THE GROWTH OF ENERGY CONSUMPTION AND PRICES IN THE USA, FRG, FRANCE, AND THE UK, 1950-1979

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PREFACE

This paper examines data on GDP, industrial output, energy consumption, and price of fuels and electricity in Western developed countries for the period 1950-1979. The study of these time series may shed some light on the relationship between the growth of GDP and energy consumption, a relationship which seems to have entered a new phase following the first oil price explosion of 1973. In particular, information on the most recent developments in energy consumption in the face of escalating prices may assist in the study of price elasticities in this new situation. Prices are taken in current values and adjusted for general inflation; they are monitored by broad sectors of the economy (industry, households, transportation) and for groups of fuel commodities and electricity. The growth of energy consumption and prices is illustrated by a set of graphs in Part I. The major observations are given in Part II. The data are presented in table form in Part III. Part IV provides concepts, definitions, and sources of the variables selected.

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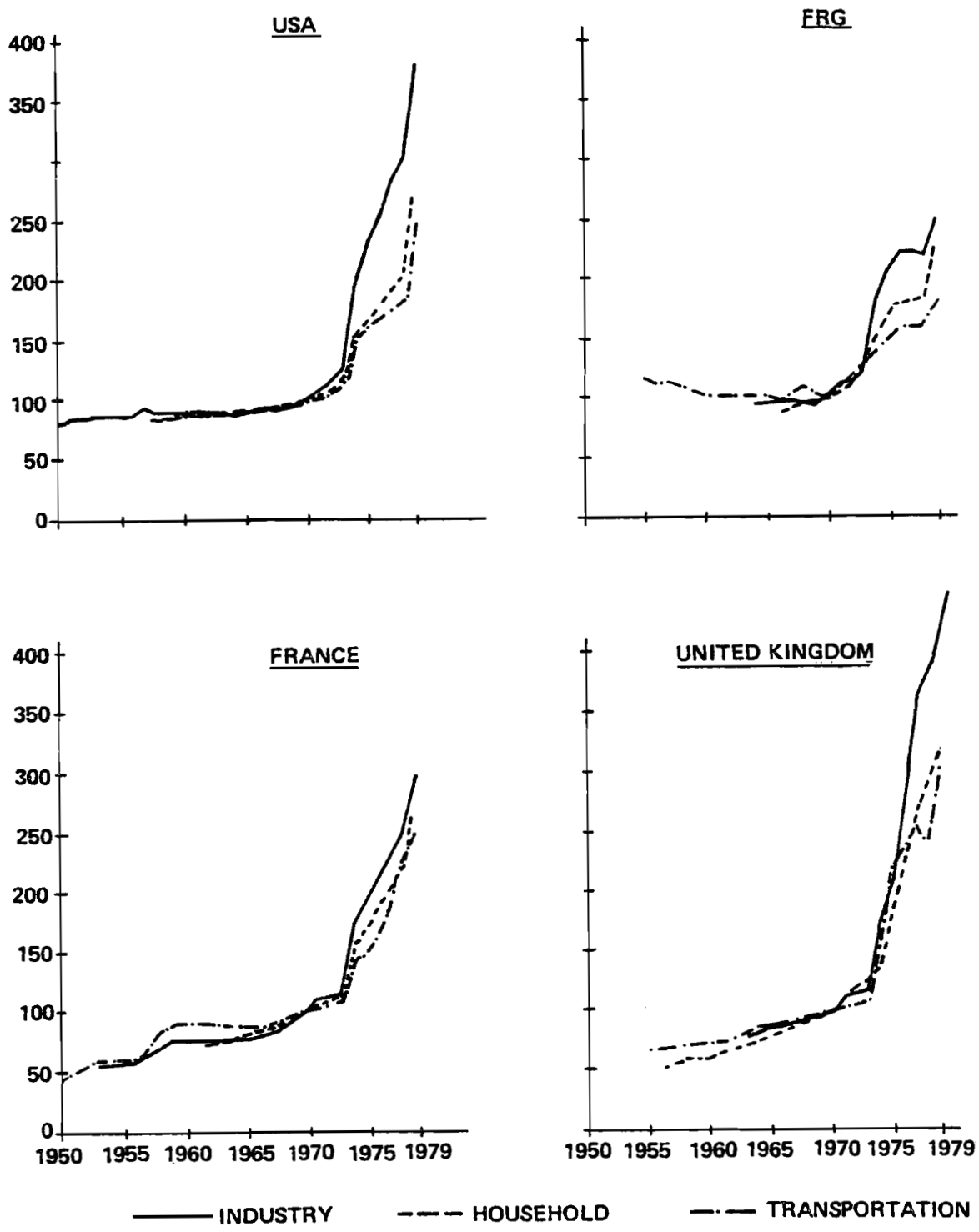

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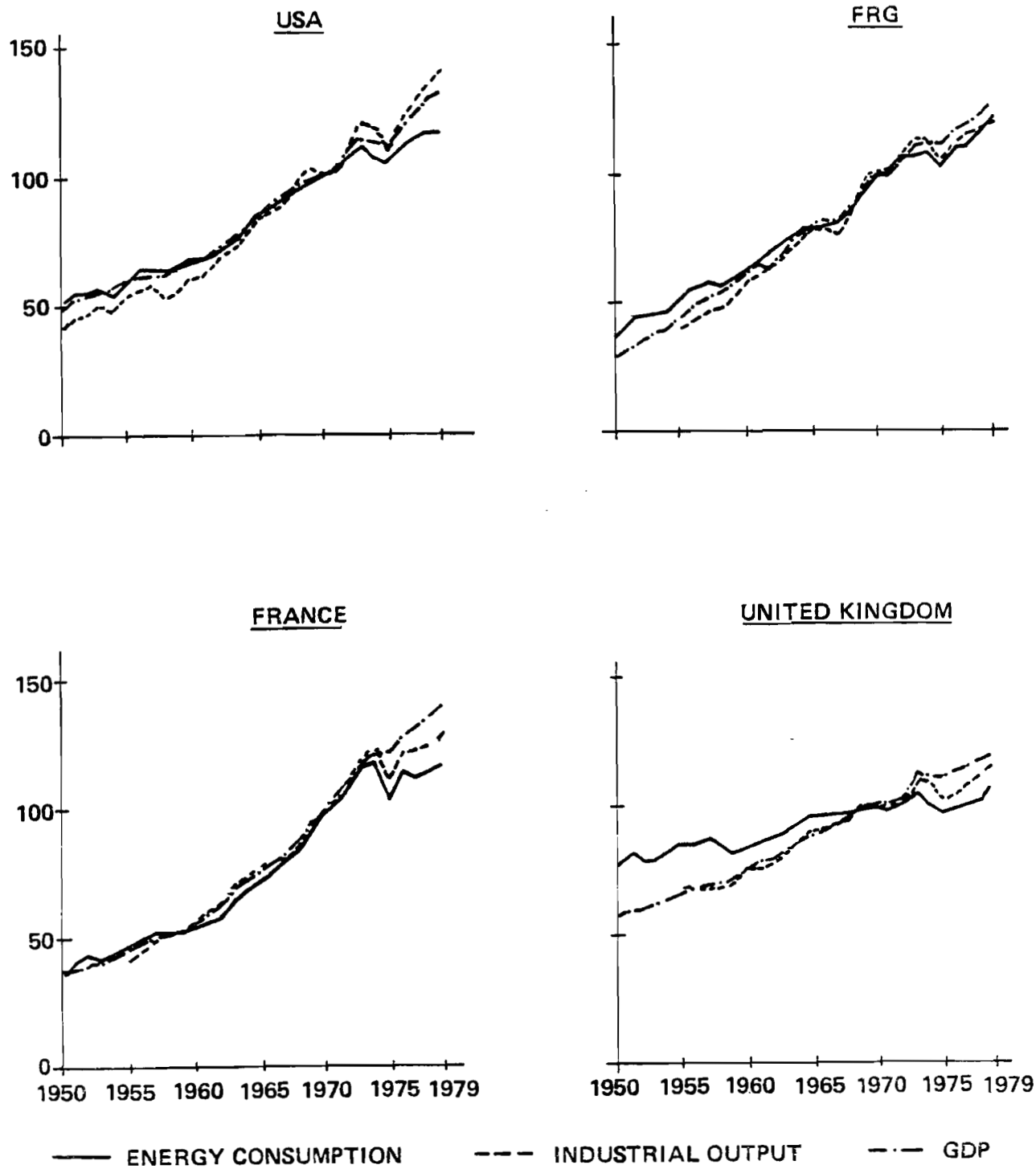

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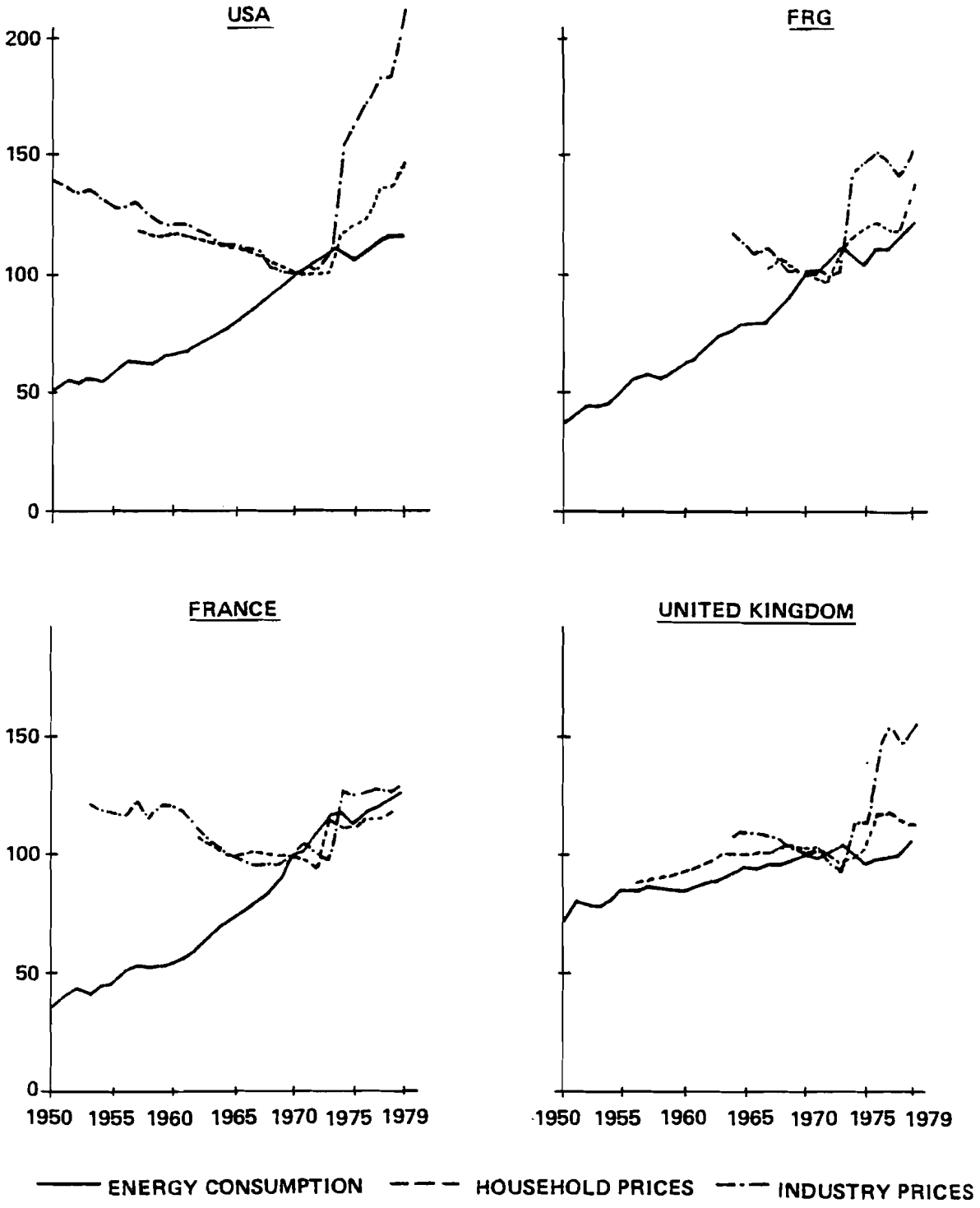

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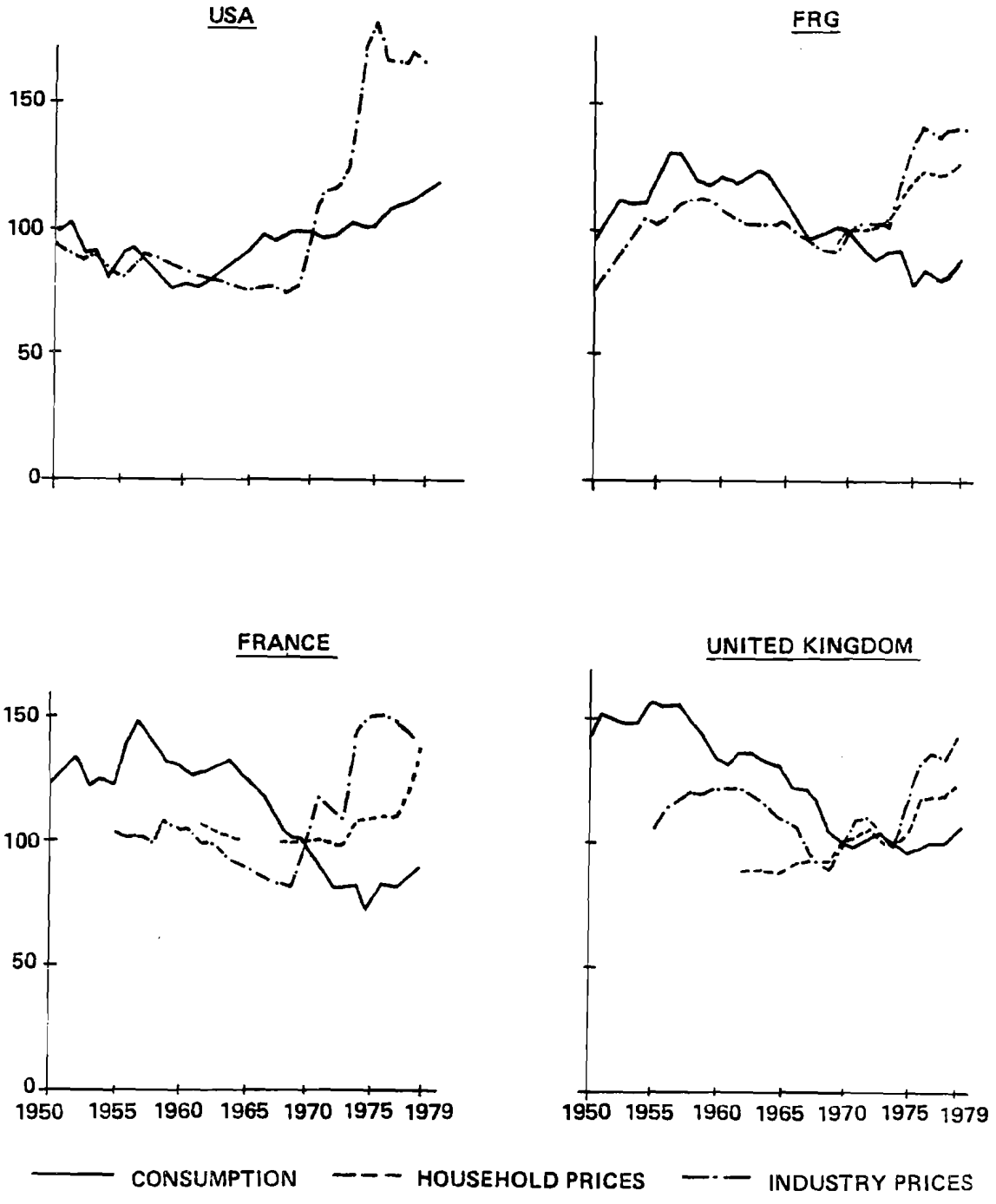

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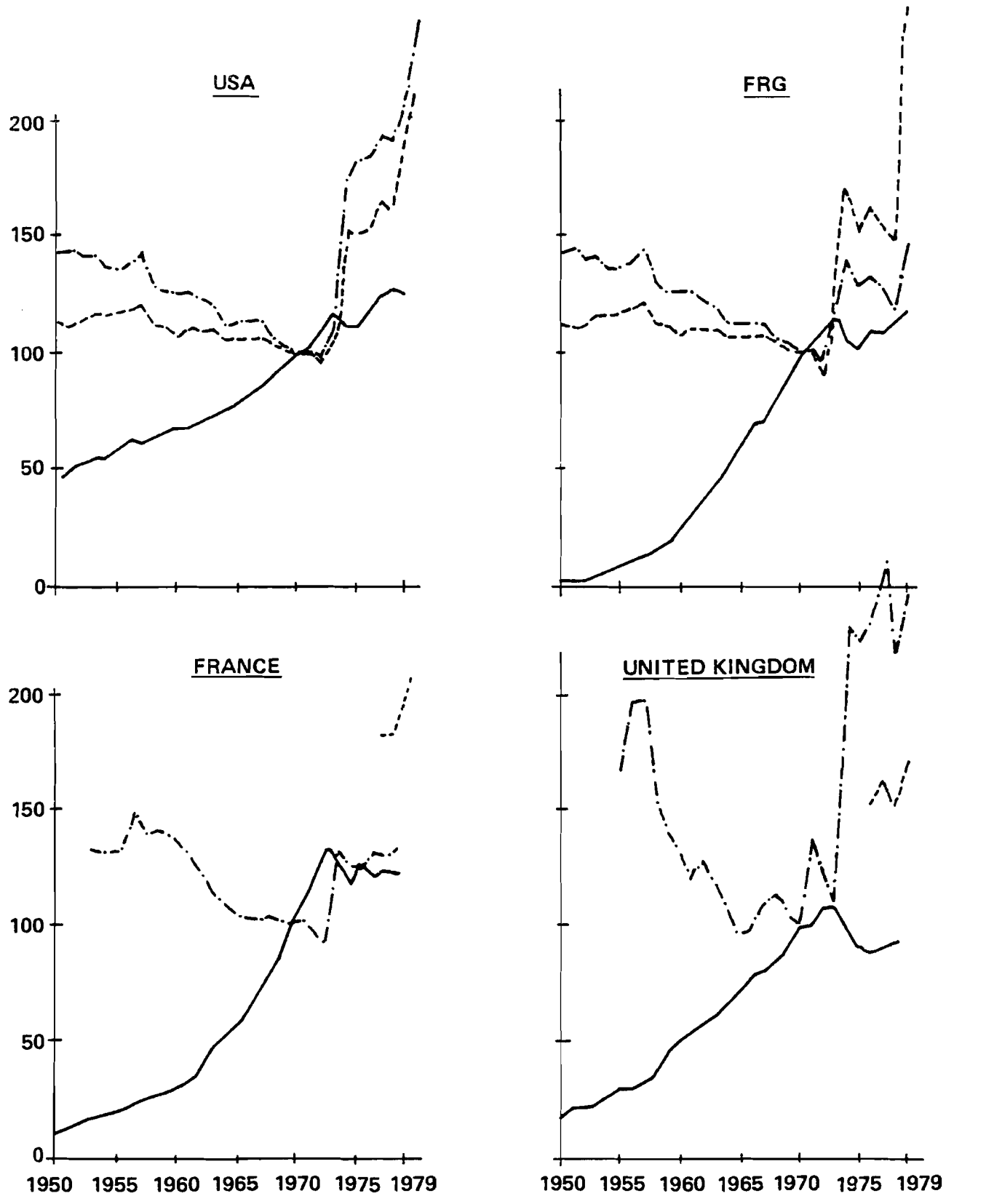

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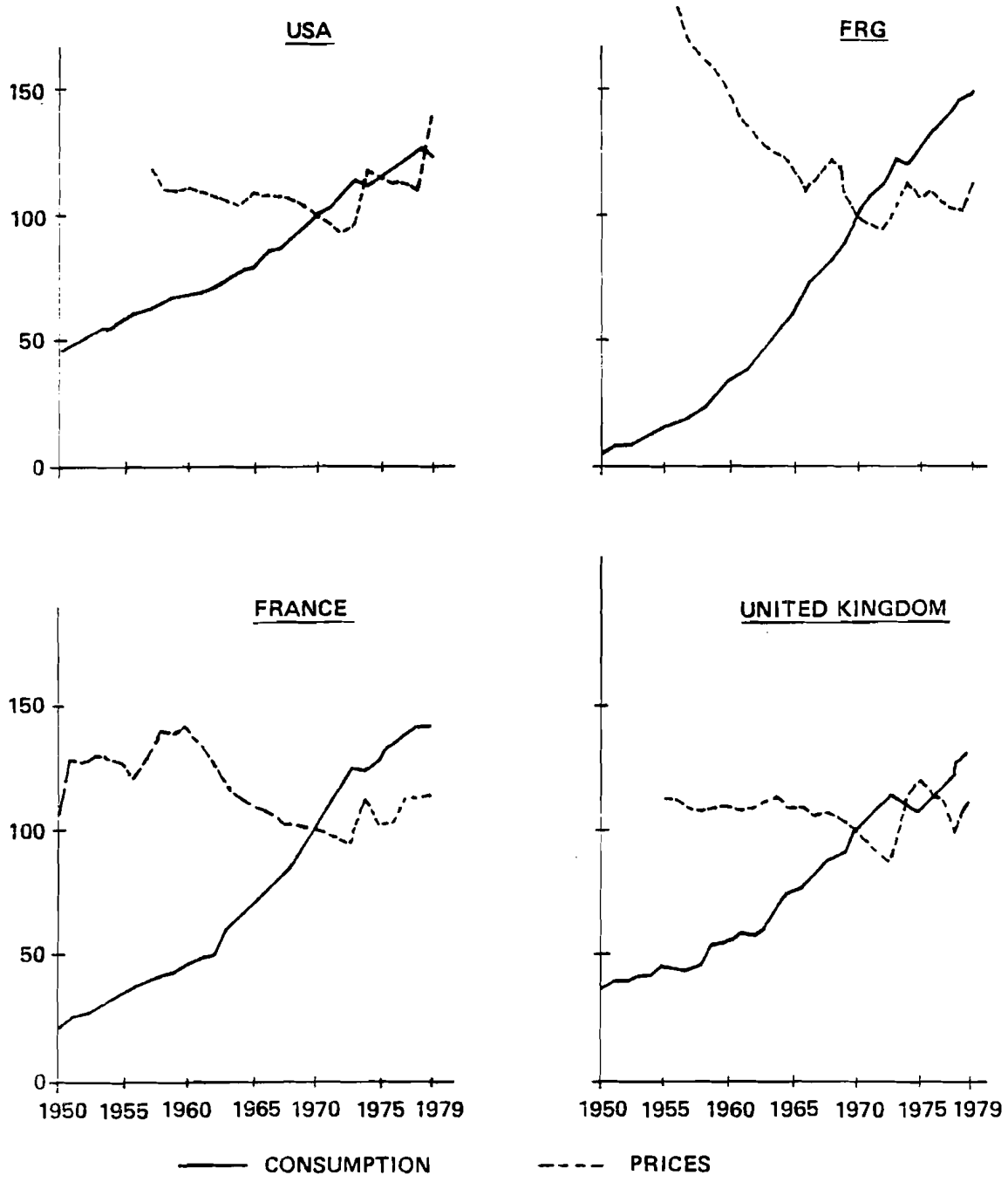

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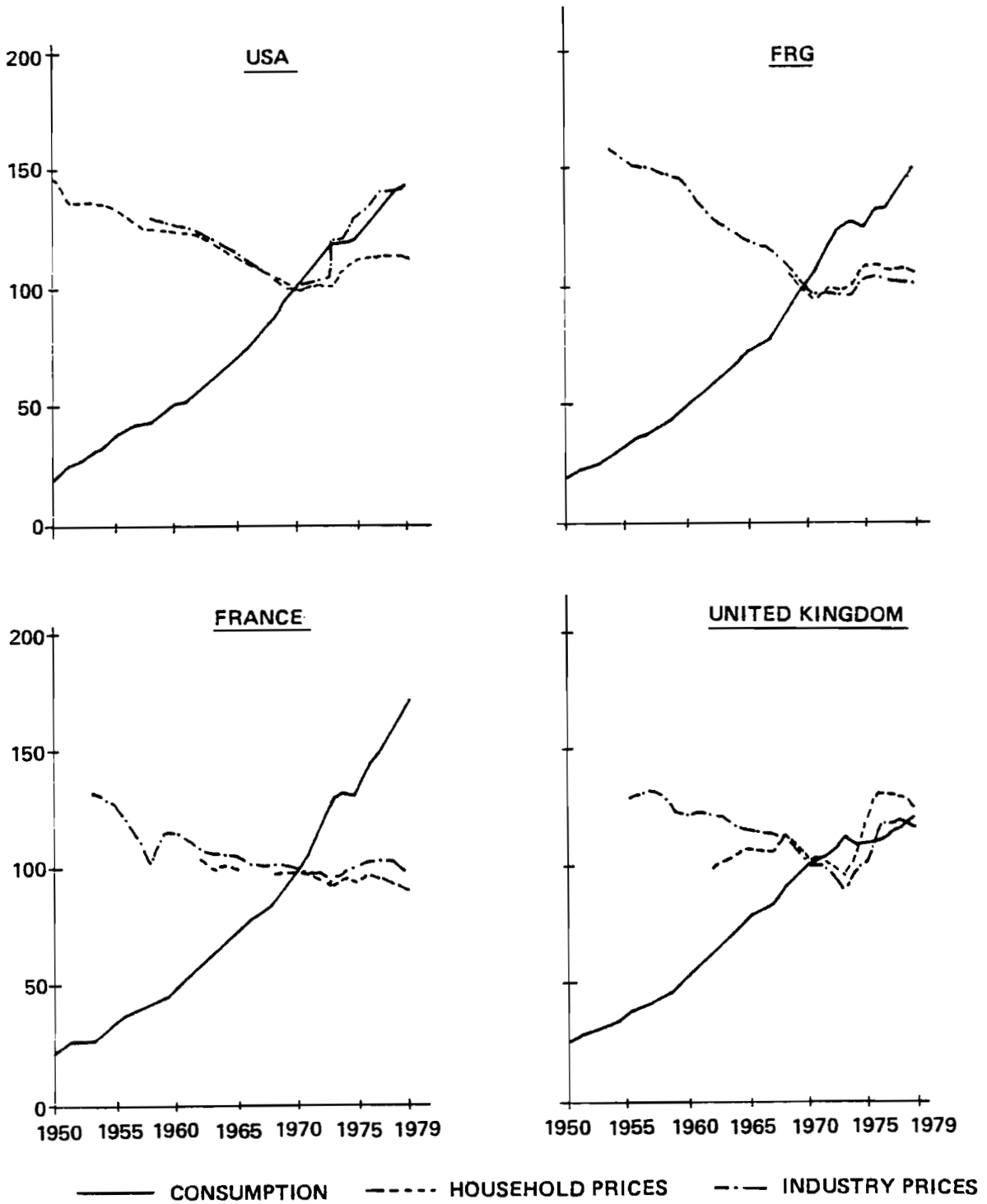

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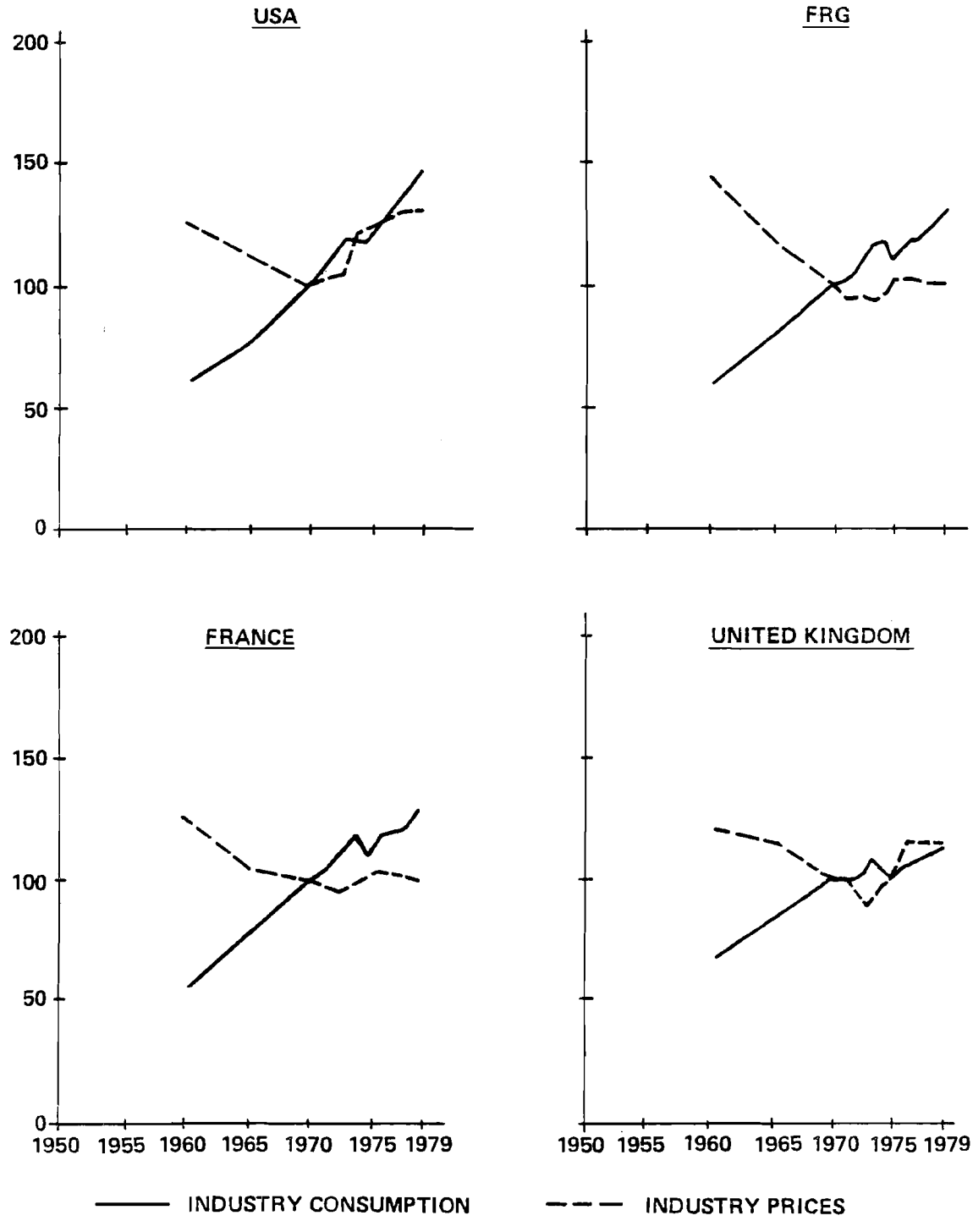

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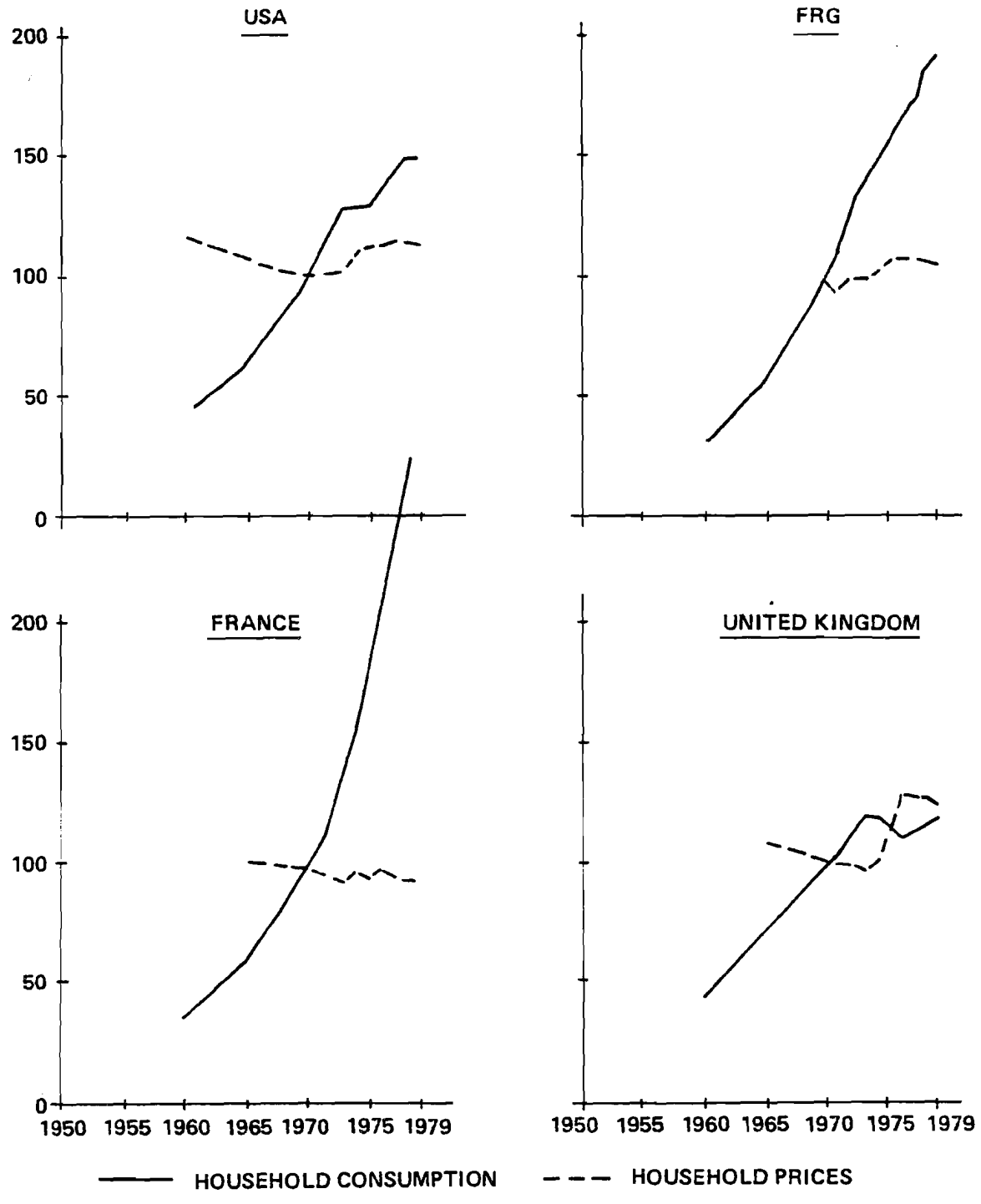

PART II. OBSERVATIONS

1. INTRODUCTION

1.1. Field of Observation

The present study of the development of energy consumption and prices is carried out at an overall, national level. For this purpose, GDP (or GNP for the US) is seen as value added for the economy as a whole, and not by sectors or industries. Likewise, the index of industrial production is not detailed by industries. Energy consumption is first considered as total in terms of primary fuel equivalents, for the country as a whole. Secondly, it is given for selected groups of fuel commodities and electricity.

The analysis centers on the US 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 EC countries under EUR 9.)

The data are mostly compiled in terms of index numbers, with 1970=100, permitting a clear view of the developments over the last decade. By way of introduction, a few variables are also shown in physical quantities, see Tables 1-8.

1.2. Population, GDP, and Energy Consumption Levels

Table 1 shows that the US population grew from 200.7 million in 1968 to 220.6 million in 1979; this was an increase of about 10%. At the same time, the EUR 3 population grew from 165.2 million to 170.7 million, or by little more than 3%. GDP in

constant prices and dollars of 1975 (Table 2) increased in the US from $1319 billion in 1968 to $1811 billion in 1979; in EUR 3 the expansion was from $773 billion to $1129 billion over the same period. Total energy consumption in terms of primary fuel equivalents rose in the US from 2222 billion tce (tons of coal equivalent) to 2816 billion tce in 1979; at the same time, the EUR 3 energy consumption rose from 804 billion tce to 1067 billion tce (Table 3).

In short, during the last decade, population continued to grow in the US, while it was nearing stagnation in EUR 3; real GDP expanded more virgorously in EUR 3 than in the US; while total energy consumption rose less than GDP in the US and EUR 3.

The 1975 consumption of selected fuel commodity groups and electricity are shown in Table 4. The data are given in order to convey an idea of the order of magnitude of the consumption of various fuels and electricity for which the growth data have been compiled in index numbers.

1.3. Energy Price Levels

The 1975 prices of selected fuel commodities per 10^7 kcal (1 ton of oil equivalent, toe) and of electricity per kWh are shown for the US, FRG, France, and the UK both in national currencies (Table 5) and in US dollars (Table 6). These data are compiled from the OECD Energy Statistics 1975-1977 [1]. They need not be identical with the industry and household prices underlying the index numbers in Tables 9-12, because they relate to selected fuels, whereas the index is made up of a group of fuel commodities. However, they convey an idea of the level of prices of various energy carriers within a country (Table 5) and from country to country (Table 6).

For example, one sees considerable differences in prices (paid in 1975) for a given thermal unit of coal, gas, or petroleum products. Accordingly, in the US, FRG, France, and the UK, industry paid less per 10^7 kcal of coal than for the same unit of gas and petroleum products. One also sees that household paid more than industry, whether they purchased coal, petroleum products, gas, or electricity. On the international level, prices of coal and gas purchased by industry were lowest in the US; petroleum products' prices were the lowest in the UK, but US prices for these products were well below those of the FRG and France. For electricity, comparisons with the US are not possible from the data in Table 6, but among the three European countries, the electricity price (for industry and households) was higher in the FRG than elsewhere.

Gasoline retail prices, per liter of regular with tax included, the so-called prices at the pump, are shown for the US and European countries, 1968-1980 both in national currencies (Table 7) and in US dollars at current exchange rates (Table 8). As detailed in Part III, these prices are compiled from national statistical publications for a standard type of gasoline. Here

it may be noted that the price index implicit in the data in Table 7 need not be identical in all instances with the consumer price index for gasoline shown in Tables 9-11, 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. The gasoline prices shown in Tables 7 and 8 also differ from those published in the OECD Energy Statistics [1]. This is so, because the OECD prices relate only to January 1 of each year. Moreover, the exchange rates used by OECD may vary somewhat from those used in Table 8.

Whatever the methods of compilation, the data in Table 8 show clearly that, in the US, gasoline prices were much lower than in Europe. To some extent, this shows the dollars' declining exchange rate, but that is not the only factor. Some explanation for the relatively low level of US gasoline prices as compared to European prices may be seen in the fact that the US tax on gasoline is comparatively modest. From October 1973 through February 1978, Federal and State taxes on gasoline amounted to 12 cents per gallon, according to data in the Statistical Abstract of the United States [3] 1978, p. 655, table 1102. This means that the share of taxes in the total selling price decreased from nearly 30% in October 1973 to 18% in 1978 and barely 16% in the second quarter of 1979, according to the OECD International Energy Trends, First and Second Quarters 1979 [39]. But in the European countries, the share of taxes in gasoline prices was 50% and more in 1978 (namely 62% in France; 59% in the FRG; nearly 50% in the UK), according to the above mentioned OECD Energy Trends. For more on gasoline taxes, see also below. Finally, in order to gauge the impact of the differences between US and European gasoline prices, it may be recalled, as was shown in Table 4, that in 1975, gasoline alone amounted to nearly 40% of the total petroleum products consumption in the US, but was less than 20% in Europe.

2. ENERGY PRICE INDICES (CURRENT)

The growth of "current" energy prices, not adjusted for inflation, will be considered first. Later, we shall look at energy prices adjusted for general inflation, together with energy consumption.

2.1. Total Energy: Industry, Households, and Transportation

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. Price index numbers for total energy, and separately for the groups of solid fuels, natural gas, petroleum products, gasoline and electricity, 1950-1978 and preliminary 1979, are shown for the US, FRG, France, and the UK in Tables 9-12 without adjustments to the general price rise, and in Tables 13-16 with adjustments for general inflation.

For total and each group of energy, the price indices are subdivided according to purchasing sector, industry, household and 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, e.g. in the US, where the household energy price index now excludes gasoline; or 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. While formerly one had to contend with two indices, one for the wholesale price of coal and petroleum products and another one called the Manufacturing Input, which 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. Some of this information is also summarized in the notes to Tables 9-12.

Figure 1, based on parts of Tables 9-12, shows the growth of prices of total energy purchased by industry, households, and transportation. 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. Then came a certain parting of the ways, due to different intensities of the energy price escalations experienced by the three purchasing sectors. Regardless of the different degrees of inflation that afflicted each country after 1973, the general trend was that price rises were the strongest for fuels bought by the industry sector, followed by households, and finally transportation.

Obviously, the energy price rises were the strongest in the UK. In 1979, the index of the price of total energy purchased by industry based on 1970=100 had climbed to 450 in the UK, to 384 in the US, stood at 290 in France and was under 250 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 FRG industry, seems to show that the country could profit from a strong DM or a weak dollar when purchasing petroleum from abroad. However, with the second oil price explosion of 1979, the energy prices of the FRG industry sector began to rise again, though not as much as in the US, in France, or in the UK.

Household sector energy price indices (1970=100) stood in 1979 at 324 in the UK, 265 in the US, 264 in France, and 220 in the FRG.

The widest gap in energy price increases between industry and households occurred in the US. The reason why the price index for household energy tends to lag behind industry may be seen in the fact that total energy used by industry includes crude oil, a very fast price riser, that is obviously excluded from household energy. Moreover, in the US the household total energy price index is heavily weighted by electricity and gas, which tend to undergo slower price rises because of the regulatory activities of the Public Utility Commissions. In the European countries, the gap between industry and household total energy price increases is less pronounced. Still, it does exist and may be explained by the fact that crude oil is included with total industry energy (FRG); moreover, the use of fuel oil for home heating, a very fast price riser, is relatively new and still assumes a low weight in national compilations of total household energy prices. However, as regards electricity--European prices of which tend also to rise more slowly--it must be kept in mind that households suffered stronger price increases than industry (FRG, UK). This is contrary to what was observed for the US and France where the price of electricity used by industry rose faster than that of residential electricity.

The transportation sector energy price indices (gasoline) based on 1970=100, rose in 1979 to 318 in the UK, 253 in France, 251 in the US, and 183 in the FRG. Preceding the very latest gasoline price escalation of 1979, the US gasoline price index had hovered at levels that were still closer to those experienced in the FRG. Some explanation for the compartively slow rise of gasoline price indices in the US and FRG may be seen in gasoline taxation. In the US, as stated on p.3 above, gasoline taxation did not increase between October 1973 and February 1978. During the same period, the average annual increase in gasoline taxation amounted to only 1.4% in the FRG, but to as much as 11.7% in France, and 18.5% in the UK. The tax data are from the US Statistical Abstract [3], 1978, p.655, tables 1102 and 1103 on Gasoline Retail Prices, Selected Countries, 1973-1978.

Moreover, the FRG gasoline prices may also have benefitted from the opportunity of paying for oil imports with a strong national currency or with a weak dollar (as already stated above in the case of total energy industry prices). In this connection it may be noted that the index for FRG gasoline prices took a small dip in 1977, picked up again its 1976 level in 1978, and has since risen through 1979 (see Table 10).

2.2. Fuel Commodity Groups and Electricity

The growth of current prices for fuel commodity groups (solid fuels, natural gas, petroleum products) and electricity with industry sector distinct from households, are shown for the years 1950-1979 in Tables 9-12. The following remarks concentrate on the development during recent years. Obviously, since inflation was the strongest in the UK, followed by the US and France, and the mildest in the FRG, this is reflected in the growth of the fuel commodities and electricity price rises.

Still, it is worth checking how the various groups of fuel commodities and electricity fared in this race; or how much did the price indices rise for coal compared to those for petroleum products, etc? And further, how have varying price increases affected the relationship between the price levels of the various fuels? An answer to this question may be implicit, if one takes the data in Table 5 of the 1975 price levels for selected fuels and electricity and applies to them the unadjusted energy price index numbers. However, this process will only yield approximations; for as explained above, the growth of the price index of a *group* of fuels need not be identical with the index of the price of *individual* fuels.

Solid Fuels. In 1979, solid fuels price indices of the industry sector, 1970=100, were at 414 in the UK, 320 in France, 300 in the US and 230 in the FRG. In France, the prices that industry had to pay for coal rose faster than the prices they had to pay for petroleum products. Until 1978, the same was true for the FRG, whereas in the US and UK the price indices of petroleum products purchased by industry rose more strongly than those of coal. This is further discussed below. But before going on to the petroleum price indices, it is worth noting the differences between industry sector and household sector coal. 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.

Petroleum Products. In 1979, industry sector petroleum price indices, 1970=100, were at 710 in the UK (heavy fuel oil), 436 in the US, 298 in France, and 240 in the FRG. As stated above, the industry price indices for petroleum products rose more strongly than those of solid fuels in the US and UK and less than those of solid fuels in France and until 1978 in 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 185.2 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 due in some measure to the fact that both countries could purchase petroleum with weak dollars or strong French Francs and DM. It may also be worth noting that, both in France and in the FRG, the index for household petroleum products rose faster than that for industry petroleum products, whereas the opposite holds true for the USA and the UK.

As far as the FRG is concerned, it may also be noted that household petroleum products' prices leveled off in 1977 and experienced a slight drop in 1978 according to the statistics--although houseowners may not have felt it! Unfortunately, with the second oil price explosion of 1979, the petroleum products price indices, both in industry and in household, registered hefty increases.

Natural Gas. For natural gas, the rise in industry sector price indices was strongest in the USA, for special reasons; the increase from 1970-1979 was fourfold topping all the other fuels used in this country. In France, natural gas industry prices trebled, whereas in the UK and FRG the price of natural gas used by industry "only" rose about 2 1/2 times over this period. The relatively mild increase in UK prices of natural gas used by industry--also due to special reasons--was less than that of any other energy commodity used by UK industry.

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

Electricity. In 1979, electricity industry price indices, with 1970=100, rose to 162 in the FRG; 225 in France; 285 in the USA, and to 336 in the UK. In the US, 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. The reason for this unusual situation may be seen in the UK supply of natural gas.

Finally, as regards household electricity versus industry electricity, household electricity price index numbers rose faster than those for industry in the UK and FRG. In the US 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 the following table that shows the 1979 energy price indices by country and group of energy commodity ranked in the order of magnitude of the price rise since 1970.

1979 Energy Prices (Current) by Groups of Energy Commodity and Purchasing Sectors. Index Numbers 1970=100.

USA		FRG		France		UK	
Nat.Gas I	524	Petr.Prod.HH	406	Petr.Prod.HH	457	Petr.Prod.I	710
Petr.Prod.I	436	Petr.Prod.I	240	Nat.Gas I	320	Petr.Prod.HH	493
Petr.Prod.HH	382	Sol.Fuels I	228	Sol.Fuels I	319	Sol.Fuels I	414
Sol.Fuels I	300	Nat.Gas I	222	Sol.Fuels HH	308	El. HH	360
Gas HH	282	Sol.Fuels HH	206	Petr.Prod.I	298	Sol.Fuels HH	357
El. I	255	Gasoline	183	Gasoline	253	El. I	336
Gasoline	252	El. HH	170	El. I	225	Gasoline	318
El.HH	206	El. I	162	Gas HH	216	Nat.Gas I	287
		Gas HH	159	El. HH	209	Gas HH	213

I = Industry sector
HH = Household sector

The table shows clearly how price escalations varied, e.g., petroleum products (industry and household) being among the fastest price risers, while electricity, gasoline and household gas lagged behind at a much slower pace. This should be kept in mind for the consideration of the growth of energy consumption.

3. ENERGY CONSUMPTION AND ENERGY PRICES

3.1. Adjustment for General Inflation

So far, the discussion of energy prices was held in terms of current prices not adjusted for general inflation. The opposite would be to look at what some people call "real energy prices", which is energy prices in *constant* national currencies. 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 [2]. The method for compiling energy prices in constant dollars consists in adjusting the "current" dollar prices by the GNP deflator, or in some cases, by the cost of living price index.

A similar method was employed earlier by the US Department of the Interior and thereafter by the DOE, to calculate fossil fuel prices in constant (1972) dollars, 1960-1977. (See the US Department of Interior, Energy Perspective 2, June 1976; reprint in US 1978 Statistical Abstract [3], p.607, table 1007.

With the above described method, and using GNP deflators, we have compiled energy prices in the respective constant currencies for the US, FRG, France, and the UK, for total energy and for groups of fuel commodities and electricity (see Tables 13-16). These are discussed below in connection with energy consumption and, at a national level, with respect to GDP and industrial output.

3.2. GDP, Industrial Output, and Energy Consumption

The growth of total energy consumption, GDP in constant prices, and industrial output quantity indices, 1950-1979, are shown in Figure 2, based on Tables 17-20. For sources and methods of compilation, see Part IV. Here 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; or toe.

For most of the period of observation, the growth indices of total energy consumption and GDP in constant prices have moved along almost identical lines, in the US, FRG, France, and with some minor exceptions also in the UK. However, with the first oil price explosion of 1973, and the recession of 1974, there came a parting of the ways. Total energy consumption dipped far deeper than real or constant price GDP, and in the subsequent recovery, the distance between the two variables tended to grow. The result is for all four countries that by 1979 the indices of GDP (US GNP), with 1970=100, stood at much higher levels than the indices of total primary energy consumption.

On the surface, this looks as if energy conservation had been successful. However, the fact that in EUR 3 and in the US, more GDP could be obtained with less energy may also suggest 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. 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 1973 and 1977 (latest year for which comparable national accounts data compiled by the UN are currently available).

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. But in recent years, the indices of total industrial production remained below those of GDP in the FRG, in France and in the UK.

At the same time, the slump in the steel industry contributed considerably to the "savings" in energy consumption. In the FRG and France, 1979 steel production measured in terms of 1970=100 based indices had barely come back to its 1970 level, but was still considerably below its 1974 peak of 120 (FRG) and 116 (France). In the UK, total primary energy consumption had shown the greatest restraint. At the same time, a chronically depressed steel production was in 1979 roughly 25% below its 1970 peak.

In the United States 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 GDP was stabilized (by UN data). But similar to what happened in the European countries, the gap between total industrial output and real GDP on the one side and total primary energy consumption began to widen. Again, to the surface, this looks as if energy conservation had been successful. However, there is also a strong possibility that some of the energy conservation was caused by the relatively slow growth of energy intensive industries; for example mining and quarrying; basic metals; cement and paper to name a few of the industries with heavy requirements in energy, whose growth has, for several years, lagged behind the national average.

Some special consideration may be given to the developments in 1979, the year of the second, and even more severe, oil price explosion. Compared to 1978, the 1979 total energy consumption remained almost constant in the USA, whereas in the European countries (FRG, France, UK) total energy consumption picked up by nearly 5 percentage points. With a continuous, but moderate, growth of real GNP in the USA (3 percentage points in 1979), the gap between GNP and energy consumption continued to widen. Whereas in the UK, there was a tendency towards narrowing the gap, as real GDP nearly stagnated while energy consumption increased again. In France and the FRG, total energy consumption grew a little faster than real GDP. In the FRG, the growth of 1979 energy consumption was due, to some extent, to the iron and steel industry, whose demand for coal (Steinkohle) increased from 33.1 million tons in 1978, to 40.3 million tons in 1979, or by as much as 21.8%. A substantial increase in coal consumption, 8% in 1979 over 1978, also occurred in the UK, where the output of crude steel increased by 4.1% in 1979 over 1978. For more details on energy consumption by type of energy commodity, see also Section 3.3.2. Energy Consumption and Prices: Fuel Commodity Groups and Electricity.

3.3. Energy Consumption and Energy Prices Adjusted for General Inflation

3.3.1. Total Energy Consumption; Industry and Household 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 13-16 and 21-24. The 1950 to 1973 years were the period for all four countries during which total primary energy consumption went up, and prices adjusted by the GDP deflator went down.

After 1973, the picture is reversed. Total energy, industry and household prices, though adjusted for general inflation, shoot up to unprecedented heights through 1976. Only in 1977/78, did the indices for the inflation-adjusted industry and household prices show some stagnation in the US (1978), a timid dip in France (1978), and a more sizeable fall in the FRG (1977 and 1978) where, as stated above, petroleum could be purchased with strong Francs and D.Marks. But also in the UK, there was a drop of the inflation-adjusted energy prices both for industry and for households (1978). In retrospect, the 1977-1978 years may now be regarded as calm before the storm, or as the period when general inflation topped energy price escalations. However, that period was short lived, and the indications for 1979 signal a very strong upward rise for the inflation-adjusted energy prices everywhere, especially in the US. Thus we see that inflation-adjusted energy prices, total industry, and total households stood at the end of the decade well above their 1970 and 1973 levels in all four countries.

How did total primary energy consumption fare in the face of the growth of inflation adjusted prices? The first energy

price explosion of 1973, and the ensuing economic slowdown, triggered a slump in total primary energy consumption in 1974-75 in the US, FRG, France, and the UK. Notwithstanding the high plateau of the inflation-adjusted energy prices, total primary energy consumption was soon to rise again, so that by 1979 the indices of total primary energy consumption stood well above their 1970 and 1973 levels in the US, FRG, and in France. In the UK the cut in total primary energy consumption had been deeper and longer lasting, both for "gross inland" and for "energy use only". However, as stated above, total energy consumption grew again in 1979; consequently the index of UK total energy consumption is now back to its level of 1973 and above that of 1970.

So much for the trend of *total* primary energy consumption. The following notes indicate that it was not duplicated by the consumption of individual fuels, such as coal, gas, petroleum products, and especially gasoline and electricity.

3.3.2. Fuel Commodity Groups and Electricity

Solid Fuels. Figure 4, based on Tables 13-16 and 21-24, shows the indices with 1970=100 for coal prices adjusted for general inflation, and consumption 1950-1979. In the United States, the 1950 price index stood at a high of 94 from which it gradually descended till 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 184.4 in 1975. The coal price index has since come down to 167 in 1976 and 1977, picked up a little in 1978 and came down again in 1979. It is interesting to note that coal prices picked up at a period (1966-1973) when petroleum products and gas prices (all adjusted for inflation) were still on the decline and that coal prices declined moderately (1976-1979) when petroleum and gas prices were skyrocketing.

The development of coal consumption was parallel to that of the inflation-adjusted prices from 1950-1960. Like its price, coal consumption was on the decline throughout the decade of the 1950s, obviously reflecting the switch from coal to oil and gas. The lowest point of coal consumption was reached in 1961. Since that time, the downward trend came to a halt and US coal consumption has been steadily increasing ever since. The consumption index based on 1970=100 rose from 78.1 in 1961 to 120.3 in 1979.

The renaissance in US coal consumption is due to the increasing demands of the utilities. Their consumption of solid fuels rose from 177 million short tons in 1960 to 477 million (or about 70% of total coal production) in 1977. At the same time, because of the even stronger increase in oil and gas fired plants, the utilities demand for coal as percent of total fuels input fell from nearly 70% in 1960 to little over 50% in 1977 (Statistical Abstract of the United States 1978, p.614, table 1020, and p.756 [3]).

In the European countries, the development in the solid fuels sector bears some resemblance to that in the US as regards prices, but it is a different case for consumption. The index of coal prices, adjusted for general inflation, was on a downward course in the FRG, France, and the UK from 1950 to 1968-69. While the descent lasted a bit longer than in the US, solid fuels in the FRG, France, and in the UK also experienced a price increase while prices of oil and gas were still falling. As shown in Figure 4, the trend of the inflation-adjusted coal price indices (industry and household) was generally upwards since 1969/70 in the FRG, France, and in the UK.

In the last three years, the inflation-adjusted prices of industry coal were stabilized in the FRG, continued to rise in the UK, but were sliding in France from their 1976 peak. Throughout the 1970s, household coal prices continued to rise almost uninterruptedly, though at a lesser speed than industry coal, in all three countries. The inflation-adjusted price indices, 1970=100, stood in 1979 for industry coal at 141 in the FRG and in France, and at 143 in the UK, while household coal was at 137 in France, 127 in the FRG, and 124 in the UK.

The coal consumption slide started in the 1950s, similar to what was observed in the US. However, unlike to what we saw in the US, the demand for coal in the European countries continued on its downward ride throughout the 1960s and well into the 1970's. Despite a pickup in the late 1970s in the FRG and UK (and somewhat earlier in France), the index of coal consumption based on 1970=100 stood in 1979 at 89 in France and the FRG, and at 82 in the UK. The comparative figure for the US was 120.

Petroleum Products. Figure 5, based on Tables 13-16 and 21-24, shows petroleum products' prices adjusted for general inflation and consumption 1950-1979.

In all four countries, the petroleum products' inflation adjusted price trend moved downward from 1950 until 1973, when price escalation following the events of 1973 were the most spectacular in the UK and the US. In 1977, the inflation-adjusted industry sector price index, based on 1970=100, shot up to 257 in the UK (heavy fuel oils) and to 195 in the US (group of petroleum products). These indices dropped slightly in 1978, only to move up with new speed in 1979 when they reached 246 in the UK and 241 in the US. Household sector petroleum products' prices rose to a lower tier, but far above the prices of any other household fuel.

Compared to the UK and the US, the FRG and French inflation-adjusted price increases for the group of petroleum products were rather mild. 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 mild increase of the prices for petroleum products observed for the

FRG and France may be explained to some extent, as stated above, by the fact that these countries, when paying for petroleum imports, were reaping the advantage of a strong currency. However, with the onslaught of 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 stood in 1979 at 149 in the FRG and at 132 in France. Contrary to what was observed in the US and the UK, household sector prices of petroleum products moved to higher tiers than industry sector prices. In 1979, the household sector petroleum products price indices, adjusted for inflation, stood at 252 in the FRG and at 203 in France.

What was the effect of prices, if any, on consumption? From 1950 to 1973, when inflation-adjusted prices decreased, consumption grew yearly in all four countries. The first interruption in the long history of growth came only with the recession of 1974/75 that followed the first oil price explosion. In the US, the cutback in the consumption of petroleum products was not very deep and more than overcome by the following recovery. Based on 1970=100, the consumption index stood in 1973 at 118; and in 1978 at 129; it subsequently fell to 126 under the onslaught of the second oil price explosion. Still, the 1979 level is comfortably high above 1973. This is a point to be retained for comparison with the European countries, where the cut of 1974/75 was deeper and longer lasting. In the FRG, where the price rise in petroleum products was moderate when compared to the US, it took 6 years for the petroleum products consumption to reach again the peak of 1973. The comeback was largely the result of last year's growth, as the index of petroleum products consumption based on 1970=100 moved from 113 in 1978 to 117 in 1979 that was also its 1973 level.

In France, where the price increase was also moderate by comparison to the US, the highpoint of the 1973 consumption was never reached again. The index of petroleum products consumption based on 1970=100 peaked in 1973 at 133, and stood at 122 in 1978 and 1979. In the UK, where the inflation-adjusted price rise was the highest (though possibly somehwat biased, as indicated above), the consumption cutback was the most pronounced. The index of petroleum products consumption, based on 1970=100, fell consistently over the years from its high of 109 in 1973 to a low of 93 in 1978 and 1979.

By way of summary it may be recalled that the second oil price explosion of 1979 was accompanied by a decrease in petroleum products consumption in the US, an increase in the FRG, and a stagnation in France and the UK.

Gasoline. Figure 6, based on Tables 13-16 and 21-24, shows the indices of gasoline consumption and prices adjusted for general inflation, 1950-1979. The long-term downward course of the inflation-adjusted gasoline prices, which had started in the wake of World War II, came to a halt in 1973 in all four countries.

In the USA, the inflation-adjusted price index for gasoline increased substantially in 1974, but this one year high soon gave

way to a recurring downward slide, so that the inflation-adjusted gasoline price, based on 1970=100, stood in 1978 at 112; 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 United States by industry or household. The decline of the inflation-adjusted gasoline price 1974-1978 is also shown in the DOE Monthly Energy Review [2]. Here it may be recalled that the DOE uses the BLS consumer price index to compile the price in 1972 dollars to end users of leaded regular gasoline; whereas we used throughout the GNP deflator to compile the inflation-adjusted prices. Whatever the methods of compilation, the results are quite similar; the index implicit in the DOE data, and the index in Table 13 show the same slow decline of the real price of gasoline, 1974-1978. But for 1979 there is some discrepancy between the two series; this is due to the fact that the consumer price index rose faster than the (preliminary) GNP deflator. Consequently, the index implicit in the DOE data showed a somewhat lesser jump (20.4 percentage points) than the data in Table 13 (23.8 percentage points). The gasoline price index adjusted for inflation by the GNP deflator, based 1970=100, rose in 1979 to 139; this is above the level of 1974 (119) and 1973 (97).

A second decrease in the inflation-adjusted gasoline prices occurred also in the FRG, 1974-1978. The index based on 1970=100 fell from 115 in 1974 to 102 in 1978; it has since risen to 113 in 1979. There was virtually no increase in gasoline taxes in the US and only a moderate rise in the FRG between 1974 and 1978.

In France and the UK, gasoline taxes increased severely between 1974 and 1978. Yet the inflation-adjusted gasoline prices of the UK show a drop from 1975 to 1978. A decrease did also occur in France, during the two years of 1975 and 1976. In both countries, the 1979 index of gasoline prices adjusted for general inflation rose above 1973 levels to 112 in France and 110 in the UK, with 1970=100.

What was the development of gasoline consumption? In all four countries, it showed nearly uninterrupted growth, from 1950 onwards through 1978. Even the consumption cutback of 1974, far milder than that experienced for total petroleum products, was rapidly overcome. By 1978, gasoline consumption was well above 1970 (and 1973) in all four countries. The consumption index, based on 1970=100, stood in 1978 at 128 in the US, 129 in the UK, 143 in France and 148 in the FRG.

The development 1973-1978 shows that at times the decline of inflation-adjusted gasoline prices favored the growth of consumption (US, FRG, UK). It also shows that at other times an increase in inflation-adjusted prices failed to discourage the growth of consumption.

The events of 1979 merit special consideration. In the US, the inflation-adjusted gasoline price rose steeply by as much as 24% (when adjusted with the GNP deflator) or by 21% (when adjusted with the cost of living index). This put a damper on

the growth of gasoline consumption, which fell by nearly 6% in 1979 to $2565 \cdot 10^6$ bbl, or roughly to the 1976 level.

Inflation-adjusted gasoline prices also rose in the FRG by 11%, and in the UK by 18%. However, in both countries consumption continued to grow in 1979, by 1% in the FRG and by 2% in the UK. In France, where prices adjusted for inflation remained about even, gasoline consumption stagnated.

Electricity. Figure 7, based on Tables 13-16 and 21-24, shows the total electricity consumption and the household and industry sector prices adjusted for general inflation, 1950-1979. Figure 8 and 9, based on Tables 13-16 and 25, show the electricity consumption in the industry and household sectors and the inflation-adjusted prices. Industry and household consumption do not represent total consumption because the latter also includes the electricity used by agriculture, railroads, commerce, banking, government and other services. This should be kept in mind when looking at the indices of *total* electricity consumption and the consumption in household and industry sectors.

At the end of World War II, the inflation-adjusted electricity prices for industry and household began to decrease, and this fall extended over two decades. In the US the historical slide ended in 1970; in the European countries it lasted longer until it was stopped by the first oil price explosion of 1973.

The inflation-adjusted prices of electricity in US industry not only started to rise earlier, the increase was also much steeper than that of the inflation-adjusted industry sector prices for electricity in the UK, in France, and in the FRG. The index with 1970=100 for inflation-adjusted electricity prices paid by the industry sector in 1979 stood at 141 in the USA, 116 in the UK, and 100 in France and the FRG.

In the FRG and UK, the inflation-adjusted price of electricity bought by the household sector rose faster than that of the industry sector. By contrast, in the US, household electricity prices adjusted for inflation showed far less of a rise than those for industry. In France household electricity prices decreased while those for industry increased. The 1979 price indices for household electricity were: 125 in the UK, 114 in the USA, 105 in the FRG, and 93 in France. Actually, in the FRG, France and the UK, the inflation-adjusted household sector electricity prices slightly dropped in 1979 over 1978.

What was the development of consumption? Figures 7, 8 and 9 show that electricity consumption grew in an almost straight line from 1950 to 1974 in all four countries. Upon the first oil price explosion of 1973, and the ensuing business recession, the industry sector energy demand fell in the US, FRG, in France and in the UK. At the same time household sector demand stagnated in the US, continued to rise in the FRG and in France, but fell in the UK. The effect on the growth rate of *total* electricity consumption was a slowdown in the US, and a cut in the other three countries. In the US, FRG, and in France these cutbacks were

quickly overcome, and consumption continued to grow as before in the US, FRG, and France through 1979. Only 1979 brought a slowdown, not a cut, in the US growth rate of total and household electricity consumption, while the industry demand of electricity advanced by more than 5 percentage points.

In the UK, the 1974 cut in electricity consumption caused by the business recession lasted longer, but eventually growth was resumed at a moderate rate. For most of the recovery period, the industry consumption rose faster than the household demand.

The result of the growing electricity demand that occurred during the 1970s--though at differing speeds--was that in all four countries the indices of total electricity consumption based on 1970=100 had widely exceeded the 1973 levels and stood in 1979 at 172 in France, 149 in the FRG, 145 in the US, and 120 in the UK. The differences in the growth of electricity demand during the 1970s bears a strong resemblance to the differences in the growth rates of GDP in these countries--with France and the FRG experiencing the strongest growth, followed by the US, and the slowest growth in the UK.

Another interesting observation suggested by Figures 7, 8 and 9 is the following. While slowly rising and decreasing, inflation-adjusted electricity prices (in the industry and household sectors) may have encouraged the growth of electricity consumption in the FRG and in France, it seems equally true that steeply rising electricity prices (especially in the industry sector) discouraged consumption in the US.

The preliminary 1980 data suggest a continued rise in electricity consumption in Europe. For the EC (EUR 9), a further rise of about 3.5% with the highest growth rates expected in Ireland and France, is foreseen for 1980 according to the report released by the EC Energy Commission, as reported in the International Herald Tribune [38] of 9 April 1980. A similar growth may not be in store for the US. During the first quarter of 1980, consumption has registered a slight drop. But barring a general severe slowdown in economic growth, electricity consumption may still be expected to continue to grow, albeit at slower rates than heretofore.

4. SUMMARY OBSERVATIONS

The development since 1950 and up to 1973 is 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 1979, the growth of total primary energy consumption began to lag behind GDP and total industrial output. The noteworthy fact is that, despite the increase in inflation-adjusted prices (not to

mention current prices) of total energy, energy consumption has so far (through 1979) not registered a lasting drop. 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, the FRG managed to continue with a growing total primary energy consumption that increased by nearly 6% in 1979. 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, total primary energy consumption is now well above 1973 levels. Only in the UK, where the 1974/75 cutbacks were deeper and longer lasting, it looked for a while as if the growth of total primary energy consumption was arrested. However, the vigorous growth in 1979 with an increase of 6% over 1978 brought total primary energy consumption back to its 1973 level.

What was the development of prices and consumption for various groups of fuel commodities and electricity? In the US, the growth of total petroleum consumption (on a primary energy basis) was quite similar to that of total primary energy. From 1950-1973, a decrease in inflation-adjusted prices and an increase in consumption prevailed. In 1974/75, there was first a short-lived cutback in consumption followed by a resumption of growth. 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 or lingered at very high plateaus. A respite in petroleum consumption growth seems to have come only in 1979 with the second oil price explosion, which triggered a 2.6% reduction in total petroleum consumption and a cutback of nearly 6% in gasoline consumption. In the European countries, the share of petroleum in total primary energy consumption was lower than in the US. Still we see that total petroleum prices and consumption followed much the same pattern as total primary energy, with the possible exception of 1979 in the FRG and UK, where an upward push in coal demand contributed markedly to the increase in the countries' total primary energy demand.

Solid fuels are a case where the developments of prices and consumption would not always follow the patterns of total primary energy. Coal prices adjusted for general inflation were universally decreasing in the US, FRG, in France, and in the UK during the 1950s and 1960s. Before the end of the decade, and preceding the oil price rise of 1973, coal prices generally began to rise. In the US, this was accompanied by a new growth trend in consumption which, due to the utilities' demand, had already started in the early 1960's. In Europe, coal consumption continued on its downward course throughout the energy crisis, with some ups in France, but generally down in the FRG and UK. Only the 1979 data indicate that this landslide may finally have been stopped--but for how long?

The way of natural gas was totally different from that of total primary energy consumption. Because of its special features, special regulations and deregulations in the US, and its

relative newness and exceptionality as an industry fuel in Europe, it will not be discussed here.

On the other hand, worth noting is the development of consumption and prices of the two foremost secondary energy groups, gasoline and electricity. During the 1970's, the growth rates of gasoline and electricity consumption were higher than those of total primary energy.

1979 Index of Consumption of Various Energy Groups. 1970=100

	USA	FRG	France	UK
Total primary energy	116.6	122.3	126.3	105.9
Gasoline	121.3	149.4	141.9	131.6
Electricity	144.7	149.2	172.1	119.8

In a nutshell, what we see is a development where most of the parts grew faster than its sum. How was that possible and what is the meaning of that development? It may signify that there were structural changes in the economy, a trend towards less energy-intensive industries and towards more services. It may also signify technological improvements in the utilization of energy, and finally some cutbacks in energy use, which altogether may have led to the conservation of total primary energy--permitting a higher use of secondary energy.

What was the relationship between prices and consumption for these secondary energy commodities? The inflation-adjusted gasoline prices rose considerably in 1974 in the US, FRG, France, and in the UK. However, these were only one-year rises, followed by slow and steady decreases, so that by 1978 the price indices, with 1970=100, were below their peak of 1974. In the European countries this trend continued through 1979, but in the US the inflation-adjusted gasoline prices rose markedly in 1979 above the 1978 and 1974 levels.

Indices of Gasoline Prices. 1970=100

	Inflation-Adjusted Prices				Current Prices			
	1973	1974	1978	1979	1973	1974	1978	1979
USA	97.3	119.2	111.7	139.0	111.9	151.4	185.9	251.5
FRG	101.9	114.6	102.2	113.4	123.2	148.2	158.9	183.2
France	89.4	111.9	111.5	112.1	108.4	151.4	220.8	252.8
UK	89.8	113.7	93.5	110.1	114.1	163.8	241.0	318.0

It is quite possible that the decrease in the inflation-adjusted gasoline prices fostered the growth of gasoline consumption in Europe from 1974 to 1979, and in the US from 1974 to 1978. Likewise, the cut in US gasoline consumption that occurred in 1979 may well have been caused by the sudden jump

in the inflation-adjusted price (not to mention the current price).

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 US, a spectacular growth in electricity consumption occurred while inflation-adjusted prices rose markedly, especially in the industry sector. (This price rise is in comparison to the European countries; inside the US electricity prices rose less than other energy groups, except gasoline.) 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, but less than in the US. In the UK, electricity consumption rose, but less than elsewhere, because the growth was stunted between 1974 and 1977--a period during which the inflation-adjusted prices rose strongly, especially in the household sector.

The message to be taken from the observation of the most important secondary energy commodities--electricity and gasoline--(that can be measured more accurately than, say, total petroleum products or total primary energy), points to the evidence that lower prices may have aided consumption; at the same time, there was no way of effectively curbing consumption by rising prices alone, with the possible exception of the US gasoline consumption in 1979.

As regards energy conservation, it is difficult to say which part of a cut in consumption or a slowdown in the consumption growth rates could be attributed to one or all three of these developments: (i) Technological progress, which consists in the improvement of the efficiency with which energy is utilized. An immediate effect of savings may not materialize, because of the energy investments required to introduce the new technology. Yet it seems that savings through better utilization of primary fuels have materialized as it became possible to produce more secondary energy from primary stock. Moreover, according to industry reports in the US and the UK, better technology and a higher energy consciousness have led to actual savings in fuel input in the aluminium, glass, and other industries. (ii) A lessening of consumption because of setbacks in the production of energy-intensive industries. It is believed that such an effect was visible, for example, as evidenced by the steel industry, where a slump in production depressed the level of *total* energy consumption; or conversely, where an uplift in production effected an increase of *total* energy consumption (UK and FRG in 1979). (iii) The will to forego the use of appliances requiring electricity or the operation of private transportation equipment. The latter has most recently occurred in the US; the cutback could have a longer lasting effect if coupled with a recession. For the experience of the 1970s has shown that the most effective way to curb consumption is through a cutback in economic growth, which was visited upon the US, FRG, France and the UK in 1974/75.

Likewise, the country among the four that showed the slowest growth in total energy consumption during the 1970s was also the one with the slowest growth in GDP.

Most of the observations above relate only to the inflation-adjusted prices. What really counts in the day-to-day interactions are the unadjusted current prices, however. And here, even with a recession, it is unlikely that *current* energy prices will decrease substantially. This has serious implications on the balances of payment of energy importing countries, since the balances are not maintained in inflation-adjusted currencies. Other serious implications are the hardships inflicted on the poor in the developed countries who must continue to heat and light their homes and drive to work, and on the poorer nations that must continue to develop their energy-consuming industries.

PART III. TABLES

Table 1. Population in the USA, FRG, France, and the UK, 1968-1979.

	USA 10^6	EUR 9 10^6	EUR 3 10^6	FRG 10^6	France 10^6	UK 10^6
1968	200.7	248.0	165.2	60.2	49.9	55.1
1969	202.7	250.3	166.4	60.8	50.3	55.3
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	52.8	55.9
1976	215.1	258.3	170.3	61.5	52.9	55.9
1977	216.8	259.2	170.4	61.4	53.1	55.9
1978	218.5	259.8	170.4	61.3	53.3	55.8
1979	220.6	.	170.7	61.3	53.5	55.9

Source: OECD Main Economic Indicators [8] Mid Year Estimates.

Table 2. GDP in Constant Prices and 1975 Dollars, USA and European Countries, 1968-1979.

	USA 10^9\$	EUR 9 10^9\$	EUR 3 10^9\$	FRG 10^9\$	France 10^9\$	UK 10^9\$
1968	1319	1064	773	330	244	199
1969	1354	1131	823	357	263	203
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	987	419	339	229
1976	1613	1423	1037	443	356	238
1977	1697	1472	1061	455	365	241
1978	1771	1523	1097	469	380	248
1979	1811	1571	1129	488	391	250

Sources: OECD Main Economic Indicators, August 1979 and January 1980 [8]. The 1975 exchange rates, used by the OECD to convert national currencies to US dollars may differn from those used by the World Bank, because of different reference periods within the year.

Table 3. Total Primary Energy Consumption, USA and European Countries, 1968-1979.

In Million Metric Tons of Coal Equivalents

	USA 10^6tce	EUR 9 10^6tce	EUR 3 10^6tce	FRG 10^6tce	France 10^6tce	UK 10^6tce
1968	2222	1073	804	289	186	329.0
1969	2338	1164	858	315	201	342.2
1970	2416	1264	913	337	222	353.7
1971	2460	1321	577	339	229	348.0
1972	2579	1340	954	354	244	356.0
1973	2686	1396	1014	379	262	373.3
1974	2619	1368	988	366	264	357.7
1975	2545	1289	935	348	246	341.1
1976	2682	1367	979	370	262	347.0
1977	2755	1351	995	372	268	354.9
1978	2824	1361	1018	389	273	355.8
1979	2816	1429	1067	412	281	374.4

Sources:

United States. Domestic energy consumption by primary energy type in DOE Monthly Energy Review [2] February 1980, backdated with Bureau of Mines Tables on total calculated consumption, in US Statistical Abstract [3].

Data supplied in Btu were converted to tce on the basis of 1tce = 27.78 x 10^6Btu.

European Community (EUR 9) 1968-1978 primary energy consumption calculated as production plus imports minus exports, from UN World Energy Supplies [14] 1973-1978 and earlier issues, standard table 2. 1979, extrapolated with OECD supply data.

FRG 1968-1978 primary energy consumption from Steinkohle 1978-79 [33]. The 1979 data are preliminary, as reported in Süddeutsche Zeitung, 11 February 1980 [40].

France. Total consumption of primary energy (consommation totale d'energie primaire corrigée) for 1970-1978 Petrol 78 [37] p.A-11. Updated to 1979 with Ministère de l'Industrie, letter 101 of 22 January 1980 [34].

Data supplied in toe were converted to tce on the basis of 1tce = 0.6667toe.

UK. Gross inland consumption of primary fuels and equivalents, 1968-1978, from Digest of UK Energy Statistics [29] 1979, table 5. Data for 1979 from Energy Trends [35] January 1980, table 2. Note: 1979 data given in million therms have been converted to tce on the basis of 1tce = 248.3 therms.

Table 4. Consumption of Fuel Commodity Groups and Electricity in the USA and in European Countries, 1975.

		10^6tce	10^6tons	10^3tcal	10^9kWh
USA					
	Solid Fuels	527.2			
	Natural Gas			5 176	
	Energy Petr.Products		687.7		
	Gasoline		287.5		
	Electricity Generation				2 124
EUR 9					
	Solid Fuels	316.0			
	Natural Gas			1 566	
	Energy Petr.Products		445.8		
	Gasoline		72.6		
	Electricity Generation				1 045
FRG					
	Solid Fuels	117.1			
	Natural Gas			386	
	Energy Petr.Products		111.3		
	Gasoline		20.4		
	Electricity Generation				310
France					
	Solid Fuels	44.1			
	Natural Gas			165	
	Energy Petr.Products		92.9		
	Gasoline		15.9		
	Electricity Generation				188
UK					
	Solid Fuels	115.0			
	Natural Gas			347	
	Energy Petr.Products		80.9		
	Gasoline		15.8		
	Electricity Generation				272

Sources: Consumption represents supply, calculated as production plus imports, minus exports. Compiled from UN World Energy Supplies [14] 1973-1978, standard tables 7 (solid fuels), 19 (natural gas), 14 (energy petroleum products), 16 (gasoline), and 25 (electricity).

Table 5. Selected Fuels and Electricity, 1975 Prices per 10^7 kcal (or 1 toe) in the USA, FRG, France, and the UK.

Data in national currencies

	USA $	FRG DM	France FFr	UK £
Industry Sector				
Solid Fuels				
Steam Coal	.	219.30	261.30	25.1
Bituminous Coal	31.00[a]	.	.	.
Anthracite	39.10[a]	.	.	.
Natural Gas				
350x10^6kcal Consumption	69.00	.	548.90	48.2
5000x10^6kcal Consumption	46.50	.	368.90	34.0
Liquid Gas	61.80[a]	.	.	.
Dry Gas	16.80[a]	.	.	.
Petroleum Products				
Light/Medium Fuel Oil	104.00	369.20	598.20	41.7
Heavy Fuel Oil	95.00	226.60	357.30	38.8
Gas/Diesel Oil	117.00	382.60	759.60	53.2
Electricity				
4000 MWh Consumption	.	1310.20	1552.90	145.3
60 GWh Consumption	.	947.20	1144.40	129.7
Household Sector				
Solid Fuels				
Anthracite	.	420.60	546.70	36.6
Gas				
Natural Gas	68.30	685.70	1429.00	70.4
Natural Gas, Residential	67.10[b]	.		
Petroleum Products				
Gas/Diesel Oil	114.90	.	677.80	64.3
Heating Oil, Residential	106.30[b]	.	.	.
Electricity				
3600 kWh Consumption	.	1917.00	3049.00	191.4
Residential Consump.	403.20[b]	.	.	.

Sources: If not otherwise indicated, data are compiled from OECD Energy Statistics 1975/77 [1].

a: Compiled from "Fossil Fuel Prices 1960-1975" in US Statistical Abstract 1977, p.596, table 983 [3].

b: Compiled from US Department of Energy Monthly Energy Review, April 1979, p.18 [2].
Prices shown in 1972 dollars were changed to 1975 dollars with GNP deflators; and prices per Btu were changed to kcal on the basis of 1 Btu = 0.2519 kcal.

Table 6. Selected Fuels and Electricity, 1975 Prices per 10^7 kcal (or 1 toe) in the USA, FRG, France, and the UK.

Data in US Dollars[a]

	USA $	FRG $	France $	UK $
Industry Sector				
Solid Fuels				
Steam Coal	.	83.64	58.24	50.70
Bituminous Coal	31.00[a]	.	.	.
Anthracite	39.10[a]	.	.	.
Natural Gas				
350×10^6kcal Consumption	69.00	.	122.35	97.36
5000×10^6kcal Consumption	46.50	.	82.23	68.68
Liquid Gas	61.80[a]	.	.	.
Dry Gas	16.80[a]	.	.	.
Petroleum Products				
Light/Medium Fuel Oil	104.00	140.81	133.34	84.23
Heavy Fuel Oil	95.00	86.43	79.64	78.38
Gas/Diesel Oil	117.00	145.92	169.31	107.46
Electricity				
4000 MWh Consumption	.	499.71	346.14	293.51
60 GWh Consumption	.	321.26	255.09	261.99
Household Sector				
Solid Fuels				
Anthracite	.	160.42	121.86	73.93
Gas				
Natural Gas	68.30	261.53	318.52	142.21
Natural Gas, Residential	67.10[b]	.	.	.
Petroleum Products				
Gas/Diesel Oil	114.90	.	151.08	129.89
Heating Oil, Residential	106.30[b]	.	.	.
Electricity				
3600 kWh Consumption	.	731.14	679.62	366.43
Residential Consumption	403.20[b]	.	.	.

Sources: see Table 5

a: Data converted from national currencies to the dollar at 1975 average annual exchange rates:
1 DM = $ 0.3814
1 FFr = $ 0.2229
1 £ = $ 2.02

Table 7. Gasoline Prices in the USA, FRG, France, and the UK, 1968-1980.

Prices per Liter in National Currencies

	USA cents	FRG DM	France FFr	UK ₺
1968	.	0.62	0.96	0.0592
1969	.	0.57	1.05	0.0658
1970	9.50 (June)	0.56	1.07	0.0700
1971	9.76 (June)	0.59	1.10	0.0721
1972	10.03 (June)	0.61	1.11	0.0742
1973	10.55 (October)	0.69	1.16	0.0756
1974	14.51 (June)	0.83	1.62	0.0884
1975	15.04 (June)	0.832	1.69	0.1588
1976	15.49	0.889	1.85	0.1696
1977	16.52	0.865	2.16	0.1685
1978	16.86	0.890	2.58	0.1640
1978 (Jan.)	16.28	0.859[a]	2.19[a]	0.1716[a]
1979 (Jan.)	18.05	0.889[a]	2.54[a]	0.1694[a]
1980 (Jan.)	29.08	1.05[a]	3.06[a]	0.2552[a]

a: EUROSTAT, Hydrocarbons [18] 25 January 1979 and 30 January 1980.

Sources: If not otherwise stated by footnote a:

USA 1970-1975, average retail dealer motor gasoline selling price in US Statistical Abstract [3] 1976 and 1978. 1976-1980 retail price, tax included, regular leaded gasoline full serve in DOE Monthly Energy Review [2] April 1980. Note: Prices per gallon were converted on the basis of 1 US Gallon = 3.79 liters.

FRG retail price, tax included, Normalbenzin, Markenware in Statistisches Jahrbuch [21] 1979, p.491 and earlier issues. For updating to 1979 see Statistisches Bundesamt, Fachserie 17, Reihe 2 [24].

France 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 [26]. For updating to 1978, see essence ordinaire, Paris agglomeration, INSEE Bulletin Mensuel de Statistique, December 1979 [25].

UK 1968-1978, prices as of 1 January, from OECD Energy Statistics, 1975-1977 [1], p.190.

Table 8. Gasoline Prices in the USA, FRG, France, and the UK, 1975 and Recent Periods.

US cents per liter

	USA	FRG	France	UK
1975 January	.	34.2	37.8	37.3
June	15.04	.	.	.
1978 January	16.28	41.2	46.3	31.3
1979 January	18.05	47.7	59.4	33.8
1980 January	29.08	60.4	75.2	57.9

Sources: See Table 7. Data converted from national currencies to US dollars at current exchange rates.

Table 9. USA. The Growth of Current Energy Prices, by Groups of Fuels and Electricity, 1950-1979

Index Numbers, 1970=100

Year	GNP Deflator	Industry Sector Prices					Household Sector Prices					Transport Prices
		Total Energy	Solid Fuels	Natural Gas	Petroleum Products	Electri-city	Total Energy	Solid Fuels	Gas	Petroleum Products	Electri-city	Gasoline
1950	58.7	82.0	55.4	.	84.2	.	.	.	67.4	66.4	85.5	.
1	62.7	85.0	56.6	.	90.8	.	.	.	67.0	70.2	86.2	.
2	63.5	84.8	56.8	.	89.6	.	.	.	68.3	71.9	87.0	.
3	64.5	87.2	58.9	.	91.6	.	.	.	70.4	75.7	88.2	.
4	65.3	85.6	55.5	.	89.2	.	.	.	71.8	76.1	88.5	.
5	66.8	85.9	54.8	.	91.0	.	.	.	74.6	78.7	89.6	
6	68.9	88.5	59.8	.	96.2	.	.	.	74.9	82.5	89.9	.
7	71.2	93.3	64.9	.	103.0	.	84.2	.	77.1	86.7	90.3	85.3
8	72.3	89.7	64.2	73.5	93.9	94.2	84.4	.	81.7	81.8	91.4	84.2
9	73.9	89.7	64.0	80.0	93.4	94.5	85.8	.	84.4	82.9	92.3	85.2
1960	75.2	90.5	63.6	84.2	94.6	95.6	88.0	.	90.1	81.4	94.0	87.6
1	75.8	91.5	62.9	85.1	96.1	96.0	88.2	.	91.2	84.7	94.3	86.6
2	77.2	91.1	62.3	86.1	95.1	96.4	88.5	.	91.2	84.8	94.3	87.2
3	78.4	90.7	62.4	88.6	94.1	95.7	88.8	.	91.2	86.6	94.3	87.0
4	79.6	88.2	62.4	87.6	89.7	94.8	88.4	.	91.5	84.6	93.8	86.0
5	81.4	89.9	62.1	89.6	92.8	94.5	90.0	.	91.8	86.4	93.3	88.9
6	84.0	92.1	63.5	93.3	96.3	94.1	91.4	.	92.4	88.7	93.3	91.1
7	86.5	94.2	66.5	96.5	98.9	94.4	92.7	.	92.2	91.5	94.2	94.2
8	90.4	93.1	69.0	89.5	97.0	95.3	94.0	.	93.1	94.4	95.0	95.8
9	94.9	95.0	74.9	90.1	98.5	96.1	95.8	.	94.8	96.4	96.8	99.0
1970	100.0	100.0	100.0	100.0	100.0	100.0	100.0	.	100.0	100.0	100.0	100.0
1	105.1	108.5	121.1	104.7	106.1	109.7	106.9	.	107.1	106.3	106.6	100.7
2	109.5	111.7	128.9	110.1	107.8	114.7	111.3	.	112.7	106.7	112.0	101.9
3	115.8	126.5	145.1	122.3	127.4	122.1	119.0	.	117.9	123.1	117.6	111.9
4	127.0	196.1	221.2	156.6	221.2	154.0	148.9	.	132.6	194.9	138.9	151.4
5	139.2	230.8	256.7	209.2	255.0	182.6	170.3	.	159.0	211.0	157.3	161.7
6	146.4	250.1	245.4	276.8	271.2	196.1	187.5	.	185.4	226.2	167.2	168.5
7	155.0	284.6	259.1	373.8	302.5	219.9	211.9	.	220.6	256.4	178.3	178.2
8	166.5	303.7	286.2	413.0	318.2	236.7	229.3	.	242.4	271.6	191.4	185.9
1979	181.0	384.3	300.4	523.9	436.3	255.2	265.4	.	281.6	381.3	206.3	251.5

Notes to Table 9.

Sources and Definitions of US Energy Price Data.

All industry sector energy prices shown in Table 9 are from the series of producer price indices by major commodity groups, total and its components. It is understood that "producer price paid by industry" is synonymous with "wholesale price", because the same index for "total fuels and related products" appears as "producer price" in the Economic Report of the President, and as "wholesale price" in the Statistical Yearbook, etc.

All household energy prices shown in Table 9 are the Bureau of Labor Statistics (BLS) consumer price indices by classes of expenditure.

The following price indices were used:

Groupings in Table 9. US Energy Price Index Numbers

Industry Sector	Series	Energy Groups	Source
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 [5] 1980, p.268
Solid fuels	"	Coal; coke (foundry by product)	US Statistical Abstract [3]; Survey of Current Business [11]
Natural gas	"	Gas fuels	
Petroleum prod.	"	Refined petroleum products	
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 [5] 1980, p.260; Bureau of Labor Statistics [32], [20]
Solid fuels	"	Separate index no longer published	
Natural gas	"	Utility piped gas	
Petroleum prod.	"	Fuel oil No.2	
Electricity	"	Household electricity	
Transport Sector	"	Gasoline, private transportation	Economic Report of the President [5] 1980, p.241.

Table 10. FRG. The Growth of Current Energy Prices, by Groups of Fuels and Electricity, 1950-1979. Index Numbers, 1970 = 100.

Year	GDP Deflator	Industry Sector Prices					Household Sector Prices					Transport Prices
		Total Energy	Solid Fuels	Natural Gas	Petroleum Products	Electricity	Total Energy	Solid Fuels	Gas	Petroleum Products	Electricity	Regular Gasoline
1950	52.3	(Includes	41.0	68.2	79.8	68.8	.	.	..	.	.	.
1	55.4	crude oil	.	.	.	.	.	.	.	.	.	.
2	59.2	and petr.	.	.	.	.	.	.	.	.	.	.
3	60.8	products)	.	.	.	.	.	.	.	.	.	.
4	60.8	.	63.9	96.5	105.8	96.5	.	.	.	.	.	.
5	62.3	.	64.3	96.5	107.5	96.5	.	.	.	.	.	.
6	63.8	.	68.1	96.5	109.0	96.5	.	.	.	.	.	117.9
7	66.2	.	73.9	99.8	116.2	99.8	.	.	.	.	.	112.5
8	68.5	.	77.8	101.8	109.5	101.8	.	.	.	.	.	112.5
9	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
1	74.1	.	77.5	102.0	101.1	102.0	.	.	.	.	.	103.6
2	77.2	.	78.9	101.4	108.2	101.4	.	.	.	.	.	103.6
3	79.6	.	80.9	100.9	107.4	100.9	.	.	.	.	.	101.8
4	81.3	94.7	83.0	100.8	99.6	100.8	.	.	.	.	.	101.8
5	84.7	95.5	87.1	102.3	95.7	102.3	.	.	.	.	.	101.8
6	87.7	95.6	87.0	103.0	95.3	103.0	89.3	.	.	.	.	96.4
7	88.8	98.9	87.1	103.0	105.8	103.0	90.5	.	.	.	.	103.6
8	90.1	95.6	82.5	102.2	102.4	101.4	95.8	.	.	.	.	110.7
9	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
1	107.9	110.8	111.9	101.6	109.5	102.7	105.4	108.7	101.1	110.4	102.4	105.4
2	114.2	112.7	118.4	108.8	106.7	109.6	110.1	116.0	106.7	102.3	111.3	108.9
3	120.9	122.4	124.2	110.6	129.8	114.7	128.2	125.2	108.8	168.8	117.6	123.2
4	129.3	184.3	154.7	123.6	181.8	123.3	149.8	147.8	119.0	220.5	128.3	148.2
5	139.7	205.9	191.2	185.1	181.4	144.1	165.5	169.0	136.1	211.8	151.3	148.6
6	144.3	220.6	205.5	207.5	193.4	150.8	176.4	178.5	148.1	233.3	157.9	158.8
7	149.5	221.6	205.2	220.3	191.2	151.7	178.4	182.6	151.8	232.8	159.1	154.5
8	155.5	217.8	218.6	228.3	185.2	157.2	183.6	192.8	157.3	227.9	166.0	158.9
1979	161.5	247.6	227.8	221.7	240.2	162.0	220.1	206.1	158.9	406.2	169.7	183.2

Note: The apparent discrepancy within the industry prices between total energy that we combined from two separate indices, and the industry prices for energy commodity groups may be explained by the inclusion of crude oil and petroleum products in total energy.

Notes to Table 10.

Sources and Definitions of FRG Energy Price Data.

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) [23], Fachserie 17, Reihe 2; the other are the basic materials' prices, published in Index der Grundstoffpreise [22], Fachserie 17, Reihe 3. Both are monthly publications, with annual data published in Statistisches Jahrbuch [21].

For household sector prices, we selected the "cost of living price series, relating to total private households". 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:

Groupings in Table 10. FRG Energy Price Index Numbers

Industry Sector	Series	Energy Groups	Source
Total energy	Basic materials (Grundstoff) prices	Combination of two separate indices, using 1970 weights: 1.coal, crude oil, petroleum products; 2.electricity, gas, water	Statistisches Bundesamt [22], Fachseries 17, Reihe 3; and Statistisches Jahrbuch [21]
Solid fuels	Producer prices (Erzeugerpreise) for industrial products	Coal mining products (coal; coke and briquettes)	Fachserie 17, Reihe 2 [23]; and Statistisches Jahrbuch [21]
Natural gas	"	Natural gas	"
Petroleum prod.	"	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 [24]; and Statistisches Jahrbuch [21]
Solid fuels	"	Coal and other solid fuels	"
Natural gas	"	Gas (city and natural)	"
Petroleum prod.	"	Liquid fuels excluding gasoline	"
Electricity	"	Electricity	"
Transport Sector	Prices per liter of Normalbenzin, Markenware	Einzelhandel Verbraucherpreise für ausgewählte Waren	Statistisches Jahrbuch [21] 1979 and earlier issues, Fachserie 17, Reihe 7 [24]

Table 11. France. The Growth of (Current) Energy Prices, by Groups of Fuels and Electricity, 1950-1979. Index Numbers, 1970 = 100.

Year	GDP Deflator	Industry Sector Prices					Household Sector Prices					Transport Price
		Total Energy	Solid Fuels	Natural Gas	Petroleum Products	Electricity	Total Energy	Solid Fuels	Gas	Petroleum Products	Electricity	Regular Gasoline
1950	38.0	.	.	.	.	.	.	.	.	.	.	40.4
1	39.3	.	.	.	.	.	.	.	.	.	.	50.7
2	43.7	.	.	.	.	.	.	.	.	.	.	56.2
3	45.9	55.8	.	.	61.3	61.7	.	.	.	.	.	59.9
4	46.7	56.0	.	.	61.6	61.7	.	.	.	.	.	59.9
5	47.4	56.2	49.4	.	63.0	61.1	.	.	.	.	.	60.0
6	49.6	58.2	50.0	.	65.4	60.9	.	.	.	.	.	60.0
7	52.6	64.9	53.5	.	79.0	60.2	.	.	.	.	.	68.3
8	62.2	71.3	60.9	102.0	86.6	64.0	.	.	.	.	.	86.6
9	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
1	67.2	79.4	70.1	102.5	89.7	76.7	.	.	.	.	.	91.6
2	70.4	79.5	69.2	99.9	88.8	76.7	76.1	73.9	81.6	.	73.8	90.7
3	74.6	80.2	70.4	100.6	88.2	79.9	78.2	77.2	80.4	.	76.8	88.8
4	77.6	80.1	70.9	106.4	86.4	82.9	79.8	79.4	80.0	.	79.9	88.8
5	79.5	79.8	71.3	100.6	85.1	84.2	80.1	80.2	79.9	.	80.4	87.9
6	81.9	80.4	71.3	101.2	85.0	84.7	83.0	.	.	.	.	87.9
7	84.2	81.6	71.0	100.4	86.2	86.0	85.0	.	.	.	.	89.7
8	88.0	85.7	73.1	100.0	90.8	91.1	88.1	86.0	89.2	.	86.0	89.7
9	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
1	105.9	111.1	125.4	113.5	108.6	104.4	106.7	106.4	106.3	.	104.7	102.8
2	112.6	113.4	128.0	126.6	108.8	109.3	109.7	112.1	110.5	.	109.1	103.7
3	121.3	117.6	132.2	131.5	112.6	114.0	114.1	118.1	115.5	.	113.8	108.4
4	135.3	170.7	194.0	194.5	176.6	133.6	156.8	145.0	139.0	.	132.8	151.4
5	152.5	191.6	229.4	218.7	190.1	154.6	169.2	166.3	163.4	.	143.4	157.9
6	167.4	210.5	252.9	237.6	207.4	173.1	187.3	184.3	174.4	.	162.6	172.9
7	181.9	232.9	269.9	257.7	236.8	185.9	209.2	198.7	185.5	.	174.0	201.9
8	197.9	251.4	286.9	296.7	255.7	202.5	227.3	230.9	200.3	359.2	187.6	220.8
1979	225.6E	290.1	318.8	320.4	297.7	224.9	263.6	308.2	216.4	456.8	209.1	252.8

E = Estimated

Notes to Table 11.

Sources and Definitions of French Energy Price Data.

The French 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:

Groupings in Table 11. French Energy Price Index Numbers

Industry Sector	Series	Energy Groups	Source
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 [25] and Annuaire Statistique de la France [26]
Solid fuels	"	Coal, total	"
Natural gas	"	Natural gas and "ORT" 1958-1961; natural gas since 1962	"
Petroleum prod.	"	Petroleum products	"
Electricity	"	Electricity	"
Household Sector			
Total energy	Prices paid by modest householders all of France	Total of coal, gas, electricity and gasoline (home heating oils seem to be excluded)	"
Solid fuels	"	Coal	"
Natural gas	"	City distributed gas	"
Petroleum prod.	"	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 [26] 1978, p.587, backdated with Comité Professionnel du Petrole, Petrole 78 [27]. For updating to 1979 see INSEE Bulletin Mensuel de la Statistique [25], December 1979

Table 12. UK. The Growth of Current Energy Prices, by Groups of Fuels and Electricity, 1950-1979. 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 (Heating Oils)	Electricity	Motor Spirit
1950	49.0	.	.	.	.	.	.	.	.	.	.	.
1	49.3	.	.	.	.	.	.	.	.	.	.	.
2	53.7	.	.	.	.	.	.	.	.	.	.	.
3	55.1	.	.	.	.	.	.	.	.	.	.	.
4	55.9	.	.	.	.	.	.	.	.	.	.	.
5	58.1	.	61.1	118.8	96.4	75.4	.	.	.	.	.	65.9
6	61.0	.	70.3	129.4	116.9	80.3	53.3	.	.	.	.	69.0
7	63.2	.	74.9	135.8	121.3	83.3	56.7	.	.	.	.	69.0
8	65.4	.	79.1	142.0	102.2	85.0	59.2	.	.	.	.	70.6
9	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
1	68.3	.	83.7	144.9	81.8	84.3	65.5	.	.	.	.	73.4
2	70.8	.	86.6	148.0	91.1	85.9	68.6	62.3	81.7	.	70.5	77.6
3	72.5	79.6	86.6	148.2	86.1	87.5	72.8	64.8	83.3	.	74.7	81.4
4	74.7	81.0	86.6	148.0	80.6	87.0	75.0	66.0	86.5	.	78.1	84.9
5	78.5	86.4	86.6	146.2	75.3	91.0	78.6	68.5	87.3	.	84.2	84.9
6	82.1	89.8	88.1	147.8	79.6	94.2	83.0	75.3	89.7	.	87.0	89.6
7	84.5	91.8	85.1	146.9	92.5	96.5	85.3	78.4	90.5	.	89.7	89.1
8	88.2	94.2	82.1	147.6	101.1	98.6	91.8	82.1	96.8	.	100.0	94.5
9	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
1	108.9	110.6	117.8	72.3	148.7	110.2	110.3	112.3	109.4	.	111.5	103.0
2	117.7	114.0	128.1	65.5	142.4	112.7	118.9	124.3	115.3	.	117.9	106.0
3	127.0	119.0	132.0	65.0	139.2	114.0	122.3	128.4	116.5	126.0	120.5	114.0
4	144.1	164.9	141.0	65.7	329.3	142.5	143.2	142.8	122.4	.	146.8	163.8
5	184.1	208.3	223.0	94.5	409.8	189.6	190.7	192.4	141.2	.	213.3	223.0
6	202.6	296.0	266.0	149.0	474.0	239.0	236.0	236.0	171.0	309.0	264.0	237.0
7	233.6	363.0	317.0	204.0	600.0	275.0	274.0	275.0	200.0	384.0	301.0	254.0
8	257.7	384.0	345.0	252.0	564.0	303.0	295.0	305.0	206.0	389.0	332.0	241.0
1979	288.7	450.0	414.0	287.0	710.0	336.0	324.0	357.0	213.0	493.0	360.0	318.0

Notes to Table 12.

Sources and Definitions of UK Energy Price Data.

The following price indices were used:

Groupings in Table 12. UK Energy Price Index Numbers

Industry Sector	Series	Energy Groups	Source
Total energy	1963-1970: Index numbers of the wholesale prices of materials purchased by selected broad sectors of industry; 1970-1979: 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 [28] 1980 edition, p.463, table 18.2 and earlier issues; UK Department of Energy, Energy Trends [35]; May 1980
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 kWh;	Digest of UK Energy Statistics [29] 1979, table 87 prices of fuels used by industry. For backdating see also earlier issues and IIASA RM-76-18 [31]; UK Department of Energy, Energy Trends [35], May 1980
	1970-1979	Current fuel price index numbers; domestic sector	
Household Sector			
Total energy (Fuel and light)	1955-1970	General index of retail prices	Digest of UK Energy Statistics [29] 1979, p.119, table 84 and Monthly Digest of Statistics [30], March 1980; UK Energy Trends [35], May 1980
coal; gas; heating oils and premium kerosene; electricity	1970-1979	Current fuel price index numbers; domestic sector	
Transport Sector	1955-1969 1970-1973 as of 1 January	Prices in national currency per liter regular gasoline;	Extrapolated, see IIASA RM-76-18 [31]; OECD Energy Statistics [2], 1975-1977, p.190;
	1970-1979	Motor spirit, current fuel price index numbers; domestic sector	UK Energy Trends [35], May 1980

Table 13. USA. The Growth of Energy Prices in 1975 Dollars, by Groups of Fuels and Electricity, 1950-1979. Index Numbers, 1970 = 100.

Year	GNP Deflator	Industry Sector Prices					Household Sector Prices					Transport Prices
		Total Energy	Solid Fuels	Natural Gas	Petroleum Products	Electricity	Total Energy	Solid Fuels	Gas	Petroleum Products	Electricity	Gasoline
1950	58.7	139.7	94.4	.	143.4	.	.	.	114.8	113.1	145.6	.
1	62.7	135.6	90.3	.	144.8	.	.	.	106.9	111.9	137.4	.
2	63.5	133.6	89.5	.	141.2	.	.	.	107.6	113.3	137.1	.
3	64.5	135.3	91.4	.	142.1	.	.	.	109.2	117.4	136.8	.
4	65.3	131.6	84.9	.	136.6	.	.	.	109.9	116.5	135.5	.
5	66.8	128.7	82.0	.	136.3	.	.	.	111.8	117.9	134.3	.
6	68.9	128.6	86.8	.	139.6	.	.	.	110.2	119.9	130.6	.
7	71.2	131.1	91.2	.	144.7	.	118.3	.	108.4	121.9	126.9	119.9
8	72.3	124.1	88.8	101.6	129.8	130.2	116.6	.	112.9	113.1	126.4	116.4
9	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
1	75.8	120.7	83.0	112.2	126.8	126.6	116.3	.	120.3	111.7	124.3	114.2
2	77.2	117.9	80.7	111.5	123.1	124.9	114.6	.	118.0	109.8	124.7	112.9
3	78.4	115.7	79.6	113.1	120.0	122.1	113.3	.	116.4	110.5	120.3	111.0
4	79.6	110.9	78.4	110.0	112.7	119.1	111.1	.	115.0	106.3	117.8	104.3
5	81.4	110.5	76.4	110.1	114.1	116.2	110.6	.	112.8	106.2	114.7	109.3
6	84.0	109.6	75.6	111.1	114.7	111.9	108.8	.	109.9	105.5	111.1	108.4
7	86.5	108.9	76.9	111.6	114.4	109.2	107.2	.	106.6	105.8	108.9	108.9
8	90.4	103.0	76.3	99.0	107.4	105.4	104.0	.	103.0	104.5	105.1	106.0
9	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
1	105.1	103.2	115.2	99.6	101.0	104.4	101.7	.	101.9	101.2	101.4	95.8
2	109.5	102.0	117.8	100.6	98.5	104.8	101.6	.	103.0	97.5	102.3	93.1
3	115.8	109.2	125.3	105.6	110.0	105.4	102.8	.	101.8	106.2	101.5	97.3
4	127.0	154.5	174.2	123.3	174.2	121.3	117.2	.	104.4	153.5	109.4	119.2
5	139.2	165.8	184.4	150.3	183.2	131.2	122.3	.	114.2	151.6	113.0	116.2
6	146.4	170.8	167.6	189.1	185.3	134.0	128.1	.	126.7	154.5	114.2	115.1
7	155.0	183.6	167.1	241.1	195.1	141.9	136.7	.	142.3	165.4	115.0	115.0
8	166.5	182.4	171.9	248.1	191.2	142.2	137.2	.	145.5	163.1	115.0	111.7
1979	181.0	212.3	166.0	289.4	241.0	141.0	146.6		155.6	210.7	114.0	139.0

Source: Energy prices shown in Table 9 adjusted for general price increase with GNP deflator.

Table 14. FRG. The Growth of Energy Prices in 1975 D-Mark, by Groups of Fuels and Electricity, 1950-1979. Index Numbers, 1970 = 100.

Year	GDP Deflator	Industry Sector Prices					Household Sector Prices					Transport Prices
		Total Energy	Solid Fuels	Natural Gas	Petroleum Products	Electricity	Total Energy	Solid Fuels	Gas	Petroleum Products	Electricity	Regular Gasoline (1 January)
1950	52.3	.	78.4	.	152.6	131.5	.	.	.	.	.	.
1	55.4	.	.	.	.	.	.	.	.	.	.	.
2	59.2	.	.	.	.	.	.	.	.	.	.	.
3	60.8	.	.	.	.	.	.	.	.	.	.	.
4	60.8	.	105.1	150.7	174.0	150.7	.	.	.	.	.	.
5	62.3	.	103.2	154.9	172.6	154.5	.	.	.	.	.	.
6	63.8	.	106.7	151.3	170.8	151.3	.	.	.	.	.	184.8
7	66.2	.	111.6	150.8	175.5	150.8	.	.	.	.	.	169.9
8	68.5	.	113.6	148.6	159.9	148.6	.	.	.	.	.	164.2
9	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
1	74.1	.	104.6	137.7	136.4	137.7	.	.	.	.	.	139.8
2	77.2	.	102.2	131.3	140.2	131.3	.	.	.	.	.	134.2
3	79.6	.	101.6	126.8	134.9	126.8	.	.	.	.	.	127.9
4	81.3	116.5	102.1	124.0	122.5	124.0	.	.	.	.	.	125.2
5	84.7	112.8	102.8	120.8	113.0	120.8	.	.	.	.	.	120.0
6	87.7	109.0	99.2	.	108.7	117.4	.	.	.	.	.	109.9
7	88.8	111.4	98.1	.	110.1	116.0	101.9	.	.	.	.	116.7
8	90.1	106.1	91.6	113.4	113.7	112.5	106.3	.	.	.	.	122.9
9	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
1	107.9	102.7	103.7	94.2	101.5	95.2	97.7	100.7	93.7	102.3	94.9	97.7
2	114.2	98.7	103.7	95.3	93.4	96.0	96.4	101.1	93.4	89.6	97.5	95.4
3	120.9	101.2	102.7	91.5	107.4	94.9	106.0	103.6	90.0	139.6	97.3	101.9
4	129.3	142.5	119.6	95.6	140.6	95.4	115.9	114.3	92.0	170.5	99.2	114.6
5	130.7	147.4	136.9	132.5	129.8	103.1	118.5	121.0	97.4	151.6	108.3	106.4
6	144.3	152.3	142.4	143.8	134.0	104.5	122.2	123.7	102.6	161.7	109.4	110.0
7	149.5	148.2	137.3	147.4	127.9	101.5	119.3	122.1	101.5	155.7	106.4	103.3
8	155.5	140.1	140.6	146.8	119.1	101.1	118.1	124.3	101.2	146.6	106.8	102.2
1979	161.5	153.3	141.1	137.3	148.7	100.3	136.3	127.6	98.4	251.5	105.1	113.4

Source: Energy prices shown in Table 10, adjusted for general price increase with GDP deflator.

Table 15. France. The Growth of Energy Prices in 1975 Francs, by Groups of Fuels and Electricity, 1950-1979. Index Numbers, 1970 = 100.

Year	GDP Deflator	Industry Sector Prices					Household Sector Prices					Transport Prices
		Total Energy	Solid Fuels	Natural Gas	Petroleum Products	Electricity	Total Energy	Solid Fuels	Gas	Petroleum Products	Electricity	Regular Gasoline
1950	38.0	.	.	.	.	.	.	.	.	.	.	106.3
1	39.3	.	.	.	.	.	.	.	.	.	.	129.0
2	43.7	.	.	.	.	.	.	.	.	.	.	128.6
3	45.9	121.6	.	.	133.6	134.4	.	.	.	.	.	130.5
4	46.7	119.9	.	.	131.9	132.1	.	.	.	.	.	128.3
5	47.4	118.6	104.2	.	132.9	128.9	.	.	.	.	.	126.6
6	49.6	117.3	100.8	.	131.9	122.8	.	.	.	.	.	121.0
7	52.6	123.4	101.7	.	150.2	114.4	.	.	.	.	.	129.8
8	62.2	114.6	97.9	164.0	139.2	102.9	.	.	.	.	.	139.2
9	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
1	67.2	118.2	104.3	152.5	133.5	114.1	.	.	.	.	.	136.3
2	70.4	112.9	98.3	141.9	126.1	108.3	108.1	105.0	115.9	.	104.8	128.8
3	74.6	107.5	94.4	134.3	118.2	107.1	104.8	103.5	107.8	.	102.9	119.0
4	77.6	103.2	91.4	137.1	111.3	106.8	102.8	102.3	103.1	.	103.0	114.4
5	79.5	100.4	89.7	126.5	107.0	105.9	100.8	100.9	100.5	.	101.1	110.6
6	81.9	98.2	87.1	123.6	103.8	103.4	101.3	.	.	.	.	107.3
7	84.2	96.9	84.3	119.2	102.4	102.1	101.0	.	.	.	.	106.5
8	88.0	97.4	83.1	113.6	103.2	103.5	100.1	97.7	101.4	.	97.7	101.9
9	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
1	105.9	104.9	118.4	107.2	102.5	98.6	100.8	100.5	100.4	.	98.9	97.1
2	112.6	100.7	113.7	112.4	96.6	97.1	97.4	99.6	98.1	.	96.9	92.1
3	121.3	96.9	109.0	108.4	92.8	94.0	94.1	97.4	95.2	.	93.8	89.4
4	135.3	126.2	143.4	143.8	130.5	98.7	115.9	107.2	102.7	.	98.2	111.9
5	152.5	125.6	150.4	143.4	124.7	101.4	111.0	109.0	107.1	.	94.0	103.5
6	167.4	125.7	151.1	141.9	123.9	103.4	111.9	110.1	104.4	.	97.1	103.3
7	181.9	128.0	148.4	141.7	130.2	102.2	115.0	109.2	102.0	.	95.7	111.0
8	197.9	127.0	145.0	149.9	129.2	102.3	114.9	116.7	101.2	181.5	94.8	111.5
1979	225.6E	128.6	141.3	142.0	132.0	99.7	116.8	136.6	95.9	202.5	92.7	112.1

E = Estimated

Source: Energy prices shown in Table 12 adjusted for general price increases with GDP Deflator

Table 16. UK. The Growth of Energy Prices in 1975 Pounds, by Groups of Fuels and Electricity, 1950-1979. 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
1950	49.0	.	.	.	.	.	.	.	.	.	.	.
1	49.3	.	.	.	.	.	.	.	.	.	.	.
2	53.7	.	.	.	.	.	.	.	.	.	.	.
3	55.1	.	.	.	.	.	.	.	.	.	.	.
4	55.9	.	.	.	.	.	.	.	.	.	.	.
5	58.1	.	105.2	204.5	165.9	129.8	.	.	.	.	.	113.4
6	61.0	.	115.2	212.1	191.6	131.6	87.4	.	.	.	.	113.1
7	63.2	.	118.5	214.9	191.9	131.8	89.7	.	.	.	.	109.2
8	65.4	.	120.9	217.1	156.3	130.0	90.5	.	.	.	.	108.0
9	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
1	68.3	.	122.5	212.2	119.8	123.4	96.0	.	.	.	.	107.5
2	70.8	.	122.3	209.0	128.7	121.3	96.9	88.0	115.4	.	99.6	109.6
3	72.5	109.8	119.4	204.4	118.8	120.7	100.4	89.4	114.9	.	103.0	112.3
4	74.7	108.4	115.9	198.1	107.9	116.5	100.4	88.4	115.0	.	104.6	113.7
5	78.5	110.1	110.3	186.2	95.9	115.9	100.1	87.3	111.2	.	107.3	108.2
6	82.1	109.6	107.3	180.0	97.0	114.7	101.1	91.7	109.3	.	106.0	109.1
7	84.5	108.6	100.7	173.8	109.5	114.2	100.9	92.8	107.1	.	106.2	105.4
8	88.2	106.8	93.1	167.3	114.6	111.7	104.1	93.1	109.8	.	113.4	107.1
9	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
1	108.9	101.6	108.2	66.4	136.5	101.2	101.6	103.0	100.5	.	102.4	94.6
2	117.7	96.9	108.8	55.6	121.0	95.8	101.0	105.6	98.0	.	100.2	90.1
3	127.0	93.7	103.9	51.2	109.6	89.8	96.3	101.1	91.8	99.2	94.9	89.9
4	144.1	114.4	97.8	45.6	228.5	98.9	99.4	99.4	84.9	.	101.9	113.7
5	184.1	113.1	121.1	51.3	222.6	103.0	103.6	104.2	76.7	.	115.9	121.1
6	202.6	146.1	131.3	73.5	234.0	118.0	116.5	116.5	84.4	152.5	130.3	117.0
7	233.6	155.4	135.7	87.3	256.8	117.7	117.3	117.7	85.6	164.4	128.9	108.7
8	257.7	149.0	133.9	97.8	218.9	117.6	114.5	118.4	79.9	151.0	128.8	93.5
1979	288.7	155.3	143.4	99.4	245.9	116.4	112.2	123.7	73.8	170.8	124.7	110.1

Source: Energy prices shown in Table 12 adjusted for general price increases with GDP deflator.

Table 17. U.S.A. The Growth of GNP, Industrial Output and Energy Consumption, 1950-1979

Index Numbers, 1970 = 100

	GNP (Constant Prices)	Industrial Output	Energy Consumption (Total Primary)
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	103.0	101.7	101.8
1972	108.9	111.0	106.7
1973	114.9	120.4	111.2
1974	113.2	119.9	108.4
1975	111.8	109.3	105.3
1976	118.5	121.1	111.0
1977	124.7	128.2	114.0
1978	130.1	135.5	116.9
1979	133.1	141.2	116.6

Sources: For GNP and energy consumption, see Tables 2 and 27. Industrial output represents the Federal Reserve Board Index of Industrial Production, from Economic Report of the President, January 1980 [5].

Table 18. FRG. The Growth of GDP, Industrial Output and Energy Consumption, 1950-1979

Index Numbers, 1970 = 100

	GDP (Constant Prices)	Industrial Output	Energy Consumption (Total Primary)
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	106.0	105.2
1973	111.9	113.0	112.3
1974	112.9	112.0	108.6
1975	110.5	104.0	103.2
1976	116.7	111.7	110.0
1977	119.9	114.9	110.5
1978	123.7	117.4	115.4
1979	128.8	123.9	122.3

Sources: For GDP and energy consumption, see Tables 2 and 22. Industrial output represents index of industrial production, from UN The Growth of World Industry [9], Vol.I, 1973 and 1975 editions; updated with OECD Main Economic Indicators, January 1980 [8].

Table 19. France The Growth of GDP, Industrial Output and Energy Consumption, 1950- 1979

Index Numbers, 1970 = 100

	GDP (Constant Prices)	Industrial Output	Energy Consumption (Total Primary)
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	104.0	103.0
1972	110.7	112.0	109.9
1973	117.6	120.0	117.9
1974	121.6	123.0	118.5
1975	121.9	112.0	110.8
1976	128.1	121.6	117.8
1977	131.3	123.3	120.3
1978	136.7	125.1	122.9
1979	140.6	130.8	126.6

Sources: For GDP and energy consumption, see Tables 2 and 23. Industrial output represents index of industrial production, from UN The Growth of World Industry [9], Vol.I, 1973 and 1975 editions; updated with OECD Main Economic Indicators, January 1980 [8].

Table 20. United Kingdom. The Growth of GDP, Industrial Output and Energy Consumption 1950-

Index Numbers, 1970 = 100

	GDP (Constant Prices)	Industrial Output	Primary Energy Consumption Gross Inland	Energy Use Only
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	110.1	102.0	96.4	96.5
1976	114.4	104.8	98.1	98.0
1977	115.9	109.5	100.3	100.5
1978	119.2	112.9	100.6	100.9
1979	120.2	117.3	105.9	126.2

Sources: For GDP and energy consumption, see Tables 2 and 24. Industrial output represents index of industrial production, from UN The Growth of World Industry [9], Vol.I, 1973 and 1975 editions; updated with OECD Main Economic Indicators, January 1980 [8].

Table 21. USA. The Growth of Energy Consumption, by Groups of Fuels and Electricity, 1950-1979

Index Numbers, 1970 = 100

	Total Energy Consumption	Solid Fuels	Natural Gas	Petroleum	Gasoline	Electricity
	Primary Energy					
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	54.3	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	115.1	119.8
1974	108.4	101.9	98.7	113.3	112.7	120.2
1975	105.3	101.1	90.6	110.8	115.1	122.1
1976	111.0	108.2	92.4	119.3	120.4	129.5
1977	114.0	111.2	90.5	125.9	123.8	134.8
1978	116.9	111.8	91.0	128.7	127.8	142.0
1979	116.6	120.3	90.0	125.5	121.3	144.7

Sources:
Primary Energy, see domestic energy consumption by primary energy type 1973-1979, in DOE Monthly Energy Review [2], February 1980; 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 various issues of US Statistical Abstract [3].
Gasoline, see Motor Gasoline total product supplied 1973-1979 in DOE Monthly Energy Review, February 1980 [2]; for backdating to 1950 see Domestic Product Demand for Gasoline from the US Survey of Current Business, Biennial supplements [11].
Electricity represents total generation by utilities and industry from all sources; 1950-1978 from US Statistical Abstract 1978 [3] and Historical Statistics of the United States Colonial Times to 1970 [37], Vol.II. The data for 1979 are extrapolated on the basis of net electricity production from DOE Monthly Energy Review, February 1980 [2].

Table 22. FRG. The Growth of Energy Consumption, by Groups of Fuels and Electricity, 1950-1979

Index Numbers, 1970 = 100

	Total energy	Solid Fuels	Natural Gas	Petroleum	Gasoline	Electricity
		Primary Energy				
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	108.8	106.4
1972	105.2	89.8	167.2	109.8	113.2	114.8
1973	112.3	92.1	210.9	116.8	122.6	119.6
1974	108.6	92.5	254.1	105.3	120.8	124.8
1975	103.2	79.2	268.1	101.1	128.3	120.8
1976	110.0	85.0	284.2	109.5	134.0	133.6
1977	110.5	80.1	303.3	108.4	140.3	134.1
1978	115.4	82.5	330.0	113.2	147.8	141.4
1979	122.3	89.4	356.8	117.4	149.4	149.2

Sources:
Primary Energy, 1950-1978 from Steinkohle 1978-79 [33], October 1979, 1979 preliminary from Süddeutsche Zeitung, 11 February 1980 [40].
Gasoline consumption 1950-1978 from UN World Energy Supplies 1973-1978 [14], table 16 and earlier issues. 1979 January-October consumption from inland deliveries in EUROSTAT Hydrocarbons, January 1980 [18].
Electricity consumption represents total generation; data for 1950-1978 from UN World Energy Supplies 1973-1978 [14], table 25 and earlier issues. Preliminary 1979 extrapolated from data on net generation in EUROSTAT Electrical Energy Monthly Bulletin, January 1980 [19].

Table 23. France. The Growth of Energy Consumption, by Groups of Fuels and Electricity, 1950-1979

Index Numbers, 1970 = 100

	Total Energy Consumption	Solid Fuels	Natural Gas	Petroleum	Gasoline	Electricity
	Primary Energy					
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	108.5	105.9
1972	109.9	81.6	138.7	121.9	119.2	117.9
1973	117.9	80.1	161.3	133.2	125.6	130.0
1974	118.5	82.9	172.0	128.8	123.6	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	122.9	84.5	224.7	122.3	141.0	161.9
1979	126.3	88.4	250.6	121.6	141.9	172.1

Sources:
Primary Energy, 1950-1969 based on supply compiled from Production plus Imports minus Exports in UN World Energy Supplies [14] 1950-1974, table 2. 1970-1978 see "Consommation totale d'énergie primaire corrigé", bilan général in Pétrole 78 [27], p.A-11. 1970 updated with Ministère de l'Industrie, lettre 101 of 22 January 1980 [34]. The 1978-1979 data exclude consumption for nonenergy purposes.
Gasoline, motor spirits (carburants auto) inland consumption, 1950-1978 from Pétrole 78 [27], p.C6. For 1979 motor spirit inland deliveries see EUROSTAT Hydrocarbons Monthly Bulletin [18], April 1980.
Electricity. Data represent total generation from all sources, 1950-1969 compiled from UN World Energy Supplies 1950-1974, table 21, 1970-1979 updated with EUROSTAT Electrical Energy, February 1980 [19] and earlier issues.

Table 24. United Kingdom. The Growth of Energy Consumption, by Groups of Fuels and Electricity, 1950- 1979

Index Number 1970 = 100

	Gross Inland Consumption	Consumption for Energy Use only[a]				Gasoline	Electricity
		Total	Solid Fuels	Natural Gas	Petroleum		
	Primary Energy						
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	105.9	105.6	82.2	396.1	93.3	131.6	119.8

a = Excludes feedstocks for petrochemical plants and industrial and white spirit, bitumen and wax.

Sources:
Primary Energy. Gross inland consumption: 1967-1978 from Digest of UK Energy Statistics 1979 [29], table 5 and earlier issues. 1979 compiled from total production, foreign trade, bunkers and drawing on stocks in Energy Trends [35], December 1979, table 2. Consumption for energy use only: not temperature corrected, 1950-1978 from Economic Trends [36], annual supplement 1980, table 81. 1979 compiled from Energy Trends [35], April 1980.
Gasoline. 1950-1967 gasoline consumption compiled from production plus imports minus exports, in UN World Energy Supplies 1950-1974 [14], table 12. 1968-1978 see motor spirit, inland deliveries in Digest of UK Energy Statistics 1979 table 54. 1979 see motor spirit, inland consumption in Energy Trends [29], January 1980, table 14 and EUROSTAT Hydrocarbons Monthly Bulletin [18], April 1980.
Electricity. 1950-1967 extrapolated on the basis of electricity generation from all sources, in UN World Energy Supplies 1950-1974 [14], table 21. 1968-1978 see total electricity supplied (gross) public supply and industrial producers in Digest of UK Energy Statistics 1979, table 64. 1979, see total electricity generated, in Energy Trends [29], January 1980, table 9.

Table 25. The Growth of Electricity Consumption by Industry and Households in the USA, FRG, France and the U K

Index Numbers 1970=100

	United States		FRG		France		U K	
	Industry	Residential	Industry	Households	Industry	Households	Industry	Households
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
1971	.	.	102.5	112.7	102.9	110.5	100.3	104.5
1972	.	.	107.5	129.2	107.2	120.9	100.2	112.5
1973	119.7	129.2	117.0	139.6	114.5	142.6	109.7	119.1
1974	119.5	129.0	120.0	148.2	119.2	155.8	104.2	119.8
1975	117.8	130.4	110.2	157.4	110.2	180.4	102.2	115.2
1976	129.1	134.6	119.5	168.3	119.3	202.6	108.7	109.8
1977	134.7	143.1	119.6	174.6	120.2	224.3	109.6	111.3
1978	139.8	149.6	123.7	187.3	122.7	254.9	111.3	111.1
1979	145.4	151.6	130.6	194.3	131.4	273.9	115.9	116.1
1979 (10^9kWh)	833	679	166.5	83.7	105.4	58.0	106.4	89.7

Sources: USA: Electricity Sales from DOE Monthly Energy Review [2] May 1980; backdated with US Statistical Abstract [3]. FRG; France; UK consumption from EUROSTAT Energy Statistics 1975 [42] and Electrical Energy Monthly Bulletin [19], June 1977; and June 1978.

Table 26. FRG: Total Primary Energy Consumption, 1950-1978, by Sources of Compilation

	A Steinkohlen-bergbau Ge-samtverband	B UN (Aggregate Consumpt.)	C UN (Supply)	A Steinkohlen-bergbau Ge-samtverband	B UN (Aggregate Consumpt.)	C UN - (Supply)
	10^6tce	10^6tce	10^6tce	Index, 1970 = 100		
1950	135.5	124.4	127.8	.	37.9	36.8
1	149.8	143.6	147.3	.	43.7	42.4
2	158.2	152.7	157.1	.	46.5	45.3
3	155.5	149.2	157.0	.	45.4	45.2
4	167.2	159.4	161.7	.	48.4	46.6
5	183.4	177.8	180.2	.	54.1	51.9
6	195.2	192.1	197.6	.	58.4	56.9
7	196.1	194.0	200.4	58.2	59.0	57.7
8	190.7	186.1	203.5	56.1	56.6	58.6
9	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
1	215.7	207.3	215.4	64.0	63.1	62.1
2	231.3	223.9	230.0	68.6	68.1	66.3
3	248.9	243.0	267.6	73.9	73.9	77.1
4	257.1	252.4	268.3	76.3	76.8	77.3
5	264.6	258.4	276.9	78.6	78.6	79.8
6	266.7	258.8	279.2	79.2	78.7	80.4
7	266.8	259.1	269.8	79.2	78.8	77.7
8	288.5	278.9	290.2	85.7	84.8	83.6
9	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
1	339.4	333.8	359.0	100.8	101.6	103.4
2	354.3	336.8	364.5	105.2	102.5	105.0
3	378.5	361.2	382.0	112.3	109.9	110.1
4	365.9	353.5	364.3	108.6	107.5	105.0
5	347.7	334.4	360.1	103.2	101.7	103.7
6	370.3	363.7	382.8	110.0	110.6	110.3
7	372.3	355.1	377.6	110.5	108.0	108.8
8	389.0	368.8	382.7	115.5	112.2	110.3
1979	412.0	.	.	122.3	.	.

Sources: Aggregate Consumption see UN World Energy Supplies [14], 1973-1978, table 4, col.9; and earlier issues.

Supply complied as production plus imports minus exports from UN World Energy Supplies, 1973-1978 [14], table 4, col.1,6,7.

Table 27. FRG: Energy Price Indices, 1962-1979
(1970=100)

	A Coal, Crude Oil Petroleum Products	B Electricity Gas, Water	C Combined Coal, Oil, Electr., Gas (incl. water)
1962	97.5	.	.
1963	97.8	.	.
1964	94.1	98.5	94.7
1965	93.4	100.6	95.5
1966	93.6	101.4	95.6
1967	97.6	101.9	98.9
1968	93.7	100.2	95.6
1969	91.2	99.4	93.6
1970	100.0	100.0	100.0
1971	113.6	103.7	110.8
1972	113.4	110.9	112.7
1973	125.3	115.5	122.4
1974	209.2	124.1	184.3
1975	231.2	144.8	205.9
1976	247.9	154.7	220.6
1977	248.4	157.0	221.6
1978	241.0	161.8	217.8
1979 I	250.8	165.9	225.9
II	267.8	166.1	238.0
III	292.8	166.3	255.7
IV	.	.	.
October	301.4	165.7	261.7

Source:
A, B: Statistisches Bundesamt, Index der Grundstoffpreise [22], Fachserie 17, Reihe 3; Statistisches Jahrbuch 1979 [21] and earlier issues.
C : Combination of A and B using 1970 weights
Coal, crude oil, petroleum products = 105.18
Electricity, gas water = 43.53

Table 28. France: Petroleum Consumption, Total and for Non-Energy Use, 1970-1978

In Million Tons of Oil Equivalent

	Petroleum Consumption (Primary Energy Basis)	
	Total, excluding non-energy 10^6 toe	Non-energy 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	105.19	10.29

Source: Compiled from Pétrole 78 [27], p.A-10.

Table 29. United Kingdom: Total Primary Energy Consumption 1968-1979, by Sources of Compilation

	A		B	C
	UK Department of Energy: Inland Energy Consumption (Primary Energy Basis)		UN Aggregate Consumption Commercial Energy	UN Supply
	Total Gross Inland	Energy Use Only[a]		
	10^6tce	10^6tce	10^6tce	10^6tce
1968	329.0	313.7	284.9	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	374.4	355.7	.	.

a = Excludes feedstocks for petrochemical plants and industrial and white spirits, bitumen, and wax.

Sources: A Inland consumption representing production, plus net trade, bunkers and stock movements. Compiled from Digest of UK Energy Statistics [29], 1979 and earlier issues, and UK Energy Trends [35], April 1980.
B Aggregate consumption, see UN World Energy Supplies 1973-1978 [14], table 4, col.9; and earlier issues.
C Supply, see production, imports, and exports in UN World Energy Supplies 1973-1978 [14], table 4, col.1, 6,7, and earlier issues.

Table 30. UK. Price Indices for Energy Used by the Industry Sector.

	UK Department of Energy	UK Department of Industry	
	Industry Sector Prices	Wholesale Prices	
	Total Fuel	Broad Sectors of Industry, Fuel	Manufacturing Industries Input, Fuel
	(incl. coal; heavy fuel oil; gas; electricity; may exclude oil)	(incl. coal and petroleum prod.; may excl.electr.)	(incl. coal, gas, electricity; excludes petroleum products)
	(a)	(b)	(c)
1970	100.0	100.0	100.0
1976	296	250.2	227.2
1977	363	304.1	264.7
1978	384	320.6	292.7
1979	450	.	328.9

Sources: a. UK Department of Energy. Energy Trends [35] May 1980
b. C.S.O. Annual Abstract of Statistics [28] 1979 Edition, table 18.2, p.463; updated.
c. UK Digest of Energy Statistics [29] 1978, Table 91, p.125; updated.

Table 31. USA Electricity Generation, Concepts and Sources

Data in Billion kWh

	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 (Edison Electric Institute)	
	Historical Statistics Vol.II [37]	US Statistical Abstract [3]	UN World Energy Supplies [14]	DOE Monthly Energy Review [2]	Survey of Current Business [11]	DOE Monthly Energy Review [2]	Survey of Current Business [11]
1970	1639.8	1636	1640	.	.	.	.
1973	.	1965	1965	1861	.	1713	.
1974	.	2003	1967	1867	.	1706	.
1975	.	2124	2003	1918	.	1730	.
1976	.	2211	2123	2038	.	1836	.
1977	.	.	2211	2124	2124	1929	1951
1978	.	.	2328	2207	2204	2004	2018
1979	.	.	.	.	2247	2057	2078

PART IV. CONCEPTS, DEFINITIONS, AND SOURCES

1. GDP AND DEFLATORS

GDP in constant prices and 1975 dollars are shown in Table 2; for GDP index numbers, 1950-1979, see Tables 15-18.

US GNP and deflators, 1950-1979, are from the Economic Report of the President 1980 [5]. For European countries, the GDP compilations are based on the dollar values of the 1975 GDP at 1974-76 prices and exchange rates given in the World Bank Atlas [6]. Backdating to 1950 was done with the index of GDP at constant prices of the individual countries, taken from the various issues of the United Nations Yearbook of National Accounts Statistics [7]. The updating to 1979 is based on the OECD Main Economic Indicators [8]. The same UN and OECD sources were also used for the European countries to compile GDP deflators, 1950-1979.

2. INDUSTRIAL OUTPUT

Index numbers of industrial production are shown in Tables 17-20. Industrial output is measured in terms of quantity indices. These are compiled by national statistical agencies 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 include mining, manufacturing, and utilities. International agencies, UN and EUROSTAT present these indices with a breakdown following ISIC, the International Standard Industrial Classification. This permits an international comparison of the production indices of individual industries.

USA. The industrial production index, presented by ISIC groupings in the UN publication The Growth of World Industry [9], checks with the index compiled by the Federal Reserve Board See the FRB index, by major industry divisions, in the Economic Report of the President [5]. The index can be updated with the Federal Reserve Bulletin [10] or the Survey of Current Business [11].

European Community. The industrial production indices for the EC as a whole (EUR 9) and individual countries, 1975-1978, by major industry groups, are from the EUROSTAT monthly: Eurostatistics, Data for Short Term Economic Analysis [12], April 1979. The indices can be backdated 1970-1975 with the EUROSTAT Quarterly Bulletin of Industrial Production, 1976 [13]. For further backdating, 1961-1970, see UN, The Growth of World Industry [9], 1973 and 1975. For individual countries, see also national statistical publications, and the OECD Main Economic Indicators, 1955-1971, and of April 1980 [8].

3. ENERGY CONSUMPTION

3.1. 1975 Consumption of Fuel Commodity Groups and Electricity, (tonnage and tce)

The US and the European countries' consumption of (selected) fuel commodity groups shown in Table 4 represent supply, calculated as production plus imports minus exports. The data were compiled from the UN World Energy Supplies 1973-1978, [14] standard table 7 for solid fuels in tce; standard table 19 for natural gas in tcal; standard tables 14 and 16 for energy petroleum products and gasoline in metric tons; and standard table 25 for electricity generation in kWh. The index numbers for the consumption of total (primary) energy and energy groups, shown in Tables 3 and 17-24, are detailed below.

3.2. Energy Consumption Total and for Fuel Commodity Groups and Electricity, 1950-1979 (index numbers)

USA. Total energy consumption, 1968-1979, in tce shown in Table 3, and the 1950-1979 index numbers of energy consumption, total and by groups of mineral fuels, shown in Table 21, 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 Bureau of Mines. For 1972-1979, these data plus electricity from wood and waste are released by the Department of Energy (DOE) Energy Information Administration. The tables are reproduced in various US statistical publications, e.g., Statistical Abstract of the United States [3] 1978, p.604, table 1001; and DOE, Monthly Energy Review [2], February 1980.

The index numbers of gasoline consumption, 1950-1979 (Table 21) represent apparent consumption compiled from UN World Energy Supplies [14], standard table 12 for the years 1950-1972. Data check with US statistics of Domestic Product Demand for Gasoline, published in the Survey of Current Business [11], e.g., Biennial Supplement 1977, and January 1980, standard table S-35. The Domestic Product Demand (given in bbl per year) are nearly identical to the motor gasoline total supply (in bbl per day) published by the Department of Energy in the Monthly Energy Review [2], December 1980. The latter source was used for the years 1973-1979.

The index numbers of electricity consumption 1950-1979 shown in Table 21 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 1950-1977 are from the US Historical Statistics, Colonial Times to 1970 [37], Vol.II, p.820, table S-32-43; and the U.S. Statistical Abstract [3] 1978, p.162. The two sources agree with each other and with the data for total electricity generation 1950-1978 in the U.N. World Energy Supplies [14] 1973-1978, p.294, table 25 and earlier issues. The latter source was used for the 1978 data.

Unfortunately, data on total electricity generation by public utilities and industry from all sources 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 check with the "Electric Utilities, Total Production" in the Survey of Current Business. For details, see Table 31, USA: Electricity Generation, Concepts and Sources.

For updating to 1979, we have extrapolated using the "Electric Utilities, Total Production" in the Survey of Current Business [11] April 1980. These data show the growth in 1979 over 1979 as 1.81%. Based on "Electricity Sales to Ultimate Consumers", the growth in 1979 over 1978 would have been a little higher, 2.97%. The latter figure agrees with the statement that "1979 US electricity consumption rose only 2.8% over 1978" from an article by J. Parisi in the International Herald Tribune [41], April 1980.

FRG. Total primary energy consumption in tce, 1968-1979, shown in Table 3, and in index numbers, 1960-1979, shown in Table 22, are from tables on "Primärenergieverbrauch in der Bundesrepublik Deutschland" prepared by Gesamtverband des Deutschen Steinkohlenbergbaus, Essen, sent to IIASA, February 1980.

The data compiled by the Gesamtverband are somewhat at variance with the "aggregate consumption" compiled from the UN [14] standard table 4, column 9, and the "supply", representing production plus imports minus exports, also compiled from the UN [14] standard table 4, columns 1, 6, and 7. For a comparison of FRG primary energy consumption, 1950-1978, by the three sources, see Table 25. The reason for the discrepancies between the sources may be seen in the fact 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 Historical Data Series, 1950-1976, IIASA Working Paper WP-78-87 [15]. 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. Preliminary 1979 data are from Süddeutsche Zeitung, 11 February 1980 [40].

Gasoline consumption index numbers 1950-1979, shown in Table 22, represent inland consumption. The data on production plus imports minus exports compiled from the UN World Energy Supplies [14], 1973-1978 and earlier issues check with "inland deliveries of gasoline" in EUROSTAT Monthly Bulletin of Hydrocarbons [18], April 1980, which was used for the updating of UN figures.

Electricity consumption index numbers 1950-1979, shown in Table 22, represent total gross generation from all sources. The data compiled from the UN World Energy Supplies [14] 1973-1978, and earlier issues check with "total gross generation of electricity from all sources" in EUROSTAT Monthly Bulletin of Electrical Energy [19] February 1980. This source was used for updating.

France. Primary energy consumption, 1970-1978, shown in Tables 3 (total) and 23 (total and by type of fuels) represent 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 Professionnel du Pétrole, Eléments Statistiques 78 [27], p.A-11. For updating to 1979, see Ministère de l'Industrie, Lettre 101 [34] of 22 January 1980, No. 122. For a comparison of petroleum consumption, including and excluding nonenergy purposes see Table 28. For backdating 1950-1969, we used the primary energy supply (production plus imports minus exports) from the UN World Energy Supplies [14].

The index numbers of gasoline consumption, shown in Table 23, represent the inland consumption of gasoline for automobiles, published by the Comité Professionnel, Eléments Statistiques 78 [27] p.C6. The data are in close agreement with the motorspirit inland deliveries published by the EUROSTAT Hydrocarbons Monthly Bulletin [18], April 1980. The latter source was used for updating to 1979.

The index numbers of electricity consumption, shown in Table 23, represent total generation from all sources. Data for 1950 to 1969 were compiled from the UN World Energy Supplies [14] 1950-1974, table 21; 1970-1978 is from the Comité Professionnel du Pétrole, Pétrole 78 [27], p.A-16. The 1979 preliminary data relate to total gross generation from all sources, from the EUROSTAT Electrical Energy Monthly Bulletin [19] of February 1980.

United Kingdom. Total primary energy consumption shown in Tables 3 and 24 represent gross inland consumption compiled by the UK Department of Energy from production, foreign trade, bunkers and stock movements. Data for the years 1968-1978 are published in the UK Department of Energy, Digest of UK Energy Statistics [29] 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 1979 see the UK Department of Energy, Energy Trends [35], which is a monthly statistical bulletin.

The consumption for energy use only, total and by types of fuels, shown in Table 24, 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 [36] annual supplement, 1980 edition. For current data and updating see also the above mentioned Digest of UK Energy Statistics, and the monthly Energy Trends.

The index numbers of gasoline consumption 1950-1979, shown in Table 24, were compiled from various sources. Data for 1950-1967 represent production plus imports minus exports, compiled from UN World Energy Supplies [14] 1950-1974. Data for 1968-1978 represent inland deliveries, motor spirit, compiled from Digest of UK Energy Statistics [29]; Energy Trends [35] and EUROSTAT Hydrocarbons [18] April 1980.

The index numbers of electricity consumption 1950-1979 shown in Table 24 represent electricity generation from all sources. The data compiled from UN World Energy Supplies [14] 1973-1978 and earlier issues check with "total gross generation of electricity from all sources" in EUROSTAT Monthly Bulletin of Electrical Energy [19], February 1980. This source was used for updating.

4. ENERGY PRICES

Tables 5 and 6 show prices paid in 1975 per 10^7kcal (1 toe) of selected fuels and per kWh of electricity. The electricity prices (USA and Europe) and all fuel prices for the European countries are from the OECD Energy Statistics 1975-1977 [1]. US fuel prices are from other sources. For prices paid by the industry sector, see the fossil fuel prices, 1960-1977, in the Statistical Abstract of the United States [3], 1978, p.607, table 1007. These prices are shown for a composite of fossil fuels, and thereof: crude oil; natural gas liquids; natural gas (dry); bituminous coal and anthracite. The data were also shown in US Department of the Interior, Energy Perspectives 2, June 1976, as quoted in [3].

For household or retail prices we used the cost of fuels to end users, in the DOE Monthly Energy Review [2] April 1979, p.18. This source shows prices per physical quantities and per 10^6Btu of gasoline, and residential heating oil, natural gas, and electricity in 1972 dollars. Using the GNP deflator, we reconverted the data to 1975 prices. Tables 7 and 8 show gasoline prices, 1968-1979, in national currencies and US dollars (at 1975 exchange rates). The sources for these data are detailed in connection with the transportation price index numbers, Tables 9-12 below.

Tables 9-20 show long-term series of energy prices. These represent index numbers for groups of energy products, compiled by national governments. The following notes relate to series currently available and possibilities of backdating and updating on a monthly basis.

USA, Industry Sector. Two series, both relating to energy prices paid by the industry sector, are published in the Economic Report of the President [5] as crude materials for furter processing, 1947-1979; the other is a wholesale price index for fuels and related products and power as industrial commodities, 1929-1979. We selected the wholesale price indices of industrial commodities, where total energy shown in Table 9 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 Statistical Abstract of the United States [3] 1977, p.473. The index numbers can be backdated to 1950 with the biennial supplement to the Survey of Current Business [11], e.g., the 1977 supplement, 19th biennial edition. For updating, 1976-1978, see the monthly Survey of Current Business, or the US Bureau of Labor (BLS) Monthly Labor Review [20], e.g., April 1980, series of producer price indices by commodity groups.

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.

USA, Household Sector. For energy prices paid by the household sector shown in Table 9, 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 1957-1979, see the President's Economic Report [5] 1980, p.260, table B.50. As regards fuel commodity groups, the source of the historical data is the BLS Handbook of Labor Statistics, 1975 [32]. For more current data, 1970-1977, see Statistical Abstract [3] 1978, p.499, table 806; for updating on a monthly basis, see the BLS Monthly Labor Review [20], e.g., April 1980. Data on solid fuels are not shown in Table 9 because 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 in the following:

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	257.40	256.36
1978	.	267.51

For the data in Table 9, we selected the price index of fuel oil No. 2; the difference between the two indices is minimal.

USA, Transportation Sector. In the United States, retail prices of gasoline are published by the Department of Commerce, by the Bureau of Labor Statistics, and the Department of Energy. Commerce Department prices exclude taxes. See the retail price of gasoline excluding taxes, in dollars per gallon of regular grade gasoline at service stations, for an average of 55 cities, published in the Survey of Current Business [11], standard table S-35. For backdating, 1947-1976, see the biennial supplement, 1977.

For both Tables 7 and 9, we have used the BLS and DOE data which include taxes. For comparability with European data, we converted the price per gallon to price per liter, on the basis of 1 US gallon = 3.79 liters.

The gasoline prices shown in Table 7, for the years 1976-1980, represent average retail dealer motor gasoline prices, tax included, full service, US total, from the DOE Monthly Energy Review [2], February 1980. We have backdated these prices to 1970 with the average retail dealer motor gasoline selling price, tax included, from the Statistical Abstract [3], 1976 and 1979. Further backdating to 1968 could be done by extrapolation with the BLS consumer price index for gasoline, motor oil and coolants, used for the data in Table 9.

The gasoline price index 1970-1979 shown in Table 9 represents the consumer price index of gasoline, private transportation, published in the President's Economic Report [5], January 1980, Table B 59. For backdating 1957-1969, see the consumer price index of gasoline, motor oil and coolants (tax included) published in the President's Economic Report [5], January 1979. 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 [20].

It may be noted that the index implicit in the gasoline prices shown in Table 7 need not be identical with the index shown in Table 9 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 as to cities and service stations surveyed. Moreover, there are differences as to the reference periods for the years 1970-1975, June, for the gasoline prices, and average of the year for the index.

FRG, 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 [22], the other is the producer price index, published monthly in Preise und Preisindizes für industrielle Produkte (Erzeugerpreise), Fachserie 17, Reihe 2 [23]. For yearly averages, 1970-1978, see Statistisches Jahrbuch 1979 [21]; for backdating see earlier issues of 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 10 represents the addition of the two indices, using their 1970 weights. For the addition of the two indices, see Table 27.

For proper interpretation of the data in Table 10, it has to be kept in mind 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 10 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.

FRG, Household Sector. The index numbers shown in Table 10 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 [24]. Annual averages, 1972-1978, are from Statistisches Jahrbuch [21] 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.

FRG, Transportation Sector. The gasoline price shown in Table 7 and the index numbers in Table 10 were compiled from

the prices, tax included, D-Mark 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 [24]. Annual data are published in Statistisches Jahrbuch [21], 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 [24], and annually in Statistisches Jahrbuch.

France, Industry Sector. The energy price index numbers shown in Table 11 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 [25], e.g. December 1978, p.36, table 10, 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 [26], e.g. 1977, and earlier issues.

France, Household Sector. The household sector prices shown in Table 11 are from the series of Monthly Consumer Prices, Urban Households, all of France,published on a monthly basis in INSEE Bulletin Mensuel de la Statistique [25], e.g. December 1978, table 12. 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. It may be noted that data for 1962-1969 were extrapolated with the old index, 1962=100. The composition of the old index may somewhat differ from the current one.

France, Transportation. The gasoline price shown in Table 7 and the index numbers in Table 11 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 [26] 1978, p.587; the 1978 price which represents a 12-month average is from the INSEE Bulletin Mensuel de Statistique, December 1978 [25]. The series were 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 [27]. It may be noted that, for overlapping years, the data from the Comité checked with those of the Annuaire Statistique.

United Kingdom. All energy price index numbers for the years 1970-1979 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 [35] May 1980.

UK, Industry Sector. The industry sector prices shown in Table 12 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 1970-1979. 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, based on 1970= 100 is published in the C.S.O. Annual Abstract of Statistics [28], 1979 edition, p.463. In the 1980 edition of the Abstract, the base year was changed to 1975=100. Whatever the base year, it is a fact that 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 [29] 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 themselves 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 pace 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 [8] January 1980, p.152.

For a comparison of the three fuel price indices described above, see Table 30, UK Price Indices for Energy Used by the Industry Sector.

To the best of our knowledge, there are no long term wholesale price indices for energy commodity groups. Therefore, the indices shown in Table 12 were backdated to 1963 with index numbers compiled from 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 kWh for electricity, 1968-1978, in the Digest of UK Energy Statistics [29] 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 check with the prices per 10^6 Btu for solid fuels, gas, liquid fuels except gasoline and electricity shown in a March 1976 Research Memorandum [31], table 2.6, p.63. Therefore, the IIASA memorandum was used for extrapolation of the prices to 1955.

UK, Household Sector. The household sector energy prices total and by commodity groups 1970-1979 are from the "domestic sector current fuel price index numbers" published in the Department of Energy, Energy Trends [35], May 1980. Total

energy represents fuel and light; it 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 [29] 1979, and the UK Statistical Abstract [28].

UK, Transportation Section. The gasoline price index shown in Table 12 represents "motor spirit"; it is from the domestic sector price series, published in the Energy Trends [35] May 1980. For backdating, use was made of the price at the pump, tax included, of regular gasoline published in the OECD Energy Statistics [1] 1975/1977 and in the IIASA RM-76-18 of March 1978.

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