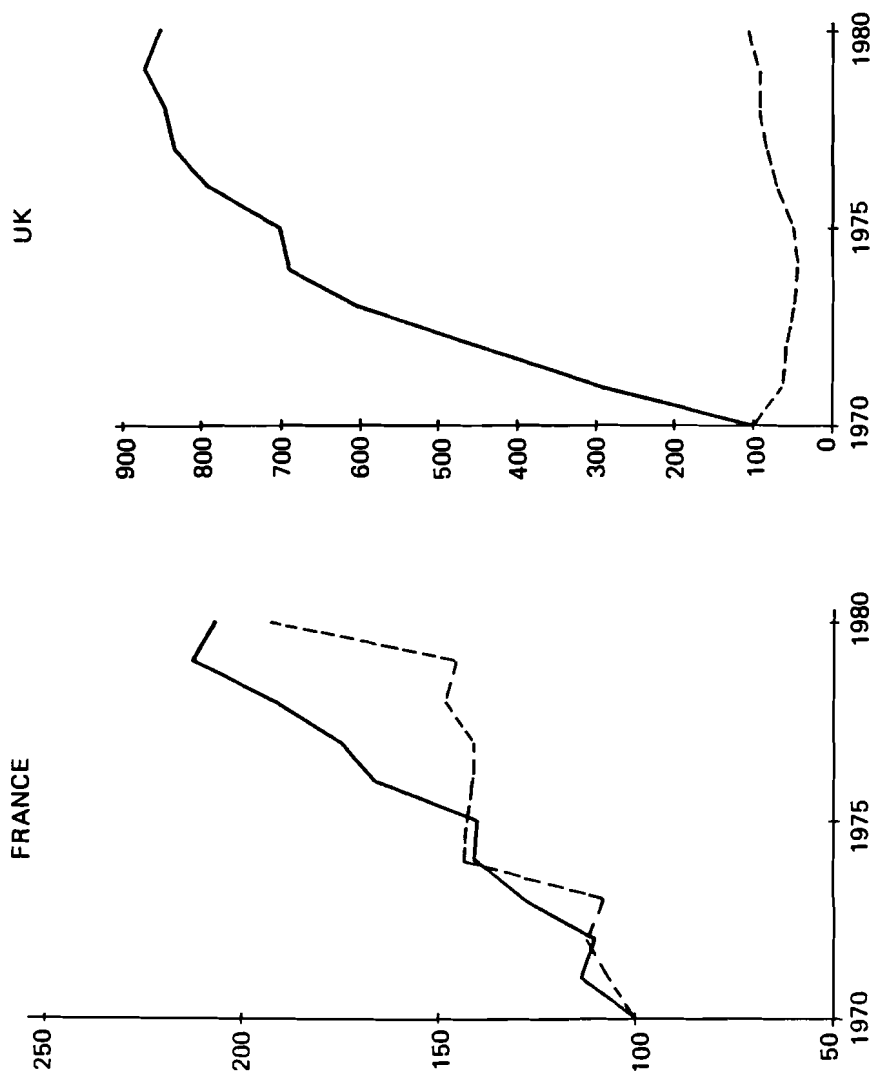
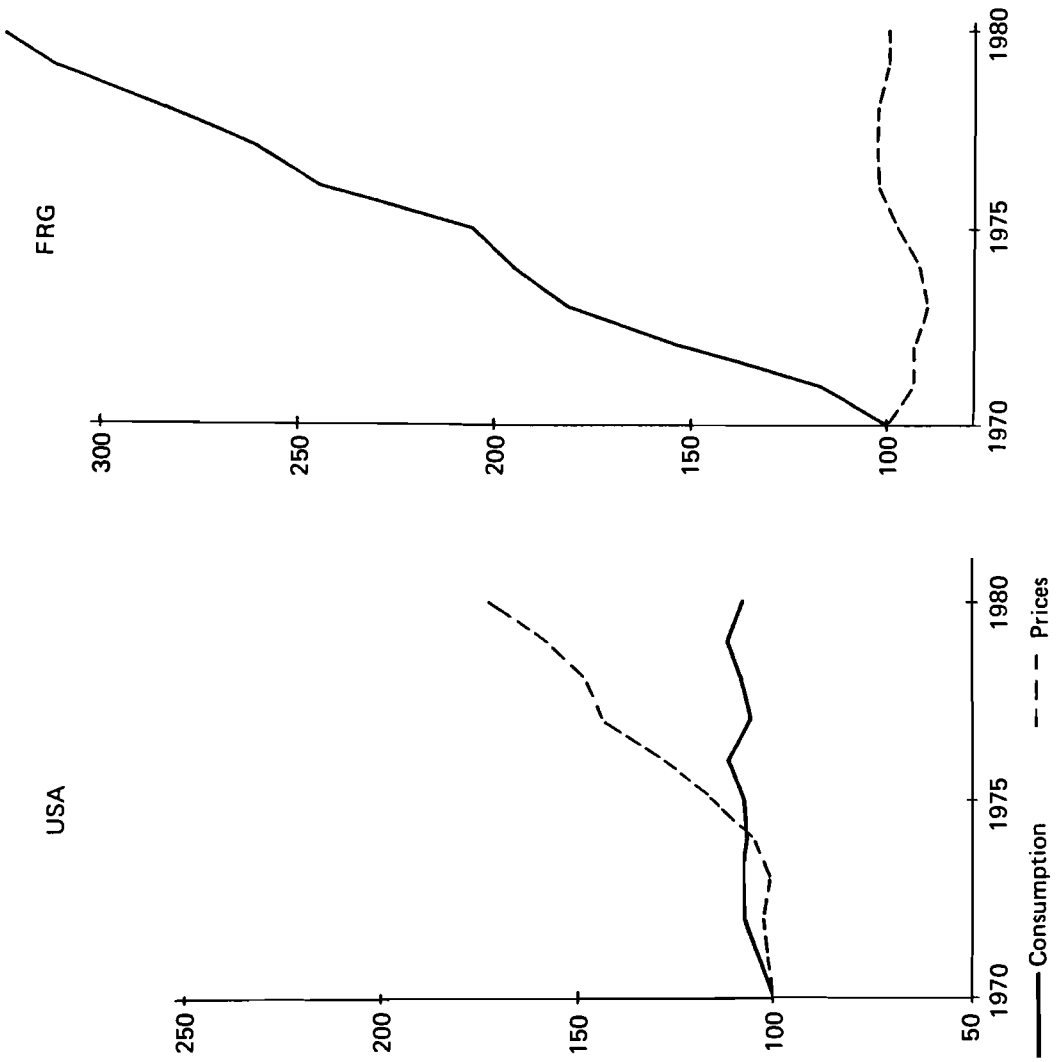


FIGURE 10 Natural gas industry sector consumption and inflation-adjusted prices, 1970–1980 (index numbers, 1970 = 100).


FRG
300
250
200
150
100
1970
1975
1980
USA
250
200
150
100
50
1970
1975
1980
Consumption
Prices

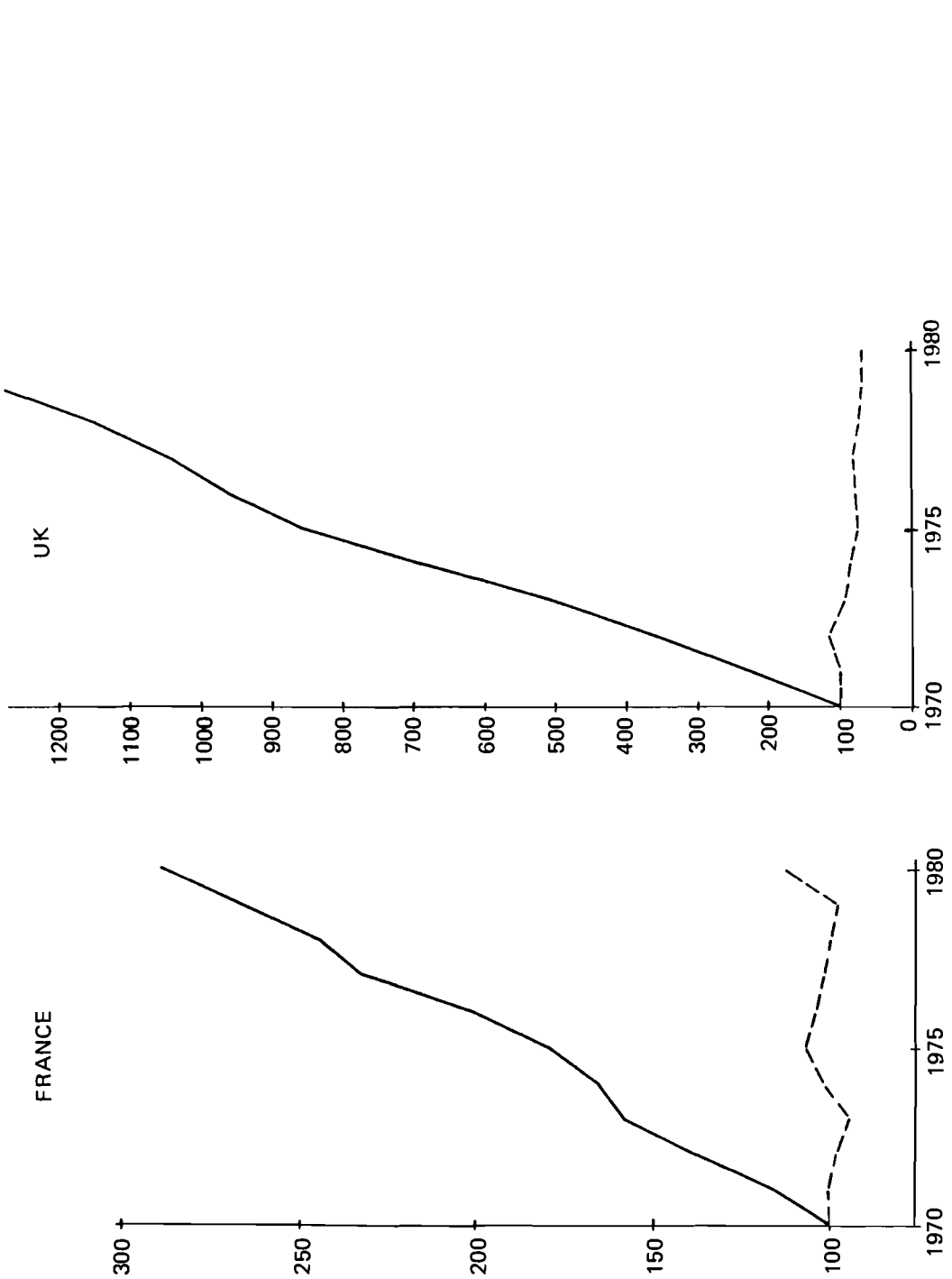
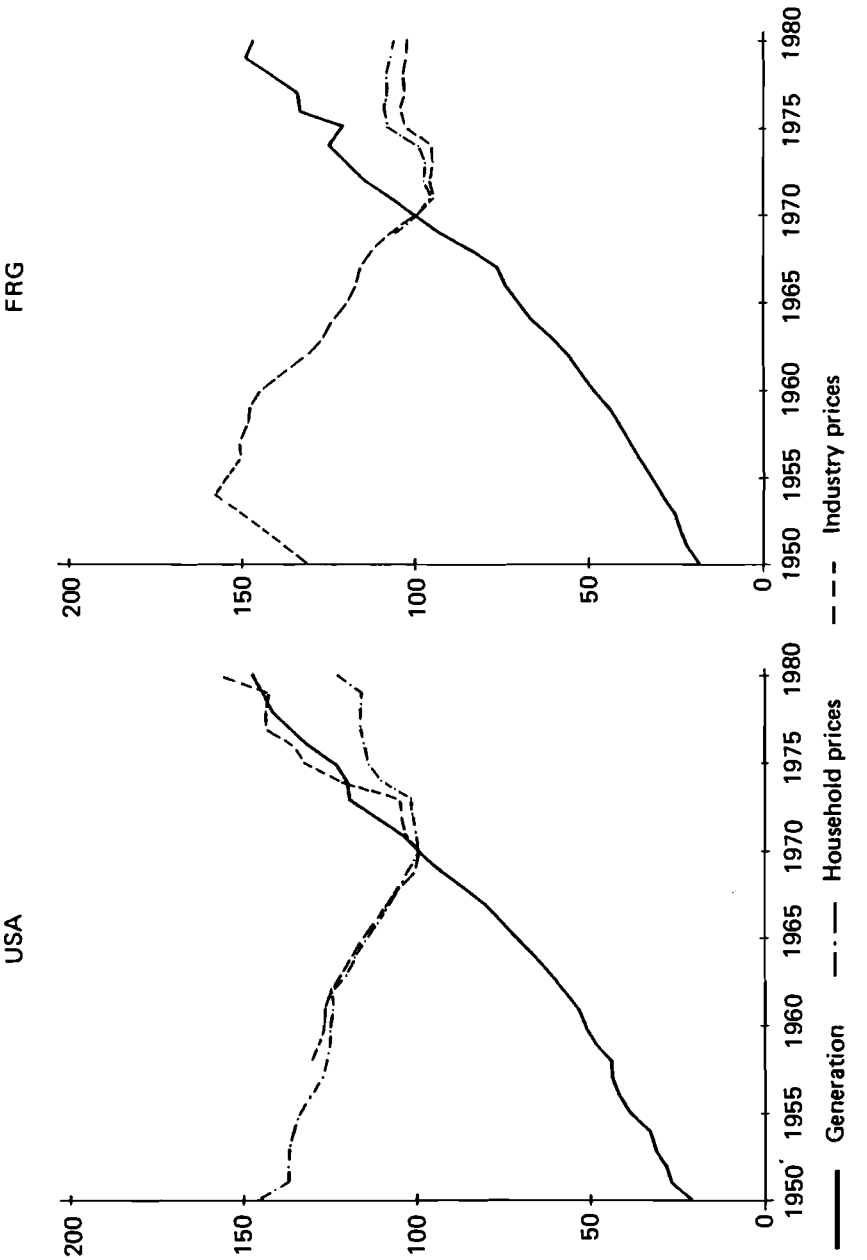


FIGURE 11 Gas, manufactured and natural, household sector consumption and inflation-adjusted prices, 1970–1980 (index numbers, 1970 = 100).


USA
FRG
200
150
100
50
0
1950
1955
1960
1965
1970
1975
1980
Generation
Household prices
Industry prices

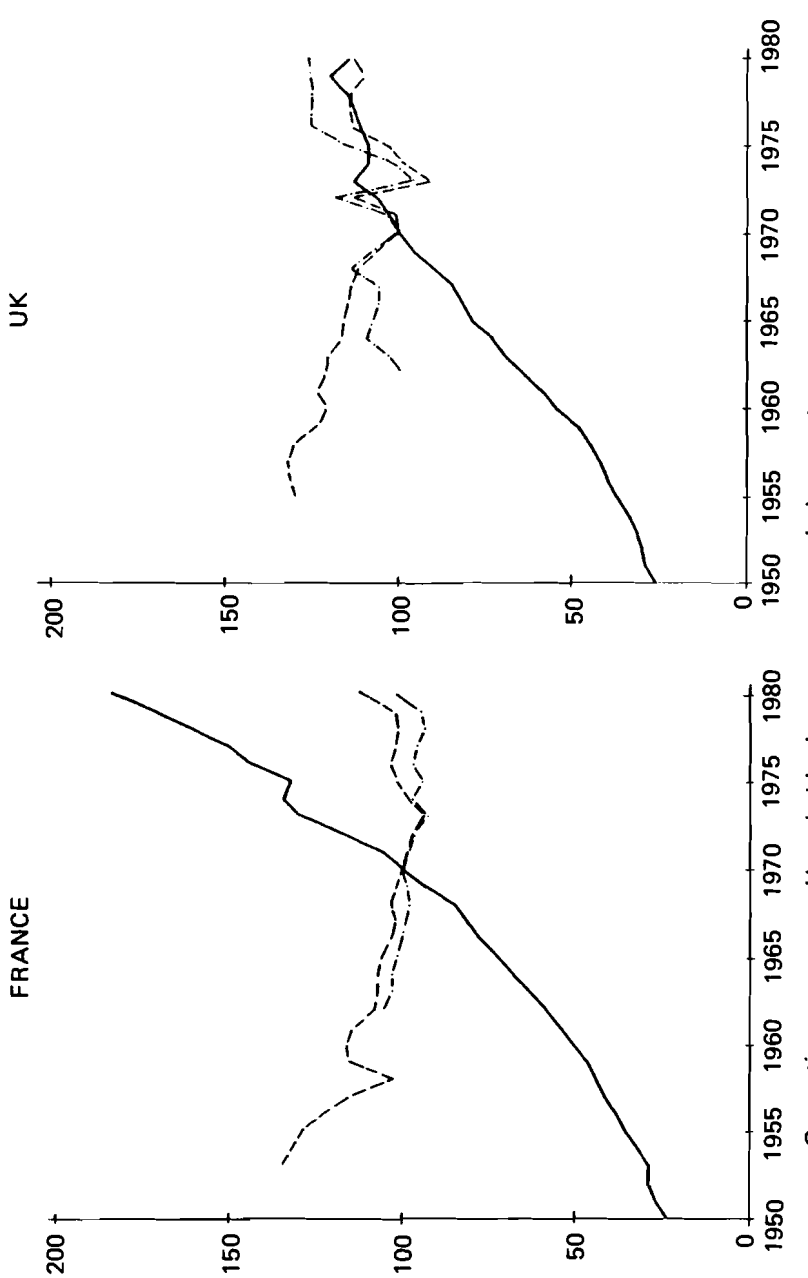
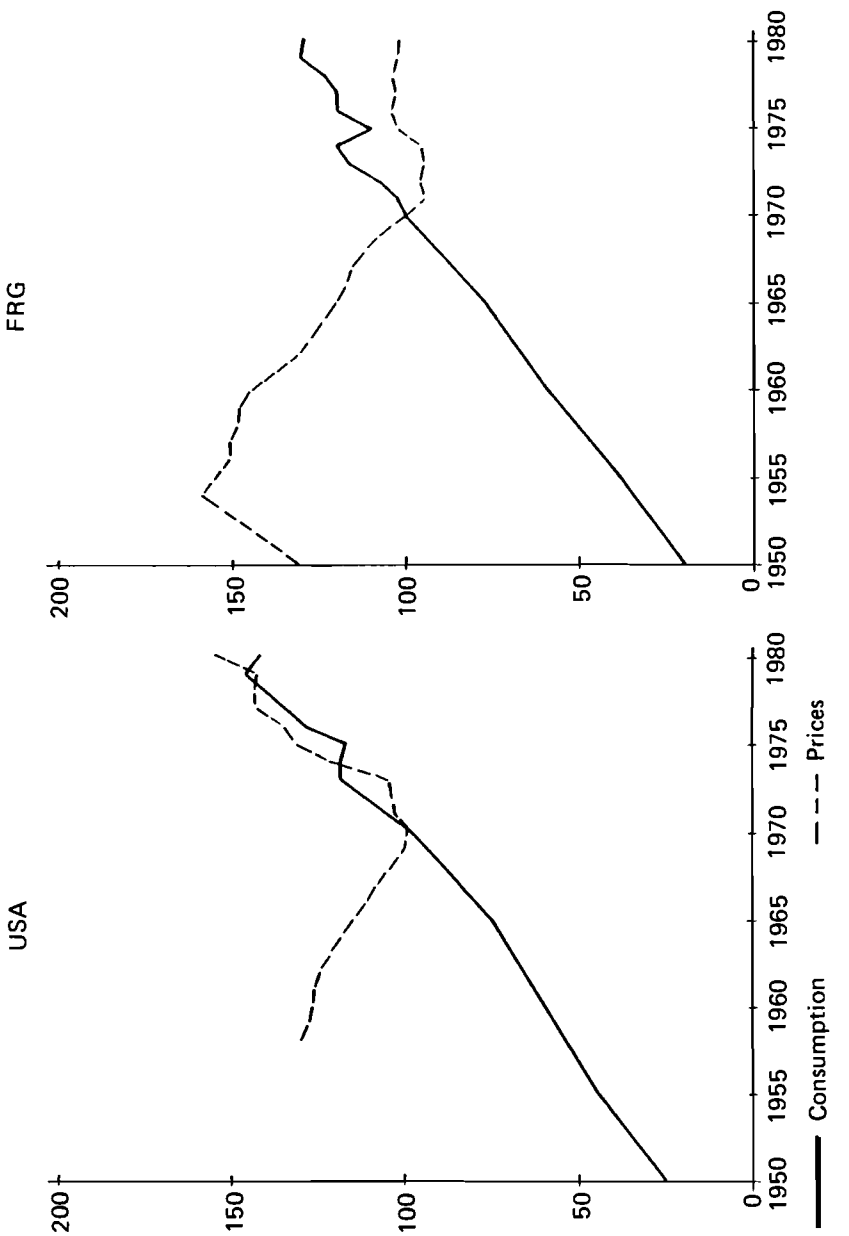


FIGURE 12 Electricity total generation and inflation-adjusted industry and household pirces, 1950–1980 (index numbers, 1970 = 100).


FRG
USA
200
150
100
50
0
1950
1955
1960
1965
1970
1975
1980
Consumption
Prices

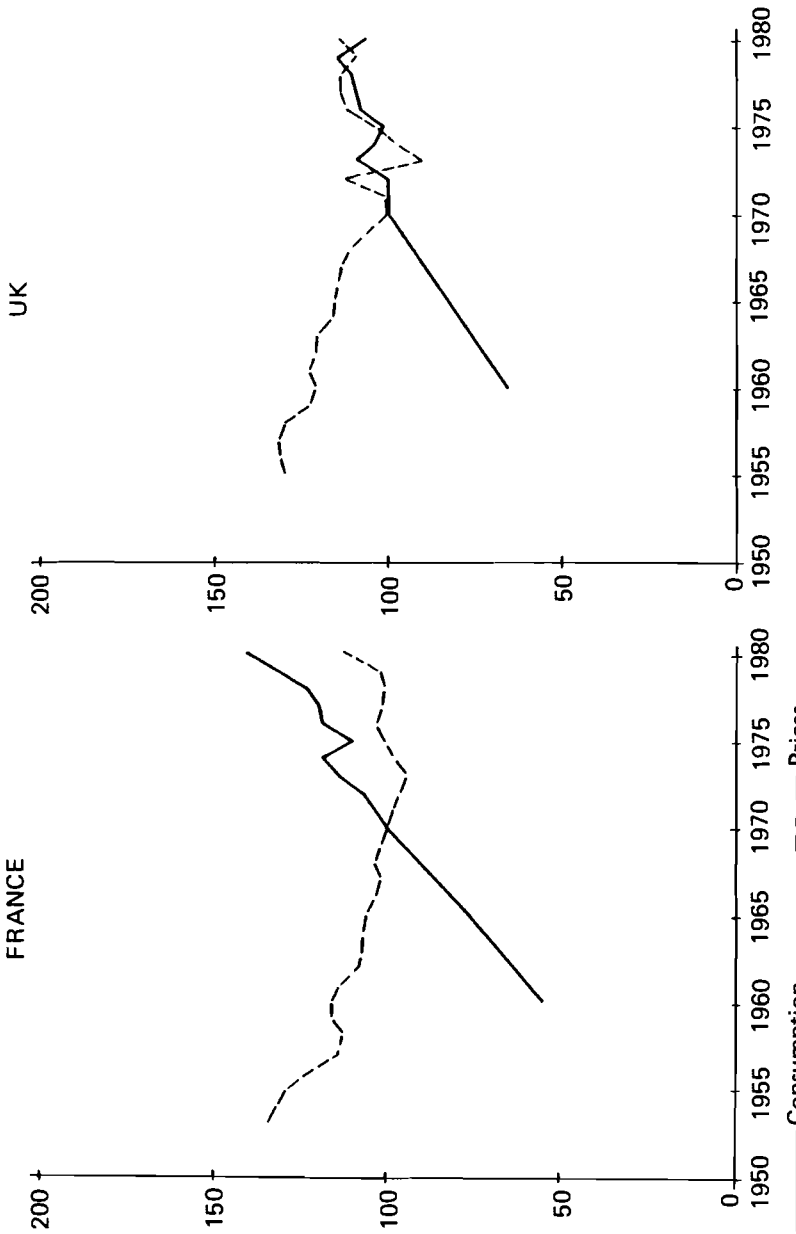
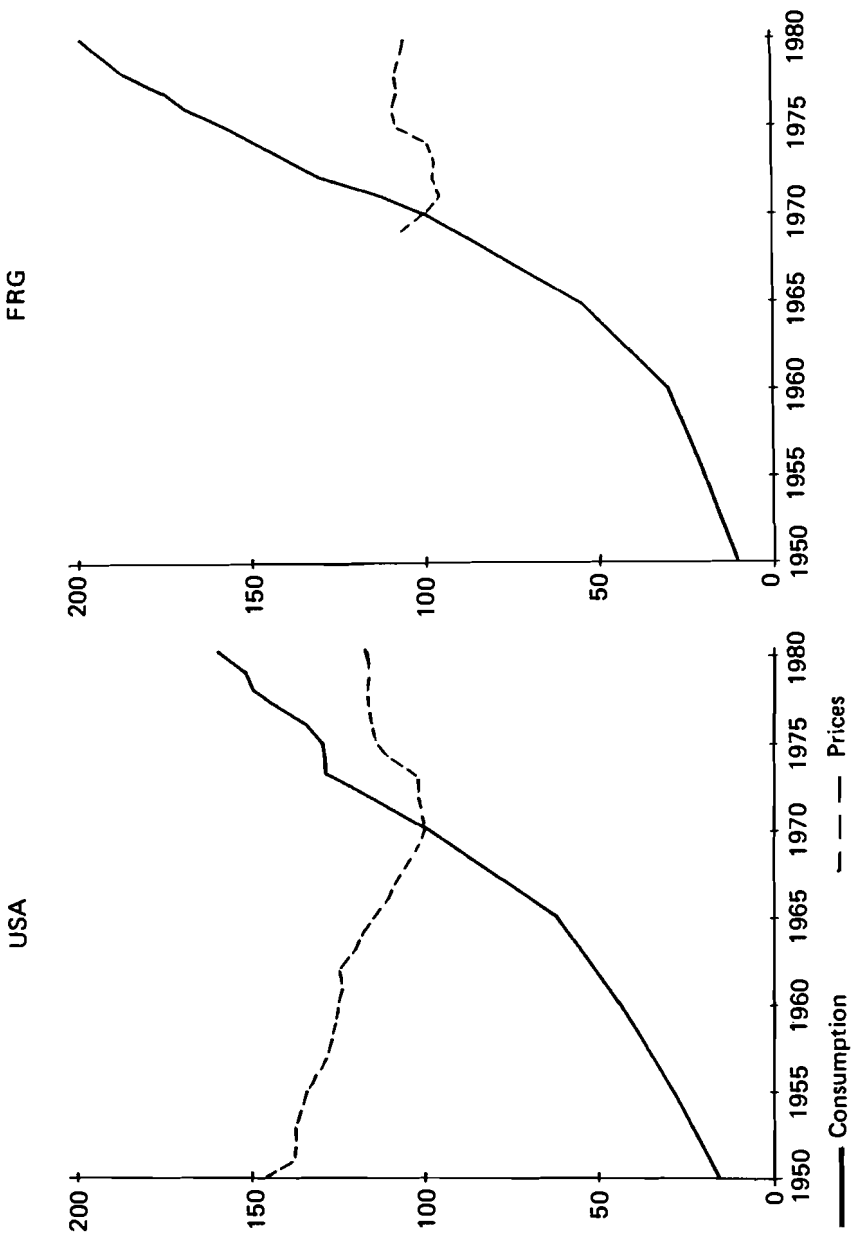


FIGURE 13 Electricity industry sector consumption and inflation-adjusted prices, 1970–1980 (index numbers, 1970 = 100).


FRG
USA
200
150
100
50
0
1950
1955
1960
1965
1970
1975
1980
Consumption
Prices

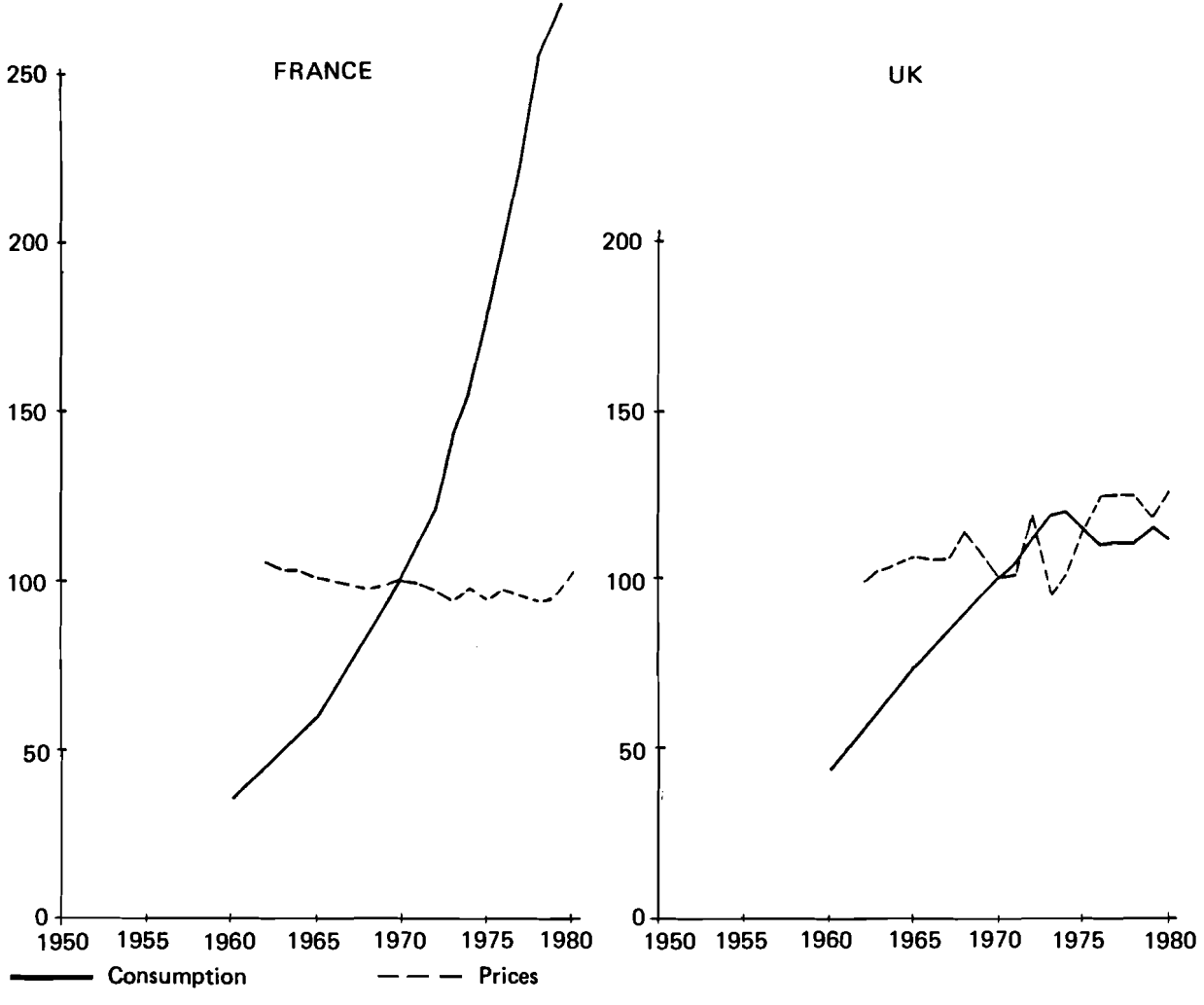
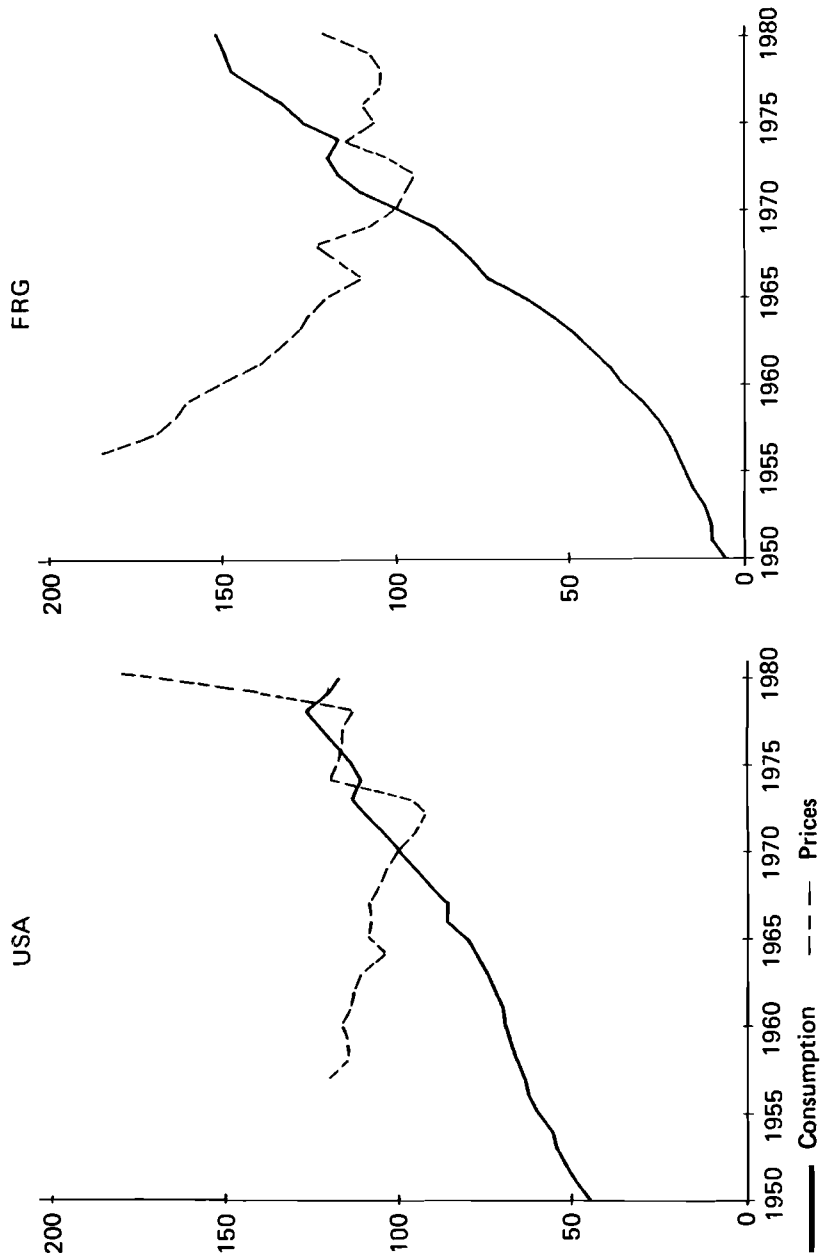


FIGURE 14 Electricity household sector consumption and inflation-adjusted prices, 1970–1980 (index numbers, 1970 = 100).


FRG
USA
200
150
100
50
0
1950
1955
1960
1965
1970
1975
1980
Consumption
Prices

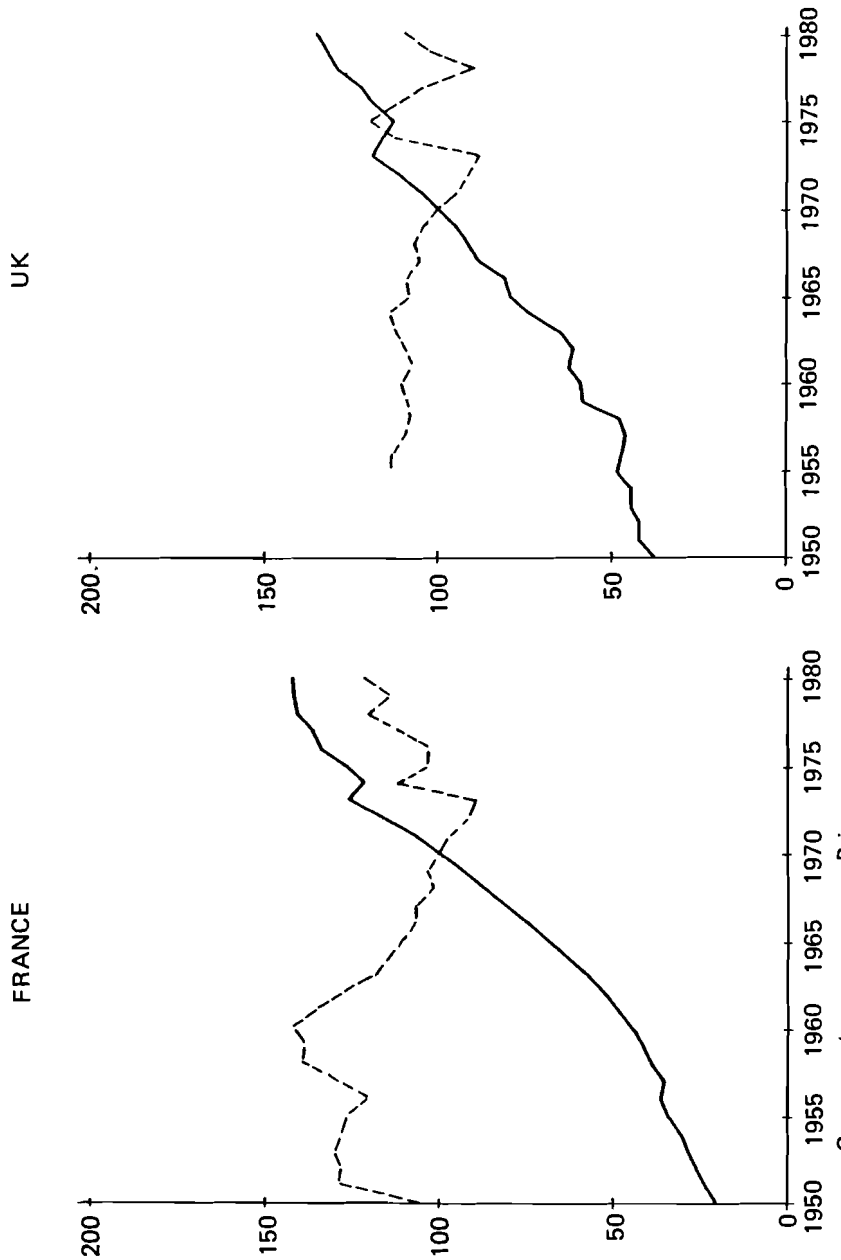


FIGURE 15 Transportation, gasoline consumption and inflation-adjusted prices, 1950–1980 (index numbers, 1970 = 100).

PART IV CONCEPTS, DEFINITIONS, AND SOURCES

1 GDP (GNP) AND DEFLATORS

US and European populations and real GDP (GNP) in US $ at 1975 prices and exchange rates are shown in Tables 1 and 2 for 1970–1980. Index numbers of the growth of GDP (GNP) in constant prices 1950–1980 are shown in Tables 25–28. All 1980 data are also shown in current prices in national currencies and in US $ at average 1980 exchange rates.

US GNP and deflators 1950–1980 shown in Tables 2 and 25 are from the January 1981 Economic Report of the President, updated with the US Department of Commerce, Survey of Current Business, April 1981.

For European countries, the 1970–1980 GDP at 1975 prices converted to US $ at 1975 exchange rates (Table 2) are from the OECD Main Economic Indicators. The 1975 exchange rates used by the OECD to convert national currencies to US $ may somewhat differ from those used by other international agencies, e.g., World Bank, UN, because of possible differences in the reference periods, e.g., exchange rates at the end of the year, or average for the year.

For GDP in constant prices 1950–1980 (Tables 25–28) see Table 2 for the years 1970–1980. For backdating to 1950 use was made of the UN Yearbook of National Accounts Statistics 1979, Vol. I and earlier issues. It may be noted that the growth index was checked and found to agree with national publications.

The 1980 GDP in national currencies and at 1980 prices was compiled from national sources as follows: FRG see Brutto Inlands Produkt, from Wirtschaft und Statistik April 1981; France see Produit Intérieur Brut, personal communication from the Observatoire Economique in Paris soon to be published by the INSEE; UK see Gross Domestic Product at Market Prices, from CSO Monthly Digest of Statistics, April 1981.

The deflators for the European countries were compiled from the above-mentioned sources used for GDP.

2 INDUSTRIAL OUTPUT

Index numbers of industrial output are shown in Tables 25–28. The output is measured in terms of production quantity on a monthly, if not weekly, basis. Therefore, data for recent periods are more readily available than value added, which must come from censuses or surveys taken annually or less frequently. The industrial production indices shown in Tables 25–28 include mining, manufacturing, and utilities, but they exclude construction. In terms of the UN International Standard Industrial Classification (ISIC) they include divisions 2 (mining), 3 (manufacturing) and 4 (electricity, gas, water). Long-term series of these indices with breakdown by individual industries that permit easy comparison between countries and over time, are published by international agencies, e.g., UN, OECD and EUROSTAT.

The following may be noted for the indices selected from a variety of national compilations:

USA. The industrial output index shown in Table 25 represents the index of General Industrial Production Quantities, compiled by the Federal Reserve Board (FRB). The index

includes mining and quarrying, manufacturing, and electricity, gas, and water; it is published by major industry divisions in the Economic Report of the President; it can be updated with monthly publications, e.g., US Department of Commerce, Survey of Current Business.

FRG. The industrial output index shown in Table 26 is the index of net production of the producing trades (Produzierendes Gewerbe), seasonally adjusted including mining, manufacturing, electricity, gas and water, but excluding construction. The index is published in Wirtschaft und Statistik, e.g., April 1981.

France. The industrial output index shown in Table 27 represents the General Index of Industrial Production, excluding construction (Indice Général, Bâtiments et Travaux Publics exclus). The index includes mining and quarrying, manufacturing, electricity and gas production; the data for 1979 and 1980 are not seasonally adjusted ("brut"), from the INSEE Bulletin Mensuel de Statistique, April 1981. For backdating see Annuaire Statistique de la France 1980 and earlier issues.

UK. The industrial output shown in Table 28 represents the Index of Industrial Production, market sector analysis, all industries other than construction. The 1975–1980 data are from the CSO Monthly Digest of Statistics April 1981. For backdating see UN The Growth of World Industry and OECD Main Economic Indicators January 1980 and earlier issues.

The industrial production indices for the EC as a whole (EUR 9), and individual countries, 1975–1978, by major industry groups, are from a monthly publication by the EUROSTAT: Eurostatistics, Data for Short Term Economic Analysis, April 1979. The indices can be backdated 1970–1975 with the EUROSTAT Quarterly Bulletin of Industrial Production, 1976. For further backdating, 1961–1970, see UN The Growth of World Industry, 1973 and 1975. For individual countries, see also national statistical publications, and the OECD Main Economic Indicators, 1955–1971, and April 1980.

3 PRIMARY ENERGY CONSUMPTION

Total primary energy consumption in toe, 1970–1980, is shown in Table 3; the 1980 primary energy consumption total and by groups of mineral fuels are shown in Tables 29–32 and the index numbers 1950–1980 in Tables 25–32. The sources and methods of compilation, country by country, are detailed below.

3.1 USA

Total energy consumption, 1970–1980, in toe shown in Table 3, the consumption in 1980 by groups of mineral fuels (Table 4), and the 1950–1980 index numbers of energy consumption total and by groups of mineral fuels, shown in Tables 25 and 29, represent primary energy. The source of these data is the series of total calculated consumption contributed by each fuel (solid, liquid, gas), plus hydropower and nuclear electricity compiled for 1920–1971 by the US Bureau of Mines. For 1972–1980, these data plus electricity from wood and waste are released by the US Department of Energy (DOE) Energy

Information Administration. The tables are reproduced in various US statistical publications, e.g., Statistical Abstract of the United States 1978, p. 604, Table 1001; and DOE, Monthly Energy Review March 1981.

3.2 FRG

Total primary energy consumption in toe, 1970–1980 shown in Tables 3 and 4 and in index numbers 1950–1980, shown in Tables 26 and 30 represent "Primärenergieverbrauch in the Bundesrepublik Deutschland" prepared by Gesamtverband des Deutschen Steinkohlenbergbaus, Essen, (personal communication, June 1981). The data will be published shortly by the Verlag und Wirschaftsgesellschaft der Elektrizitätswerke, Frankfurt 6070.

The data compiled by the Gesamtverband are somewhat at variance with the "aggregate consumption" compiled from the UN World Energy Supplies 1973–1978, Standard Table 4, column 9, and the "supply", representing production plus imports minus exports, also compiled from the UN source, Standard Table 4, columns 1, 6, and 7. For a comparison of FRG primary energy consumption, 1950–1978, by the three sources, see Table 38. The reason for the discrepancies between the sources is that the UN data on "supply" represent, as stated above, simple additions of production and import, minus exports; whereas the UN "aggregate consumption" data are adjusted for bunkers and nonenergy consumption. For differences between the concepts of "supply" and "aggregate consumption," see also Doblin (1979), Historical Data Series, 1950–1976. The reason why the Gesamtverband data differ from both UN compiled supply and aggregate consumption, may be due to the fact that the Gesamtverband consumption data are adjusted for bunkers and movements of stocks. Moreover, there may be differences in the factors at which the various fuels are converted from weight to tce, and toe.

3.3 France

Primary energy consumption, 1970–1980, shown in toe in Tables 3 and 4 and in index numbers 1950–1980 in Tables 27 and 31 are production plus imports, minus exports, and bunkers adjusted for movement of stocks; petroleum used for nonenergy purposes is excluded. The climate-corrected data are published under "bilan général" in Comité Professionel du Pétrole, Eléments Statistiques 78, p. A-11. For updating to 1980, see France, Ministère de l'Industrie, Lettre 101, 12 May 1981, No. 152. For a comparison of petroleum consumption, including and excluding nonenergy purposes see Table 40. For backdating 1950–1969, we used the primary energy supply (production plus imports minus exports) from the UN World Energy Supplies.

3.4 UK

Primary energy consumption in toe 1970–1980 shown in Tables 3 and 4 and in index numbers 1950–1980 in Tables 28 and 32 represent gross inland consumption

compiled by the UK Department of Energy from production, foreign trade, bunkers and stock movements. Data for 1968–1978 are published in the UK Department of Energy, Digest of UK Energy Statistics, 1979, showing availability and consumption of primary fuels and equivalents in Tables 5 (million tce); 6 (million toe); 7 (million therms) and 8 (petajoule). For updating to 1980 see the monthly statistical bulletin of the UK Department of Energy, Energy Trends, April 1981.

The consumption for energy use only, total and by types of fuels, shown in Table 28, represents gross inland consumption minus feedstocks for petrochemical plants, industrial and white spirits, bitumen, and wax. Data for 1950–1978 are published by the UK Central Statistical Office in the Economic Trends annual supplement, 1980 edition. For current data and updating see also the above mentioned Digest of UK Energy Statistics, and the monthly Energy Trends.

4 INDUSTRY AND HOUSEHOLDS ENERGY CONSUMPTION

The following notes relate to the concepts and sources of mineral fuels and electricity consumption by industry and households, including commerce. Consumption of mineral fuels and electricity 1970–1980 are shown in Tables 5–8 (absolute values), 9 (percentages), and 33–35 (index numbers).

Electricity sales to industry and households (only) are also discussed in Section 5, in connection with concepts and sources of total electricity generation.

Energy consumption by industry and households including commerce (Tables 5–8) may not be strictly comparable between countries, because of differences in classification and concepts. For example, the French show "gross" and "net" final energy consumption with the difference consisting in blast furnace gas shipped from steel to other industries, and fuels consumed by industry integrated electricity generation. The US consumption of (final) energy by the residential and commercial, and industry sectors are compiled from the consumption of mineral fuels by these sectors plus sales to these sectors of electricity, excluding losses in generation and transformation (US DOE, June 1981 Monthly Energy Review, 20–21).

A summarization of mineral fuels consumption, plus electricity sales, plus losses in electricity generation and distribution for *all sectors* of the economy adds up to total energy consumption in primary energy equivalents. The UK provides data in final energy consumption by the various sectors on a heat supplied basis.

As regards classification of activities, it may be noted that in the US, FRG, France, and the UK, the energy sector is excluded from industry, which generally includes mining, manufacturing, construction, and, in the US, agriculture. For better comparability the household sector was combined with commerce – as separate data for households only are not available in the US and French compilations. Thus, the household and commerce sector includes the following activities:

USA: Housing units; nonmanufacturing business establishments, e.g., wholesale and retail trade; health and educational institutions, and government office buildings.

FRG: Households and small-scale users (Kleinverbraucher).

France: Households and tertiary sector which are services excluding transport and communications.

UK: Households and public administration.

For a comparison of energy consumption between countries it is necessary to keep in mind the differences in concepts and classification mentioned above. However, the data are perfectly adequate to indicate the share of various fuels and electricity in energy consumption by industry and households, and to trace the trend of fuel substitution.

4.1 USA

The industry sector excludes energy and includes agriculture, mining, manufacturing, and construction; data for the household and commerce sector are combined.

4.1.1 Mineral Fuels

The pre-1973 data were extrapolated on the basis of coal consumption (in million short tons), natural gas (billion cubic feet), and petroleum products (million barrels) 1950–1974 published in the US 1979 Statistical Abstract, p. 757. These data come from the Bureau of Mines and were compiled for the Minerals Yearbook. The 1973 to 1980 data are from the series of consumption of energy by the end use sector, published in the US DOE June 1981 Monthly Energy Review, pp. 18–24. Combining the two series was thought to be feasible, as the 1973 data correspond, and for overlapping years the trends implicit in the two series are similar, though not identical.

4.1.2 Electricity

The pre-1973 data were extrapolated on the basis of electricity sales to industry (large light and power) residential or domestic and commercial customers (small light and power) given for the years 1950–1978 in the US 1979 Statistical Abstract Table No. 1034 Electric Light and Power Industry, p. 613. The source for these data is the US Federal Power Commission; thereafter US Energy Information Administration, Six Year Summary of Power Production and Generating Capacity.

1973–1980 electricity consumption represents sales to the residential and commercial, and industry sector (excluding losses in generation and transmission). Data are from the US DOE June 1981 Monthly Energy Review, p. 20–21; the same tables used for mineral fuels consumption by industry and households, discussed above.

It may be noted that the electricity sales are given in quadrillion (10^{15}) Btu. For example, 1980 sales of electricity to the industry sector are given as $2{,}781 \times 10^{15}$ Btu. A conversion on the basis of 3,412 Btu per kWhr shows 1980 electricity consumption of purchased electricity by the industry sector as 815.1×10^{9} kWhr. This is the same figure as the one shown for electricity sales by the utilities to industrial customers in the US DOE June 1981 Monthly Energy Review, p. 63.

For more on electricity generation and sales, see also Section 6.

4.2 FRG

The 1950–1980 final consumption of solid fuels, petroleum products, gas, and electricity by the industry and household sectors are compiled by the Gesamtverband des Deutschen Steinkohlenbergbaus in Essen (personal communication 1 September 1981).

For 1970–1980, the industry sector is classified as "Endenergieverbrauch des übrigen Bergbaus und verarbeitenden Gewerbes"; this means all mining except coal mining; all manufacturing industries except petroleum refining; and construction. This classification differs somewhat from the "Endenergieverbrauch der Industrie" that applies for 1950–1969. However, the pre-1970 data may be used for extrapolation.

The household sector consumption is given in two sets; one "Energieverbrauch der Haushalte", 1960–1979, which relates to households only; and another "Energieverbrauch der Haushalte und Kleinverbraucher", 1950–1980, which includes households and other small-scale users. The "household and other small-scale users" group was selected for comparability with US and French data.

For a comparison of final consumption of electricity with electricity sales to industry and houesholds, and total electricity generation, see Section 6.

4.3 France

French final energy consumption of solid fuels, petroleum products, gas, and electricity are published by the Ministère de l'Industrie and by the Comité Professionnel du Pétrole. In the Ministère de l'Industrie et de la Recherche, the Bureau de Statistique de l'Energie (STISI) has prepared final consumption in accordance with the World Energy Conference, French National Committee. The data on final energy consumption, 1970–1980 are published in the 1979 and 1980 Annuaire Statistique de la France in the series "Consommation d'Energie des Utilisateurs Finals par Secteur d'Utilisation, avec Correction de Climat." The data are given in metric tons for petroleum products, kWhr for electricity, etc. and in tons of coal equivalents (tec). The steel industry final energy consumption is shown separately from that of other industries. This is similar to the classification applied by the UK that also provides separate data for the final energy consumption by the steel industry. Other sectors for which final energy consumption are provided, are: household and tertiary sector (which includes commerce); transport and communication; and agriculture.

The same breakdown by sectors and for mineral fuels and electricity is applied in the 1973–1980 final energy consumption, with this distinction that all data are given in toe (French TEP) released by the Ministère de l'Industrie, in Les Chiffres Clés, Energy 1981 published by Dunod, Paris 1981.

The same series, in toe, are also published 1965–1979 in Comité Professionnel du Pétrole, Eléments Statistiques, Activité de l'Industrie Petrolière 1978–1979.

The industry sector final energy consumption is given in terms of "gross" and "net." For the steel industry, the difference between "gross" and "net" consists in the blast furnace gas that is shipped out to other users; for "other industries" the difference between gross and net represents consumption of fuels for generation of electricity by industry outside the energy sector.

Our compilations of energy consumption by the industry sector shown in Tables 7, 9 and 33–35 are neither "gross" nor "net." Instead, they are gross minus that part of blast furnace gas leaving the steel industry, for which separate data are available. No other correction from gross to net was possible without data for individual mineral fuels.

For a comparison of the final consumption of electricity and electricity sales to industry and households, as well as total electricity generation, see Section 6.

4.4 UK

Final energy consumption of mineral fuels and electricity by sectors, 1970–1980 are shown in the series of "Energy Consumption by Final Users, Heat Supplied Basis" in the UK Department of Energy Digest of Energy Statistics 1979 and 1981. For updating on a monthly basis see also the UK Department of Energy's Energy Trends, a Statistical Bulletin. The data are provided for the following sectors: iron and steel industry; other industries; domestic (households); transport; and other final consumers, which includes public administration; agriculture; and miscellaneous. For comparability with the US, FRG, and French data, the final energy consumption of households was combined with that of public administration. The "heat supplied" data are given in toe. Data are also provided in original units of measurements.

For a comparison of final consumption of electricity and electricity sales to industry and households, as well as total electricity generation, see Section 6.

5 GASOLINE CONSUMPTION BY ROAD TRANSPORTATION SECTOR

Total energy consumption by the entire transportation sector, compiled by national authorities as part of their series on final energy consumption, was discussed in Section 4. For purposes of the comparability with price data, we limited the analysis to gasoline for road transportation.

5.1 USA

Gasoline consumption in Tables 4 and 29 represents supplies from the series of "motor gasoline total product" supplied 1973–1980 in the US DOE 1981 June Monthly Energy Review. For backdating to 1950 and compilation of index numbers (Table 29) use was made of the series of "Domestic Product Demand for Gasoline" from the US Department of Commerce, Survey of Current Business, Biennial Supplement 1977. For overlapping years, the series on "product supplied" and "domestic product demand" were found to be nearly identical. It should also be noted that these data correspond with the apparent consumption of gasoline in the UN World Energy Supplies, 1950–1974 Standard Table 12.

In 1980, the motor gasoline supplied amounted to 6583×10^3 barrels daily, or 2403×10^6 barrels a year. This was converted to 282.7×10^6 metric tons on the basis of 1 metric ton = 8.50 barrels of gasoline.

5.2 FRG

Gasoline consumption in Tables 4 and 30 represents inland consumption. The data on production plus imports minus exports compiled from the UN World Energy Supplies 1973–1978 and earlier issues correspond with "inland deliveries of gasoline" in EUROSTAT Monthly Bulletin of Hydrocarbons, April 1980. This issue and the one for June 1981 were used for updating the UN data.

5.3 France

Gasoline consumption shown in Tables 4 and 31 represents inland consumption of gasoline for automobiles, published by the Comité Professionnel, Eléments Statistiques 1978, p. C6. The data are in close agreement with the motor spirit inland deliveries published by the EUROSTAT Hydrocarbons Monthly Bulletin June 1981. The latter source was used for updating to 1980.

5.4 UK

Gasoline consumption, shown in Tables 4 and 32 was compiled from two sources. Data for 1950–1967 represent production plus imports minus exports, compiled from UN World Energy Supplies 1950–1974. Data for 1968–1980 represent inland deliveries by end use, motor spirit, compiled from Digest of UK Energy Statistics 1981, p. 84. For updating see also UK Department of Energy (Monthly) Energy Trends, A Statistical Bulletin. Data also correspond with EUROSTAT Hydrocarbons, June 1981.

6 ELECTRICITY GENERATION AND SALES

The following paragraphs relate to total electricity generation (Tables 4 and 29–32); and to sales of electricity to industry and households (Table 36). Note that the *sales* to industry and households (Table 36) do differ from *consumption* by industry and households including commerce (Tables 5–9) becasue of differences in methods of compilation and classification.

6.1 USA

6.1.1 Total Electricity Generation

The index numbers of electricity consumption 1950–1980 shown in Table 29 represent *total production* of electricity, by public utilities and industries, from all sources (thermal, hydro, nuclear, geothermal, and waste). Data include the generation of electric energy by manufacturing and extracting industries, and by electric railroads and railways, but exclude electric energy generated by the following sources: nonutility generating plants of less than 100 kW capacity; plants operated by hotels, apartment houses, office buildings, or other commercial, transport, or service establishments; and plants in military installations. Data for 1950–1972 are from the US Historical Statistics, Colonial Times to 1970, Vol. II, p. 820, Table S-32-43; and the US Statistical Abstract 1978, p. 162. The two sources correspond with each other and with the data for total electricity generation 1950–1978 in the UN World Energy Supplies 1973–1978, p. 294, Table 25 and earlier issues.

Very recent data on total electricity generation are not readily available in current US statistical publications. The electricity generation shown in the DOE Monthly Energy Review relate to "Net Electricity Production, by Utilities and Industry;" they correspond

with the "Electric Utilities, Total Production" in the US Department of Commerce, Survey of Current Business. For details, see Table 43.

The index implicit in the *net* electricity production, 1973–1978 is quite similar to the one of *total* generation. Therefore, the updating 1973–1980 is based on the *net* electricity production by utilities and industry, shown in the DOE Monthly Energy Review.

6.1.2 Sales of Electricity to Industry and Households

For 1973 to 1980, the sales of electricity to industry (including agriculture, mining, and manufacturing) and households in Table 36 are from the series of sales to ultimate consumers, based on the Federal Energy Regulatory Commission Form 5 Monthly Statement of Electric Operating Revenue and Income, published in DOE Monthly Energy Review, e.g., June 1981, p. 63. For extrapolation to 1950, use was made of the series of electricity sales to industrial and residential customers, 1950–1978 in the US Statistical Abstract 1979, Table No. 1034 Electric Light and Power Industry, Energy Generated, Sales, Revenue and Customs 1950 to 1978.

As can be expected, total electricity *sales* to ultimate consumers are at a somewhat lower level than total *net production*, for a comparison, see Table 43. The distribution into four user groups: industrial, residential, commercial, and others (including street lighting and transportation) are shown in Table 44.

6.2 FRG

6.2.1 Total Electricity Generation

Electricity consumption index numbers 1950–1980, shown in Table 30, represent total gross generation from all sources. The data compiled from the UN World Energy Supplies 1973–1978, and earlier issues check with "total gross generation of electricity from all sources" in EUROSTAT Monthly Bulletin of Electrical Energy, February 1980 and May 1981. This source was used for updating and for 1980 electricity generation in kWhr.

6.2.2 Electricity for Industry and Households (Table 36)

The data for 1950–1960 were extrapolated with the series of final energy consumption.

The 1960–1980 data were compiled from the EUROSTAT Electrical Energy, Monthly Bulletin, 1977 June, 1980 June, and 1981 June; from the series on availabilities for the internal market minus network losses, for "industry" and "households." It may be noted that data are also available for other consumer groups (e.g., rail transports) and handicrafts, commerce, etc. However, we limited the selection to industry and households only, because of the availability of electricity price indices for these groups.

The 1970 = 100 based index in the EUROSTAT series of electricity availability for industry and households was compared with the index implicit in the final consumption of electricity by industry and households (only) compiled by the Gesamtverband des Deutschen Steinkohlenbergbaus, discussed in Section 4. It was found that for industry consumption, there is close agreement for the years 1970–1976; thereafter the Gesamtverband index tends to move at slightly higher levels; however for 1980 as percent of 1970

there is close agreement with the Gesamtverband index of 130.9 and the EUROSTAT index of 129.9.

For household (only) consumption of electricity, there is close agreement between the two sources for all the years under consideration.

6.3 France

6.3.1 Electricity Generation

The index numbers of electricity consumption 1950–1980 shown in Table 31, represent total generation from all sources. Data for 1950 to 1969 were compiled from the UN World Energy Supplies 1950–1974, Table 21; 1970–1978 is from the Comité Professionnel du Pétrole, Pétrol Elements Statistiques (1978–1979). The 1979–1980 data relate to total gross generation from all sources, from the EUROSTAT Electrical Energy Monthly Bulletin of February 1980 and May 1981. This source was used for updating and for electricity generation in kWhr.

6.3.2 Electricity for Industry and Households (Table 36)

The 1960 to 1980 data were compiled from EUROSTAT (see Section 6.2).

A comparison of the 1970 = 100 based index of electricity availabilities compiled from EUROSTAT with the index implicit in the final consumption of electricity (Section 4), shows fairly close agreement for the years 1970 to 1979. But for 1980, there is a discrepancy between the two indices, based on preliminary data for that year.

Index of electricity consumption by industry

	Final energy consumption	EUROSTAT availabilities
1970	100.0	100.0
1979	132.0	133.4
1980	133.5	140.9

For households, a comparison was made between electricity final consumption by households and tertiary sector (Section 4) and the EUROSTAT availabilities of electricity for households (only). Since the classifications are not the same, it cannot be expected that the trend implicit in the two series should be identical. However, the discrepancy is so large that it should be noted. For explanation of some of the discrepancies it may be recalled that household electricity consumption increased markedly with the promotion of central heating by electricity that began in the mid 1970s.

6.4 UK

6.4.1 Total Electricity Generation

The index numbers of electricity consumption 1950–1980 shown in Table 32 represent electricity generation from all sources. The data compiled form UN World Energy

Supplies 1973–1978 and earlier issues correspond with "total gross generation of electricity from all sources" in EUROSTAT Monthly Bulletin of Electrical Energy, February 1980 and May 1981. This source was used for updating; and for 1980 electricity generation in kWhr, shown in Table 4.

6.4.1 Electricity for Industry and Households

For the sales of electricity to industry and households, (Table 36), compiled from EUROSTAT, see Section 6.2.

A comparison of the 1970 = 100 based index of the EUROSTAT electricity availabilities for industry with the index implicit in the final electricity consumption by industry (Section 4), shows that the two series agree for the years 1970–1976; thereafter the index implicit in the final electricity consumption (compiled by the UK authorities) tends to move at higher levels than EUROSTAT – this is somewhat similar to what was observed in the FRG. However, for 1980 the two series are more similar. The electricity consumption by industry in 1980 as percent of 1970 is 109.2 (final electricity consumption), and 107.2 (EUROSTAT).

A comparison of the trend implicit in final electricity consumption by households with the EUROSTAT availabilities of electricity for households shows very close agreement between the two series.

7 ENERGY PRICE LEVELS, 1970–1980

The prices of individual energy commodities paid in national currencies by the various purchasing sectors (industry, utilities, household, transportation) were compiled for mineral fuels (Tables 10–13), gasoline (Table 14), and electricity (Table 15). The purpose of these tabulations was to see whether the interfuel price relations have shifted over the last decade due to varying intensities in price escalations. Without average prices – e.g., for the group of coal products used by total industry, or the group of all petroleum products used by households – it was necessary to make a selection from a variety of solid fuels, or petroleum products, etc., that command different prices because of different qualities or suitabilities. Where feasible, we gave the prices of several energy commodities within the same group, e.g., anthracite and bituminous coal, in order to see upper and lower limits. Where feasible, we also showed the OECD compilations; this was done as a check on the range of prices suggested by our selections. However, it is not certain whether the price samples we selected can be regarded in all cases as typical for the particular group of fuels under which they are listed. For this reason, it was thought useful to indicate the methodology along with the interpretations in Part II Observations, Section 2 Energy Price Levels 1970–1980. The sources and conversion factors for each of the prices selected are indicated in Tables 10–15.

8 ENERGY PRICE INDEX NUMBERS, 1950–1980

While the energy price levels (Tables 10–15) discussed in Section 7 relate to individual energy commodities, the index numbers discussed here are for *groups* of energy products

that, with proper weighting, should be representative for the use of various consumer groups. Tables 16–24 show the index numbers of the prices for mineral fuels and electricity used by industry and household sectors, as well as gasoline for road transportation. The data in Tables 16–19 are in *current* prices; we have adjusted these prices for general inflation by using GDP deflators (see Tables 20–24).

The following paragraphs relate to the energy price index numbers currently available from government sources, and the possibilities of backdating and updating on a monthly basis.

8.1 USA

8.1.1 Industry Sector

Two series, both relating to energy prices paid by the industry sector, are published in the Economic Report of the President of January 1981. One is the crude materials for further processing, 1947–1980; the other is the producer price index for fuels and related products and power as industrial commodities. We selected the latter, where total energy shown in Table 16 includes crude petroleum, refined petroleum products, coal, coke (foundry byproducts), gas fuels, and electric power. The components of this index are not shown in the President's Report. Thus, for separate fuel commodity and electricity we used the 1960–1976 data in the US Statistical Abstract 1977, p. 473. The index numbers can be backdated to 1950 with the biennial supplement to the US Department of Commerce, Survey of Current Business, e.g., the 1977 supplement, 19th biennial edition. For updating 1976–1980 see the monthly US Bureau of Labor (BLS) Monthly Labor Review, e.g., April 1981, series of producer price indices by commodity groups, or the monthly Survey of Current Business, e.g., April 1981.

It is understood that "producer price paid by industry" is synonymous with wholesale price, because the same index for total fuels and related products and power appears as producer price in the President's Economic Report, and as wholesale price in the US Statistical Yearbook.

8.1.2 Household Sector

For energy prices paid by the household sector shown in Table 16, use was made of the BLS series of consumer prices. See the consumer price index, US city average, all urban consumers, fuels (which includes electricity). The index relates to all urban consumers since January 1978; earlier data comprise wage earners and clerical workers. Total energy includes fuel oil; coal and bottled gas; utility piped gas; and electricity. For data 1957–1980, see the President's Economic Report 1981, p. 289, Table B. 50. The source of the historical data for fuel commodity groups is the BLS Handbook of Labor Statistics, 1975. For more current data, 1970–1977, see Statistical Abstract 1978, p. 499, Table 806; for updating on a monthly basis, see the BLS Monthly Labor Review, e.g., April 1981. Data on solid fuels are not shown in Table 16 as a separate index for the price of household coal ceased to be published some time ago.

For natural gas we used utility (piped) gas. For petroleum products, one has the choice between "fuel oil, coal, bottled gas" and only "fuel oil" (No.2), the two indices, 1970 = 100, are shown.

Consumer price index numbers;

	Fuel oil, coal, bottled gas	*Fuel oil (No. 2)*
1970	100.00	100.00
1971	106.72	106.31
1972	107.63	106.68
1973	123.52	123.06
1974	194.91	194.88
1975	213.71	210.98
1976	229.79	226.17
1977	157.40	256.36
1978		167.51

For the data in Table 16, we selected the price index of fuel oil No. 2; the difference between the two indices is minimal.

8.1.3 Road Transportation Sector

In the USA, retail prices of gasoline are published by the Department of Commerce, the Bureau of Labor Statistics, and the Department of Energy, Commerce Department prices exclude taxes. The retail prices of gasoline excluding taxes, in dollars per gallon of regular grade gasoline at service stations, for an average of 55 cities, are published in the US Department of Commerce, Survey of Current Business, April 1981, Standard Table S-35. For backdating 1947–1976, see the biennial supplement, 1977.

For both Tables 14 (gasoline price levels) and 16 (gasoline price indices) we used the price at the pump, including taxes.

The gasoline price index 1950–1980 shown in Table 16 is from the President's Economic Report of January 1981, Table B-51, p. 291. It is from the series transportation, private, gasoline. For updating, e.g., on a monthly basis, see the consumer price index, gasoline, US city average, all urban consumers, published in the BLS Monthly Labor Review.

It may be noted that the index implicit in the gasoline prices shown in Table 14 need not be indentical with the indices shown in Table 16 for gasoline. Although both series relate to retail prices, tax included, there are differences, as one series relates to the price of only one type of gasoline whereas the other includes regular and premium. There may also be differences in cities and service stations surveyed, as well as reference periods during the year.

8.2 FRG

8.2.1 Industry Sector

Statistisches Bundesamt compiles two series of industry sector prices. One is the price index for basic materials, published monthly in Index der Grundstoffpreise, Fachserie 17, Reihe 3, the other is the producer price index, published monthly in Preise und Preisindizes für Industrielle Produkte (Erzeugerpreise), Fachserie 17, Reihe 2. For yearly the Jahrbuch, and change the 1967 base year to 1970. A price index for total energy is

not available from either series. However, the Grundstoff price series contains an index for coal, crude oil, and petroleum products; and one for electricity, gas, and water. The 1970 weights for these indices are 105.18 for coal, crude oil, and petroleum products; and 43.53 for electricity, gas, and water. The index shown in Table 17 represents the addition of the two indices, using their 1970 weights. For the addition of the two indices, see Table 39.

For proper interpretation of the data in Table 17, note that the price of crude oil is included in the basic materials series, but virtually excluded from the producer prices. This explains why during certain years, e.g., 1974–1976, the price index for total energy increased more than the price indices of the energy commodity groups.

The price indices for energy commodity groups shown in Table 16 were compiled from the series of producer prices, e.g., coal mining products for solid fuels; natural gas; and total electricity. It may be noted that for these energy groups we found hardly any difference between the prices compiled from the basic materials and the producer price series.

8.2.2 Household Sector

The index numbers, shown in Table 16, of prices paid by the household sector are part of the cost of living series, all private households. Data are published monthly by Statistisches Bundesamt in Preise und Preisindizes für die Lebenshaltung, Fachserie 17, Reihe 7. Annual Averages, 1972–1978, are from Statistisches Jahrbuch 1979, p. 487. For backdating see earlier issues of the Jahrbuch. Total household energy comprises electricity, gas, coal, and liquid fuels excluding gasoline. Indices are published separately for the component energy groups.

8.2.3 Road Transportation Sector

The gasoline prices shown in Table 14 and the index numbers in Table 16 were compiled from the prices, tax included, DM per liter of normal gasoline, regular brand (Normalbenzin), which are a part of the series of consumer prices, selected products (Verbraucherpreise für ausgewählte Waren). Data are published monthly in Preisindizes für die Lebenshaltung, Fachserie 17, Reihe 7. Annual data are published in Statistisches Jahrbuch, e.g., 1979, p. 409, and earlier issues.

It may be noted that the index implicit in the price per liter described above is very similar to the liquid fuels (Kraftstoffe) consumer price index, all private households, published monthly in Fachserie 17, Reihe 7, and annually in Statistisches Jahrbuch.

8.3 France

8.3.1 Industry Sector

The energy price index numbers shown in Table 18 are from the series of wholesale prices, tax included, published on a monthly basis in the Institut National de la Statistique et des Etudes Economiques (INSEE) Bulletin Mensuel de Statistique, e.g., April 1981, p. 36, 39 Produits Energétiques. Total energy includes, and indices are shown separately for coal, refined petroleum products, electricity, natural gas, Gaz de France, and water (for industrial use). Crude petroleum is not included. For annual averages of this series, see the INSEE Annuaire Statistique de la France, e.g., 1977, and earlier issues.

8.3.2 Household Sector

The household sector prices shown in Table 18 are from the series of Monthly Consumer Prices, Urban Households, France, published monthly in INSEE Bulletin Mensuel de la Statistique, e.g., April 1981, p. 44. Total household energy includes, and indices are shown separately for, coal, liquid fuels, gasoline, city gas, and household electricity. The annual averages are published in the INSEE Annuaire Statistique. The data for 1962–1969 were extrapolated from the old index, 1962 = 100. The composition of the old index may differ from the current one.

8.3.3 Transport

The gasoline price shown in Table 14 and the index numbers in Table 18 are based on the retail price, tax included, in francs per liter of regular gasoline (essence ordinaire) sold in the Paris agglomeration. The 1971–1977 prices are from the Annuaire Statistique 1978, p. 587; the 1978–1980 prices are from the INSEE Bulletin Mensuel de Statistique, April 1981. The series was backdated to 1950 with the price in francs per liter of essence auto, tax included, in the Comité Professionel du Pétrole, Pétrole 1973, Eléments Statistiques, Paris 1974. For overlapping years, the data from the Comité corresponded with those of the Annuaire Statistique.

8.4 UK

All energy price index numbers for the years 1970–1980 are from the Department of Energy's series of "current fuel price index numbers, domestic sector and industrial sector" that have recently become available, and are published with the base year 1970 = 100 in the UK Department of Energy, Energy Trends, e.g., May 1981.

8.4.1 Industry Sector

The industry sector prices shown in Table 19 are the Department of Energy's current price indices for "total fuel" and its components: coal, heavy fuel oil, gas, and electricity for the years 1970–1980. It is assumed that this index excludes crude oil. The Department of Energy index is different from the Department of Industry's price index of fuels that is part of their series "wholesale prices: index numbers of materials purchased by manufacturing industry." The wholesale price index of fuels includes petroleum products but may exclude electricity, and relates to the purchases of selected broad sectors of industry. The index, base year 1970 = 100, is published in the CSO Annual Abstract of Statistics, 1979 edition, p. 463. In the 1980 edition of the Abstract, the base year was changed to 1975 = 100. Whatever the base year, the Department of Industry's wholesale price index of fuels purchased by broad sectors of industry rose at a slower pace than the industrial sector current fuel price index of the Department of Energy. It may be worth noting that the Department of Industry compiles another wholesale price index of fuels, purchased by (total?) manufacturing industries. This index, 1970 = 100, is published in the UK Digest of Energy Statistics 1978, Table 91. According to the explanatory notes to this index, the total fuel purchased by manufacturing industries includes coal except for carbonizing, gas, and electricity, but does not include petroleum-derived fuels as these are part of the output of the manufacturing industry. With petroleum products excluded, it is

obvious that the index tends to rise at a much slower rate than the two above-mentioned fuel price indices. It is published by the OECD as "wholesale prices of manufacturing input: fuel" in Main Economic Indicators, January 1980, p. 152.

For a comparison of the three fuel price indices described above, see Table 42.

To the best of our knowledge, there are no long-term wholesale price indices for energy commodity groups. Therefore, the indices shown in Table 19 were backdated to 1963 with index numbers compiled form the price of individual fuels delivered to large consumers in the manufacturing sector. See prices in £ per ton of coal and per ton of heavy fuel oil, in pence per therm for gas, and pence per kWhr for electricity, 1968–1978, in the Digest of UK Energy Statistics 1979, Table 87, p. 117. Data for 1963 to 1967 were taken from earlier issues of the digest. For the years 1963 to 1973, the index numbers implicit in these prices correspond with the prices per 10^6 Btu for solid fuels, gas, liquid fuels except gasoline and electricity given in Doblin, 1976 Table 2.6, p. 63. Therefore, the latter figures were used for extrapolation of the prices to 1955.

8.4.2 Household Sector

The household sector energy prices total and by commodity groups 1970–1980 are from the "domestic sector current fuel price index numbers" published in the Department of Energy, Energy Trends, May 1981. Total energy includes fuel and light, but excludes gasoline. The indices are very close to the UK Department of Employment general index of retail prices, that was selected for backdating of the series. See retail price indices for total fuel and light, and individually coal, gas, and electricity in the Digest of UK Energy Statistics 1980, and the UK Statistical Abstract.

8.4.3 Transportation Sector

The gasoline price index shown in Table 19 represents "motor spirit"; it is taken from the domestic sector price series, published in the Energy Trends 1981. For backdating, use was made of the price at the pump, tax included, of regular gasoline published in the OECD Energy Statistics 1975/1977 and in Doblin, 1976.

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