HISTORICAL DATA SERIES 1950-1976

Claire P. Doblin

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INTERNATIONAL INSTITUTE FOR APPLIED SYSTEMS ANALYSIS
A-2361 Laxenburg, Austria

PREFACE

The historical data series were used to elaborate global scenarios underlying the projections in the forthcoming book of IIASA's Energy Systems Program on Energy in a Finite World--A Global Systems Analysis. The series were also used to support the application of a macro-economic model called MACRO in the IIASA set of energy models in a study carried out under contract with the Commission of the European Communities.

The data base relates to population, energy, national accounts, foreign trade, annual investments, energy prices and labor. Part One explains the concepts and definitions; this should serve to understand the meaning of the variables and their use for international time series. Included in Part Two is a set of nearly 60 tables, providing an overview of the development of leading indicators over the last 25 years. Finally, in Part Three, the sources for compiling the statistics are detailed, so as to facilitate updating and possible expansion of the data base.

It is hoped that the historical data series may be helpful not only for IIASA's Energy Systems Program but outside the Program and IIASA as well.

Wolf Häfele

Deputy Director,
Program Leader, Energy Systems

CONTENTS

PART ONE:

METHODOLOGY

1. INTRODUCTION, SELECTION OF COUNTRIES AND VARIABLES

A large part of IIASA's Energy Systems Program is devoted to the development of scenarios designed to investigate future energy demand and supply conditions at a global level [1]. For this purpose, the world has been divided into seven regions, differing from each other by degree of development, abundance of fuels, and whether they are market economies or centrally planned.

The data in the historical series were compiled for individual countries and subsequently summarized so as to correspond to the seven world regions in the Energy Systems Program scenarios. The regions and the countries within each region are indicated in Table 1.

An early source for compilation of historical data series were the computer tapes, underlying the Chenerey study on Patterns of Development [2]. They contain for 101 Western developed and developing countries 30 variables (macroeconomic and social statistics), covering in principle the period 1950-1970. Some of the macroeconomic statistics were updated and expanded where feasible, to include centrally planned economies; and a number of variables were added for both Western countries and centrally planned economies. Thus, the data for the years 1950-1975, discussed in Part One and shown in Part Two, relate essentially to:

- Population (total, over 65, urban) past and projections;
- Energy (primary fuels and electricity production; consumption by type of fuels; the energy gap between developed and developing countries, energy trade flows and the dependency of certain regions on energy imports;
- GDP (growth and the development of the GDP gap between developed and developing countries);

- GDP deflators;
- Annual investments, total and in the energy sector;
- Energy prices (fuels and electricity);
- Labor (employment; unemployment; man-hours and wages).

2. CONCEPTS, DEFINITIONS, DATA

2.1. Population

2.1.1. 1950-1975 and Projections

Total population represents midyear estimates, published by the United Nations in the Statistical Yearbook [3] and updated in the Monthly Bulletin [4]. Data were collected for each country (East and West), each year of the period 1950-1977; they are summarized by regions, at 5-year intervals, in Table 2. The population 65 years and over, for each country summarized by regions, 1950-1975, were compiled from the UN study: Population by Sex and Age for Regions and Countries, 1950-2000 [5].

The projections for total population and 65 years old and over are based on estimates prepared by Professor N. Keyfitz: Projected Population 1975-2075 at Five Year Intervals for World, Male and Female, sent to IIASA's Energy Systems Program, with letter of 7 April 1977 [6].

The attached tables show the summaries by regions, 1950-2075, for total population (Table 2); and percentage share of population 65 and over in total population (Table 3).

2.1.2. Urbanization

Data on urban as percent of total population 1950-1970 for Western countries only, are contained in the computer tapes underlying the Chenery study [2]. These were updated to 1975

by IIASA regions, with projections to the year 2000; the data base was further expanded through the inclusion of centrally planned economies.

The definition of "urban" varies widely among the various countries. The criteria insofar as they are known are indicated by the United Nations in the Global Review of Human Settlements [7]. Accordingly, urban means in the United States "places of 2500 inhabitants or more incorporated as cities, boroughs, villages and towns"; in France, the Netherlands, the FRG and the GDR "communities with 2000 and more inhabitants", in India "5000 or more inhabitants, a density of not less than 1000 persons per square mile, and at least three fourths of the adult male population (!) employed in pursuits other than agriculture";in Czechoslovakia the number of inhabitants per town is "usually 5000 or more inhabitants" plus half a page of conditions, including sewerage systems, at least five physicians and a hotel with at least 20 beds; in Portugal and Spain "localities of 10 000 or more inhabitants", in Japan "localities of 30 000 or more inhabitants",with a lot of conditions as to density and occupations of the population; etc. etc. Some countries dispense altogether with numbers, i.e. the UK and many others, where urban means "area classified as urban for local government purposes".

In view of this heterogeneity, the question arises as to the significance of the statistics on urbanization. The absolute number of "urban" and "rural" may not be comparable within given areas--but strictly speaking, neither are GDP and many other macroeconomic data. However, to the extent that the criteria for the definitions of "urban" and "rural" do not materially change over time, the data may be significant to show the trend. For this reason, it was con-

sidered useful to estimate the urbanization for all IIASA regions, 1950 to 2000. To do so, use was made of the estimated and projected percentage of population in urban areas for the world (including centrally planned economies) macro-regions and regions, 1950-2000, published by the UN in the Compendium of Housing Statistics [8]. In order to apply the UN ratios of their "macro-regions" to the IIASA regions, it was necessary to disaggregate the latter into groups of countries. Table 4 shows the correspondence of the IIASA regions and sub-regions with the appropriate UN estimated percentage of urban population in 1975.

It may be noted that the UN projections of urban and total populations relate to the medium variant; since the latter are akin to the Keyfitz data, there seems to be no conflict in the application of the ratios to the IIASA population data shown in Table 2. The estimated urban population, by IIASA regions, 1950 to 2000, is shown in absolute numbers and as percentage of total population in Table 5. The table also shows the urban population for total developed and total developing countries, 1950-2000. These data match the distribution of rural and urban population for developed and developing countries, shown in earlier IIASA publications [9].

2.2. Energy Production, Consumption, Trade (Quantities)

2.2.1. Primary Energy Production; Conversion Methods

In the following, all energy data relate to commercial energy only. Production and the UN estimated "apparent inland consumption" of primary energy in terms of TCE was compiled for all countries and each year of the period 1950-1975 from the United Nations World Energy Supplies [10]. World primary energy production and electricity generation, by IIASA regions and at 5-year intervals, 1950-1975, are summarized in Table 6 and 7.
All production and consumption data include hydro and nuclear electricity converted from original physical output units (kWh) to a measure of primary energy, expressed in TCE. As regards the conversion, it may be recalled that the UN collects all energy production, trade and consumption data from member countries through a questionnaire. At the UN, different types of fuel are then made comparable on the basis of their heat content (BTU) expressed in terms of TCE. The UN uses this method also for the conversion of hydro and nuclear electricity to TCE. This procedure is detailed as follows:.
"Using the actual thermal content of electricity (3412 BTU per kWh) and of coal (about 27 million BTU per ton), one comes up with a conversion factor of 1000 kWh of hydro-electricity equal to about 0.125 tons of coal." Darmstaedter [11]. The conversion factor actually used by the UN is 0.123; see Table 8.

The alternative to the UN practice (method A) is to estimate the amount of fuel needed at a steam power plant for generation of a given amount of electricity (method B). For instance, in the US in 1965, the generation of "1000 kWh of electricity would have

required about 0.40 tons of coal" Darmstaedter [11]. Under method B, the TCE for 1965 would be about three times higher than the amounts figured by the UN (method A). Method B is followed by the US Bureau of Mines, and this explains why e.g. primary energy consumption data for the US, presented by the UN [10] differ from the tables of the US Bureau of Mines, shown for instance in the US Statistical Abstract [12]. Method B is also followed by other international agencies and various energy research. Table 8 shows for the world as a whole the production of primary energy including hydro and nuclear electricity brought to primary energy basis by either methods A or B, for the years 1950-1975. Throughout this period the method A conversion factor remains constant, ex definitio, and this is one reason why it is favored by the UN. Over the same period of observation, 1950-1975, the method B conversion factor changes, reflecting the increase in the efficiency of fuels utilization in thermal energy generation. Based on H. Schilling et al. [13] the fuel needed for the generation of 1000 kWh decreased from an estimated worldwide average of 0.55 TCE in 1950, to 0.40 TCE in 1965 and 1974. For the US, it is estimated that the requirements of coal per 1000 kWh decreased from 1.0 TCE in 1925 to 0.40 tons in 1965, see Darmstadter [11]. The TCE requirements for thermal electricity generation seem to have remained stationary since 1965, in the estimates for the US, and for the world, the latter being largely based on the former.

Table 8 also shows that for the world as a whole, the differences in the compilations of total primary energy production (and hence consumption) amount to no more than 4 to 5 percent, between methods A and B. Obviously, the picture changes if one looks at individual

countries, where hydropower is important, e.g. Norway. At the same time, method B is recommended for future scenarios with increasing importance of nuclear energy.

While in the above it was noted that the UN data for world production (and consumption) of primary energy totals were understated by 4 to 5 percent, there is also reason to believe that the UN world total may be overstated. This suspicion is founded on the fact that UN world totals include China, or region VII by IIASA energy scenarios. The official China data that enter the UN compilations by way of the government's reply to the UN questionnaire, tend to be considerably higher than those collected by other sources. Table 9 shows primary energy consumption for China (region VII) and the world, depending on whether or not UN data are replaced by the knowledgeable estimate of V.Smil[14]. The result is a considerable difference for the region, as the Smil data are about one third lower than the UN data. On the other hand, results for the world as a whole are not much affected; the difference amounts to no more than 4 percent between world totals including official and estimated China data.

2.2.2. Primary Energy Consumption; Total Supplies and Apparent Inland Consumption

In the foregoing, reference was made to the UN data on apparent inland consumption of primary energy in terms of TCE. This item is shown in World Energy Sypplies [10], standard tables 1 and 2, columns 11 and 12 as consumption of total commercial energy, aggregate and per capita. It is explained in the text that "data on consumption refer to apparent inland consumption and are derived from the formula production + imports - exports - bunkers ± additions to stocks". World totals of the so-defined apparent inland consumption do not add up to world totals of primary energy

production. There is a gap of roughly 7 percent. On the other hand, the gap between world production and consumption narrows considerably if instead of apparent inland consumption one uses the concept of total energy supplies. The latter can be compiled from the same source [10], standard tables 1 and 2, using columns 3, 8 and 9, as primary energy production plus imports minus exports. This formula disregards stock movements, for which data are not published; and bunkers, though published, are not treated as exports. Both stock movements and bunkers constitute relatively small quantities, not more than 2-3 percent of total world consumption, according to H. Schilling et al. [13]. See also bunkers more fully discussed in connection with trade, and shown in Table 19.

Table 10 shows world totals, 1950-1975, of total primary energy production, total supplies, and the much lower apparent inland consumption. This leads to the question of what accounts for the difference between the two sets of primary energy consumption, both compiled from the same UN standard table; which set should be used and whether adjustments should be made to the apparent inland consumption?

In order to find an answer, it might be useful to look at total supplies and apparent inland consumption in the various regions. See Table 11, which shows primary energy consumption, aggregate and per capita, for each of the IIASA regions, 1950-1975. The table shows that in region I, throughout the 25 years, the differences between total supply and apparent inland consumption are roughly 6 percent, which is close to the world average. In region III, the margin between the two sets of consumptions rose from 5 percent in 1950 to about 10 percent since 1965. The differences are particularly pronounced, about 50 percent, in region VI. These

data tend to indicate that in region III a relatively high amount of primary fuels was progressively used as raw materials in chemicals production; this may also be true to some extent in region VI. At the same time, this does not exclude the fact that a fairly high amount of primary fuel escapes the count in region VI. Thus, it may be safe to assume that the difference between the two sets derives essentially from the exclusion in the apparent inland consumption of fuels that are put to non-energy use serving as raw materials (feedstocks), plus the loss of primary fuels that occurs when gas is flared in the field. Therefore, the apparent inland consumption seems to represent the consumption of all products (including losses in conversion), put to energetical use only.

Now that it has been ascertained what accounts for the difference between total supply and apparent inland consumption, it remains to be seen for what purpose either definition should be used. If the objective is to study the trend of long-term time series, it might suffice to use the more readily available UN concept of apparent inland consumption. This was used to compile for the seven IIASA regions a breakdown of primary energy by type of fuels and electricity, 1950-1975. See Tables 12 and 13. To prepare tables of this type it would not have been possible to use total energy supplies as complete data are not available from UN sources. Though for this reason the consumption by type of fuels may be somewhat incomplete the time trend emerges very clearly. Tables 12 and 13 show for the world as a whole the dramatic decrease in solid fuels from 62% of total primary energy consumption in 1950 to only 33% in 1975; in region I the relative decrease was from 41% to

21%, and in region III from 85% to 27% of the total over the same period of time. At this point one may recall the UN's statement that "the principal objective of the series is to provide a global framework of comparable data on long-term trends and recent developments in the supply of all commercial forms of energy, as a basis of the characteristics of energy supply and demand" [10, Introduction]. This objective is well met; regardless of whether or not hydro/nuclear electricity may be somewhat understated, Chinese data may be somewhat overstated, or the total amounts of fuels and energy consumed may be on the low side, the series show the trend followed over the last 25 years in each of the IIASA regions and the world as a whole.

2.2.3. Energy Gap Between Developed and Developing Regions

For the growth of primary energy consumption in developed and developing regions, or the development of the energy gap, 1950-1976, data were compiled for both total energy supplies and for apparent inland consumption. Table 14 shows aggregate primary energy consumption for market economies, divided into developed regions (I and III) and developing (IV-VI). Whatever the concept used, energy supply or the somewhat smaller apparent inland consumption, the trend is the same--the share of developed countries in total primary energy consumption has slowly decreased from 92% in 1950 to 84% in 1976. A very similar dwindling of the share of developed countries in aggregate consumption could be observed if data were to include both market and centrally planned economies.

Table 15 shows that the share of developed regions (I-III) as compared to the developing (IV-VII) has decreased just a little bit faster recently, falling from 92% in 1950 to about 82% in 1976. This development shows that as far as aggregate energy consumption is concerned, the gap between developed and developing countries has tended to narrow ever so slightly over the last 25 years. If this narrowing continues, the developing countries (market economies)which presently consume about 16% of aggregate primary energy, might reach 25% by the year 2000. Whether this suffices to reach the Lima target of 25% of industrial production is another question.

It is often thought that to study the gap between developed and developing regions, it is not very meaningful to look at aggregate consumption only. The per capita primary energy consumption 1950-1976 is

shown for developed and developing regions of market economies (Table 16) and market and centrally planned economies (Table 17). Again, the messages are very similar; regardless of what concept (total supplies or apparent inland consumption) was used, and whatever the statistical universe (market economies only or market and centrally planned), the gap has tended to become smaller over the last 25 years. While in 1950 market-economies developed regions consumed 20 times more primary energy (total supplies) than the developing, they consumed "only" 12 times more than the developing in 1976. In terms of apparent inland consumption, the gap ratio fell from 24.0 in 1950 to 14.3 in 1976. The trend is about the same for the world (market and centrally planned economies)--except that the latter reflects more sharply the Chinese development of the 1960s.

The per capita primary energy consumption (apparent inland only) for both market economies and the world in developed and developing regions, on an annual basis, 1950-1976, is also shown in Table 18.

It appears from the above that both concepts of energy consumption have their raison d'ètre. Depending on the purpose for which the data should be used, one may choose either the UN favored apparent inland consumption or the somewhat larger total energy supplies.

2.2.4. Energy Trade Flows and Import Dependencies

Specific cases in which it may be preferable to use the concept of total energy supply relate to the estimation of regional energy surplus or deficits, and to their import dependency.

The energy surplus or energy deficit is estimated as the difference between total domestic production and total consumption. Due to the fact that apparent inland consumption tends to be low, surpluses derived from production minus consumption tend to be too high, and deficits too small. For example, in 1950 region I had a primary energy production of 1195 · 10^6TCE, an apparent inland consumption of 1187 · 10^6TCE, leaving a "surplus" of 8 · 10^6 TCE. Whereas, if one compares primary energy production with total supplies., same time and same region, there appears an energy deficit of 67 · 10^6TCE. The energy deficits and surpluses of the regions are again discussed below in greater detail under "trade".

The trade flows in primary energy, showing for each region imports, exports and bunkers 1950-1975 are presented in Table 19. The table shows that world imports and world exports do not match. There are actually quite solid, statistical reasons why this must be so, including the fact that all over the world imports tend to be registered differently, and with a time lag, from exports. Besides, the trade data as shown by the UN [10] on standard tables 1 and 2 represent general trade. This means that imports include shipments that go into entrepôt; some of the entrepôt is used as bunker fuel that serves to supply national and foreign ships and aircraft in international transportation. The question is whether or not bunker fuel should be treated as exports. Since some of it is used to provide fuel for the nation's own carriers, and because it is impossible to allocate bunker as imports to anyone country, it was thought preferable to exclude them from "net trade flows".

Total energy supplies and net trade flows, with the minus sign indicating net imports and a plus sign for net exports, by regions, and within regions I and III are shown in Tables 20-25. The tables also show the import dependency, which is measured as the percentage of net imports in total supplies. The tables illustrate how the above defined import dependency rose, and at what speed, in the world's two major energy deficit areas, regions I and III. Accordingly, in region I the import dependency rose slowly from 5 percent in 1950 to about 8 percent in 1970--taking a dramatic jump only in the seventies, when import dependency escalated to over 14 percent in 1975 (see Table 20). Within region I, there were some important changes. Canada turned from an import dependency of over 60 percent in 1950 to become a net exporter in the 1970s (see Table 21). While in the US, where import dependency was virtually unknown in the early 1950s (less than 2%), barely reached 7% in 1960, and was still less than 10% in 1970, it has since shot up to a record 23% in 1977 (see Table 23).

In region III, the import dependency rose gradually from 15% in 1950 to 64% in 1970, dropping slightly to 62% in 1975 (Table 20). Within region III, the import dependencies of the EC and Japan (Tables 24 and 25) rose to far higher levels than those observed for the USA, except that the growth story had a different ending in the last 5 years. In 1950, both EC and Japan started out with an import dependency of 10, respectively 8%; in the EC it rose to 32% in 1960, and 61% in 1970; but contrary to what happened in USA, there was no further rise between 1970 and 1976, as import dependency oscillated around 60%. In Japan, the import dependency stood

at 47% in 1960; 86% in 1970; with a further increase to 92% in 1973, and subsequently a leveling out at this very high plateau.

Finally, reference may be made to the degree of import dependency estimated by the Statitical Office of the European Communities. They use a slightly different concept, namely: Net imports minus bunkers as percent of gross inland consumption of primary sources and equivalents. Thus for the nine member EC countries they estimate the degree of dependence on foreign supply in 1975 as 56.9%, see EUROSTAT [15] 1976-4, which is not different from our estimates as 58% shown above.

2.3. GDP, Total and Per Capita Growth

2.3.1. Regional Product for Market and Centrally Planned Economies

The GDP in 1975, at 1974-1976 prices, and converted from national currencies to US dollars at 1975 exchange rates, was compiled for all Eastern and Western countries from the World Bank's Atlas 1977 [16]. At IIASA these data were extrapolated backwards to 1950 with the index of GDP at constant prices contained in various issues of the UN Yearbook of National Accounts Statistics [17]. The GDP country data were updated to 1976, and where feasible to 1977, with indices of GDP at constant prices given in various current statistical publications, e.g. UN Monthly Bulletin of Statistics [4]; also EUROSTAT and OECD quarterly bulletins [18; 19]. The data relating to individual countries were then aggregated into the appropriate IIASA regions.

For countries in region II the 1975 GDP at 1974-1976 prices and dollars, compiled from the World Bank Atlas [16], were extrapolated to 1950 on the basis of the growth index implicit in "net material product" published in the UN Yearbook of National Accounts Statistics [17], current and earlier issues. These sources give net material products of the USSR and Eastern European countries with centrally planned economies only in terms of national currencies, not in dollar values.

For region VII the UN has so far not published any net or gross product data in the Yearbook of National Accounts Statistics [17]. The 1975 GDP of China, at 1974-1976 prices and dollars compiled from the World Bank Atlas [16] was extrapolated to 1950, on the basis of the GNP data, 1949 to 1975, contained in V. Smil, China's Energy: Achievements, Problems, Prospects [14]; p. 141, table 6.3. The conversion of centrally planned economies' material products to GDP at dollar values introduces an element of uncertainty that one has to keep in mind when comparing global data on the level of GDP.

2.3.2. Selection of Exchange Rates for Long-Term Series

Difficulties in conversion from national accounts of GDP into dollar values are not limited to the data emanating from centrally planned economies. There is a certain lack of comparability of the concepts of national accounts, especially between developed and developing countries. Besides for nearly all countries it is difficult to find the appropriate exchange rate to the dollar, be it a purchasing power parity rate, or the selection of the reference period of an official exchange rate. The latter is important in the case of time series. See Table 26, which shows the exchange rates to the dollar of EC member countries and Japan, in 1969,

1975 and mid-1978. If one chooses an exchange rate that predates the dollar devaluation, the GDP of North America (region I) tends to be overstated vis-a-vis the GDP of the EC and Japan; whereas if one uses a post-dollar devaluation rate, the reverse may hold true. This can be seen in the following example:

	1975 GDP in US Dollars at exchange rates of:	
	1970	1975
	10^9\$	10^9\$
Region I (US and Canada)	1678	1678
Part of Region III (EC and Japan)	1521	1743

At the old, 1970 exchange rates, the 1975 GDP of Region I would be larger than the aggregate of the European Community and Japan; whereas at 1975 exchange rates the opposite holds true. Thus, the historical series are bound to become unrealistic for part of the time covered. The question is whether it is fair to give a greater weight to Europe and Japan for the entire 1950-1976 period by using recent exchange rates that reflect truthfully only the conditions of the present and the recent past.

2.3.3. GDP Gap Between Developed and Developing Regions

All the above mentioned considerations have to be kept in mind when one looks at world GDP in constant prices of 1975, by regions and sub-regions, 1950-1976, shown in Table 27. As in the case of energy consumption (see Tables 14 to 18) we have arranged the GDP data to show the gap between developed and developing regions of market economies (Table 28) and globally for the world (Table 29). Contrary to what was observed in energy consumption, there was less narrowing of the GDP gap. On an aggregate level, in market economies (Table 28) the share of developed regions

(I and III) in total GDP decreased only from 87% in 1950 to 85% in 1970, and since then to 83% in 1976. Per-capita-wise, there was no change in the gap. In 1976 the developed regions (I and III) GDP was still 11 times higher than that of the developing (IV-VI); this is the same as it was in 1950. The picture is not much brighter if one looks at global data. Between 1950 and 1976, the share of developed regions (I-III) in world GDP decreased only from 84.9% in 1950 to 80.9% in 1976, while the per capita GDP in the developed regions was still 10 times higher than that of the developing (IV-VII) in 1976--the same as in 1950.

The difference in the behavior of the energy gap vis-a-vis that of the GDP gap may to some extent be indicative of the differences in the economic structures. The fact that developing countries could catch up more easily with energy consumption than with GDP may reflect the well-known situation, whereby industrial activities in the developing countries are still largely dominated by energy-intensive primary industries, with a lack of industries susceptible to generate a higher share of value added.

2.3.4. Compilation of GDP Deflators (Regions I and III)

For the countries in regions I and III, GDP was also compiled at current prices in national currencies for the period 1950-1976. These time series were then converted to dollars at 1975 exchange rates. This gave for each country, and by summarization for the region as a whole, GDP at current and constant prices in US dollars at 1975 exchange rates. With the help of the 2 time series, GDP at constant and current prices, it was possible to compile the GDP deflators for individual countries and for the region as a whole. See Table 30 for a comparison of GDP deflators for the USA with those of EC and Japan, 1950 to 1976.

2.3.5. Structure of National Accounts and Foreign Trade Values

For Western countries only, detailed data on the structure of national accounts and foreign trade values are contained for each of the years 1950-1970 in the tapes underlying the Chenery study [2]. A copy of the tapes, made available to IIASA, is kept in the Energy Systems Program. The tapes consist of 13 card decks for the storage of over 30 economic and social variables of 101 countries. See Table 56 for the list of variables and codes on the tapes.

In support of the data base requested for the study done at IIASA under contract from the Commission of the European Communities and for possible application of the MACRO model to region III, we have updated some of the indicators.

The updating to 1975 was done with the aid of the World Bank's World Tables 1976 [20]; dollar values originally given at 1964 prices and dollars, were changed to 1967/69 prices and exchange rates. Thus, for each of the years 1950-1975 and for each EC country and Japan, computer printouts may be made available, upon request, for the following variables in 1967/69 prices and dollars for:

GDP; National Income; Private Consumption; Gross Domestic Savings; Gross Domestic Investments; Capital Consumption Allowances; Government Gross Revenues; Tax Revenues; Indirect Taxes; Government Purchases; Government Transfer Payments; Industrial Output; Services Output; Total Export; Total Imports; Population and GDP Deflators.

2.4. Annual Investments (Capital Formation)

2.4.1. Annual Investments, All Sectors of the Economy

The annual investments in structures and equipment in all sectors of the economy, represent gross fixed capital formation (GFCF) in accordance with the concept used by the United Nations for National Accounts. For regions I-VI, the annual investments (GFCF) are shown for 1960; 1970 and 1975 in Table 31. Region VII (China) is excluded for lack of comparable data. Table 21 shows first the total annual investments for all sectors of the economy in 1975 prices and dollars. Secondly, these investments are shown as percent of GDP. The source for these data are the UN Yearbook of National Accounts Statistics [17] 1976, updated by the UN Monthly Bulletin of Statistics [4]. Regional data represent the summarization of individual country data first compiled in national currencies at 1975 prices and then converted to US dollars at 1975 exchange rates. It may be noted that the US data, included in Region I, for comparability with other regions, relate to annual investments in private and government sectors; this explains why the share of investments in GDP is somewhat higher than the roughly 10% commonly observed for the share of gross fixed private investments (see Table 32).

It should also be noted that for countries in region II (USSR and Eastern Europe) the data represent net fixed capital formation, as a share of Net Material Product, compiled from the UN Yearbook of National Accounts Statistics [17] 1976, Vol. II, Table 2B.

The data in Table 31 indicate the growth of investments (GFCF) in constant dollars of 1975, that occurrred in the various regions between 1960 and 1975. At the same time, there is widespread difference between regions (and countries) in the share of annual

investments in GDP. The investment coefficient (share of GFCF in GDP) was the highest in Japan, whereas the investment coefficient of region I (specifically USA) was among the lowest. Table 31 also shows the growth of the investment coefficient between 1960 and 1975 in regions IV-VI, especially in Africa, Asia and the Middle East. When the poor countries can afford to set aside a higher share of their GDP for annual investments (GFCF), this is by itself an indication of economic development. For more data on the share of annual investments (GFCF) in GDP in individual countries ranged by IIASA regions, for the years 1960, 1970 and 1975 reference may be made to the IIASA publication Capital Formation, Capital Stock and Capital Output Ratios, 1850-1975. IIASA RM-78-70, December 1978 [21], p.56, Table I.8.

2.4.2. USA Annual Investments in the Energy Sector

US direct investments in the energy sector are compiled by the Office of Economic Growth, in the Bureau of Labor Statistics (BLS), as part of the data base they developed for 170 industries and various aggregates of these industries, on gross and net investment and gross and net capital stock, at historical prices and in 1972 prices, for the years 1947-1974. From the preliminary computer printouts, sent to IIASA with letter of 26 April 1978 [22] we compiled the US annual investments in the energy sector. Table 32 shows the total energy sector investments (GFCF) in dollars of 1972 and as shares of GNP, for the period 1947-1974. The table indicates that in nearly 30 years the share of energy sector GFCF in total GNP has oscillated between 1.5 and little over 2%. In the 1950s, the share stood at about 2%, decreasing from a high of 2.166% in 1957 to a low of 1.469% in 1963. Since that time, the percentage share has

been rising, reaching 2.050% in 1974. Table 33 shows direct investments in the energy sector for various fuels and electricity, for the years 1947-1974. The data, compiled by the BLS, are given in constant dollars of 1972; data at current prices, are also available at the BLS [22], as well as capital stock.

As indicated by the caption of the table, the data relate only to private investments, excluding those made by government. As stated above, this makes a considerable difference for total investments. As regards the exclusion of government from direct energy sector investments, the exclusion may be relatively small for the years 1947-1974.

2.4.3. European Community Annual Investments in the Energy Sector

For the countries of the European Community, investments in the energy sector are compiled as part of National Accounts Statistics; see EUROSTAT, National Accounts Detailed Tables 1970-1976 [23], Standard Table 7. We have used this source to compile Table 34 which shows for the individual countries of the European Community a breakdown of total investments by broad sectors of the economy, in 1975. Accordingly, the energy sector investments ranged between 6 and 15% of total investments in the major EC countries. In Table 35 we show for these countries the energy sector investments, and GDP, 1970-1976. The table shows that the share of energy sector investments in GDP range between 1 and 3% in the community countries. The highest share, 3.17%, was obtained in the UK in 1975.

Data on the distribution of energy sector investments by type of fuels and electricity are currently not available from

official government sources, with the exception of the FRG, discussed below. The EC may be expected to compile such data. Work on investments in the energy sector is also in progress at the United Nations Economic Commission for Europe in Geneva. See in particular the reports presented to the 33rd session of the Commission in January 1978 on New Issues Affecting the Energy Economy of the ECE Region in the Medium- and Long-Term [24]. It may be noted that the ECE region, in contrast to EC, also includes Eastern European countries.

2.4.4. FRG Estimated Annual Investments in the Energy Sector

Investments in the energy sector are not published by the FRG as part of National Accounts Statistics. Annual investments by individual mining and manufacturing industries are compiled by the German "Industrie-Statistik". Investment data are also compiled for the electricity (public and industry) and gas utilities. Detailed gross fixed capital formation is compiled annually for the construction industries, and for agriculture. These data, all part of official German statistics, are currently published in the FRG Statistisches Jahrbuch, 1977 [25]. For industry, see p. 162, table 4; for electricity and gas see p.196, table 9.28; for construction see p.190, table 9.19; for agriculture see p.183, table 8.9.

There is no official explanation why these investment data are not processed into sectoral data of the system of national accounts. One can only guess some of the reasons. Most likely there is a difference in concept and definition of "investments". For instance, the "Gross Fixed Capital Formation" (Brutto-Anlage-Investitionen) in construction includes expenditures on land; whereas purchases are excluded by definition from GFCF in national accounts. The

gross and net investments in agriculture, separated into "buildings", "equipment", and "changes in livestock" may exclude land purchases but the definitions used by the Ministry of Food and Agriculture (Bundesministerium für Ernährung, Landwirtschaft und Forsten) which collects these data may differ from those used by national accounts. There is a possibility worth checking whether the industry investments include land purchases; moreover there may be some double counting between the investments in "mining and manufacturing" on the one hand and the "electricity" investments on the other hand.

Direct investments in the energy sector should comprise the following categories:

Energy sector, investment categories

Solid fuels	coal and lignite mining
Hydro-carbons	production (in recent surveys, data are included with chemicals)
Crude oil and natural gas	exploration; production; transportation
Petroleum Products	Refining; storage; transportation; research
Electricity	Thermal central power stations; hydro-pumping; geothermal; nuclear generation and distribution
Gas	Plants and distribution

Following this scheme, we estimated the FRG investments in the energy sector, using the Industrie-Statistik for coal mining, hydro carbons (if and when separately available), crude oil and natural gas production; and petroleum refining. Investments in electricity and gas industries were compiled from the utilities statistics in the 1977 Statistisches Jahrbuch [25] and earlier issues. The results of these compilations are shown in Table 36, FRG Estimated Annual Investments for Various Sources of Energy, 1950-1975.

2.5. Energy Prices

2.5.1. Selection of Representative Data

When compiling energy prices the question arises for all countries, at which level of processing or consumption, and for which variety and grade of a given type of fuel? What is typical of prices paid by the industry sector, by householders and for transportation? For the calculation of a coal price index, which type and grade of what coal (anthracite, bituminous) or coke (imported, domestic) should be selected, how should the index be weighted? Is the price of heavy fuel oil no.2 representative of the price of (all) liquid fuels used by industry? The compilation of an electricity price index may become complicated because rates vary between low and high voltage, or by quantities of electricity used, and hours of the day. Should prices be collected per physical quantities or for calorific values of the various energy carriers?

Fortunately, the solution to these problems lies in the availability of data and the purpose of the presentation.

Following is a brief review of compilations by international organizations that the reader may want to use to supplement the data compiled by national statistical agencies, presented below.

2.5.2. International Compilations

United Nations: An up to date and readily available index is compiled by the United Nations on world price indices of total fuels and thereof individually coal, crude petroleum, and natural gas for the years 1972 to 1978, shown in the UN Monthly Bulletin of Statistics, April 1979 [4] table 59, p. 162. This index is weighted by the importance each fuel has in world trade during the base year. Recently, the data were adjusted so that 1975 is the new base year. The Statistical Office of the UN will soon publish a report containing historical series beginning in 1950 through 1977, all adjusted to 1977=100.

For selected oil exporting countries (Libya, Saudi Arabia; Venezuela; Iran; Kuwait; Iraq; Nigeria; Indonesia) the UN shows prices in current US dollars per barrel of oil, 1970 to 1978, in the UN Monthly Bulletin of Statistics [4], latest issue consulted April 1979. These compilations are very handy because they represent averages of various grades for each country. They

are based on the very detailed prices per barrel of crude in current dollars, per loading port, type of crude and gravity, posted in OPEC countries since 1950, as shown for instance in the OPEC Annual Statistical Bulletin, 1977 [26]. The latter also contains price statistics of refined petroleum products, in exporting and consuming countries.

European Communities' Statistical Office (EUROSTAT): In the past, EUROSTAT published exhaustive monographs on energy prices. See for instance EUROSTAT A Comparison of Fuel Prices: Oil, Coal, Gas 1955-1970, Special Number 1, Luxembourg 1974 [27] and EUROSTAT Fuel Oil Prices 1960-1974, Special Number 2, Luxembourg 1974 [28]. For other, EUROSTAT derived fuel price compilations, see also C. Doblin, Data Provided for W.D. Nordhaus Study: The Demand for Energy, IIASA Research Memorandum RM-76-18, March 1976 [29]. The EUROSTAT monographs were not updated, except for gas and electricity prices. Gas prices paid by industry and households within the European Community in 1973 and 1976-1978 were recently published, see EUROSTAT Gas Prices 1976-1978 [30]. Electricity prices are expected to be published in October 1979. Coal price compilations were discontinued, because there was not much of a market except for coking coal and coal used for electricity generation. But coking coal prices are difficult to get, and prices of coal used in power plants are not always released.

It may be worth noting that EUROSTAT has not compiled fuels and electricity prices or indices for the EC as a whole, only for individual countries.

OECD: The OECD publishes energy prices, mostly per calorific values, for selected fuels and electricity in each of its 15 member countries (US, Canada, Japan and European countries). Data are given per 10^7kcal (=1 TOE) in national currencies and US dollars, for the last decade. The prices are distinguished by sectors of the economy by which they are purchased. See OECD Energy Statistics 1975-1977, Paris 1979 [30]. We have used some of these data for compilation of the tables on the levels of energy prices (Tables 37 and 38) discussed below.

2.5.3. Selected Fuels and Electricity, 1975 Price Levels

The 1975 prices of selected fuels and electricity shown in national currencies (Table 37) and US dollars (Table 38) are based on the OECD Energy Statistics [30], Part II, prices in national currencies per 10^7 kcal paid by various sectors of the economy (industry, households, transportation) for electricity (at various levels of consumption) and selected commodities of solid, liquid and gaseous fuels. Since we converted the prices from national currencies to US dollars at the exchange rates prevailing for the average of the year 1975, the dollar data presented in Table 38 may somewhat differ from the dollar prices compiled by the OECD.

For the USA, we have supplemented the OECD data by using the compilations of the US Department of the Interior "Fossil Fuel Prices per BTU in Current and Constant Dollars 1965 to 1975", shown in the US Statistical Abstract 1977, [12], p. 596, table 983, and the Department of Energy (DOE) compilations of the cost of fuels to end users in the DOE Monthly Energy Review [27] April 1979, p.18. For this purpose, the DOE 1975 prices in constant 1972 dollars had to be reconverted to 1975 current prices, by use of the GNP deflator.

Because the majority of the data coming from the OECD were given in terms of prices per 10^7 kcal (= 1 TOE), it was thought useful to convert the US prices from BTU to kcal, instead of doing it the other way round. These conversions were done on the basis of 1 BTU = 0.2519 kcal.

The data in Table 37 show how within the US, FRG, France, UK, the prices paid for given fuels and electricity may vary according to the sector which purchases them. The table also shows which fuel ranks highest or lowest in terms of the amount of money spent per kcal. Table 38 permits to make the same observations, plus inter-country comparisons, because of the conversions from national currencies to US dollars. Thus, one sees that in 1975, prices paid per kcal were consistently lower in the US than prices paid for the same fuel commodities in the FRG, France and the UK. The only exception to this rule were the UK prices per 10^7 kcal of petroleum products, purchased by the industry sector, that were below US levels.

For those who want to study the development of the energy prices per calorific values over a period of time, reference may be made to the data 1968-1978 contained in the OECD source [30], and the US data for 1960; 1965 and 1970 to 1975 for fossil fuel prices [12], as well as cost of fuels to end users [27] for 1973 to 1978. The trend implicit in these time series need not necessarily agree with the energy price index numbers, based on physical quantities for groups of energy commodities, discussed below.

2.5.4. The Growth of Energy Prices, by Sectors of the Economy, 1950-1978 (USA, FRG, France, UK)

The development of energy prices since the 1950s in the USA, FRG, France and the UK is shown in Tables 39-46. All data are presented in terms of index numbers, with 1970=100. The year 1970 was selected to facilitate graphic presentation; a change to 1975, the base year for energy scenarios, can be obtained easily.

As in Tables 37 and 38 above, showing the level of selected fuel and electricity prices, the data in Tables 39-46 are ranged by the same categories for groups of fuel and electricity. The price indices for the various groups were selected from a number of series compiled by government offices on prices per physical quantities, for groups of fuel commodities and electricity sought to be typical of the requirements of various purchasing sectors.

For prices paid by the industry sector, we selected from the various government compiled series those on "producer prices" and "basic materials prices" (FRG); "wholesale prices, industrial products" (France); "prices of fuels used by industry", and "wholesale prices of materials purchased by selected broad sectors of industry" (UK); and price index numbers in the US alternately appearing under "producer prices" (President's Economic Report) or "wholesale prices" (Statistical Abstract). For prices paid by the household sector we used for the US the consumer price indices (President's Economic Report); for the FRG the "prices paid by all households" which is rather different, rising less steeply than the German "retail price series"; for France we selected the "prices paid by modest households for all of France" and for the UK the indices of "retail prices for fuel and light". For the transportation sector, we used for the US the consumer price index of "gasoline, motor oil, coolants;" from the President's Economic Report [31]. For the European countries, the prices at the pump, per liter of regular gasoline, as of 1 January, compiled by the OECD [30] were used. The latter may differ somewhat from nation-

ally compiled price index numbers, that relate to the average of the year.

The exact series of the price index numbers, and the energy group to which they relate, together with the sources are indicated in the notes attached to Tables 39-42. The sources from which the series were compiled, are as follows:

For US energy price index numbers see the Economic Report of the President [31], US Statistical Abstract [12], updated by Survey of Current Business [33] and BLS Monthly Labor Review [34].

For the FRG see Statistisches Jahrbuch [25], updated by Fachserie 17, Reihe 2 [35]; Reihe 3 [36] and Reihe 7 [37].

For France see Institut National de la Statistique et des Etudes Economiques (INSEE), Annuaire Statistique de la France [38] updated with INSEE Bulletin Mensuel de Statistique [39].

For the UK energy prices were compiled from the UK Statistical Abstract [40] and the Digest of UK Energy Statistics [41].

For more details on industry and household sector prices, showing the composition of fuel groups by fuel commodities, see the notes to Tables 39-42; the information on these notes should enable proper interpretation of the time series and facilitate their updating.

The energy price index numbers are first given in terms of (current) energy prices (Tables 39-42); secondly to adjust for general inflation, "real energy prices" or "energy prices in constant dollars" were calculated (Tables 43-46). This was done through division of the current price index numbers by the GNP deflator (USA), and GDP deflators, respectively (FRG, France, UK). The result of these calculations is to show that in terms of "real prices", the energy price rises of the 1970s were far less accentuated that those suggested by the index numbers in current prices. In fact, a slight drop seems to have occurred in the US in 1978 for total household fuels and electricity, as the 1970 based index dropped from 125.0 in 1977 to 123.3 in 1978. However, this is a very small drop, if any, because 1978 data are still somewhat preliminary.

While the question of a drop seems debatable, the relatively slow rise of "real energy prices" is also indicated in the "cost of fuels to end users in 1972 dollars", for selected fuels and gasoline, in the DOE Monthly Energy Review [32], April 1979, p.18.

A drop in real energy prices in the FRG and France was more noticeable. Here it was caused not only by the fact that the general price level (GDP deflator) rose even faster than energy prices. Instead the leveling off and the slight drop in energy prices especially in the FRG but also France was due to the fact that they were able to purchase petroleum with "weak" dollars. The reason for the modest leveling off of the UK petroleum products real prices was again of a different nature.

2.5.5. Real Energy Prices for the Combined Industry, Household and Transportation Sectors in the USA, FRG, France and the UK

While we did find index numbers for total energy purchased by the industry sector, households, and for transportation, there seems to be no index officially estimated, in which the three sectors are combined. We have estimated such an index shown in Table 47, for the USA, FRG, France and the UK for the years 1968-1978. The combined index was compiled by using the real energy price index numbers, applying to the industry, household and transportation sectors shown in Tables 43-46 and applying to them the weights for 1972 estimated energy consumption, by groups of fuels and sectors, shown in Table 48. These weights derive from estimated payments for delivered energy, based on 1972 price levels and quantities consumed, from data contained in a draft paper by W. Hogan, Dimension of Energy Demand, Harvard University, Cambridge, Mass., July 1979 [42].

An interpretation of the data shown in Table 11 is left to the reader, who should keep in mind the facts that the weights were estimated, and maybe look at the sources and definitions of government energy price index numbers attached to Tables 39-42. Moreover, household sector price indices for petroleum products not being available from government sources, we used instead the OECD prices for light/medium fuel oil paid by the industry sector [30].

2.6. Social Indicators; Labor

2.6.1. Social Indicators

Indicators of the development stage of a country are data on food consumption as percent of GDP; birth and death rates; primary and secondary school enrolments; and education expenditures by government. These statistics were collected for 101 western countries for use in the Chenery study on Patterns of Development 1950-1970 [2]. Not all data for all countries were found to be available for all ofthe years covered by the study. For the more developed Western countries, the social indicators are on the tapes, of which a copy is stored IIASA's Energy Systems Program. See also Table 56 for the listing of the variables, countries for which they are available, and computer tapes. The statistics can be updated and the number of countries may be expanded through various World Bank publications.

2.6.2. Working Population; Total and Non-Agricultural Employment

The concepts, definitions, methods and reference periods of collection of labor statistics employed by national governments are different from one country to another, with numerous changes introduced over the last 25 years. The terms "working population" and "economically active population" or "labor force" are used interchangeably here below. The data represent official estimates, coming from national statistical offices (FRG) or the Ministry of Labor (Belgium) or the Department of Employment (UK). Whatever the source, the working population or labor force comprises all those persons who were employed during the reference period (usually annual average but in some countries, i.e. Belgium and the UK, 30th of June) as well as those out of work, i.e. persons who would have wished to work during this period if they had had the opportunity. The "civilian working population" comprises these

same persons, excluding the armed forces. The "working population" comprises employers, employees, and aiding family members. The latter work without direct remuneration in agriculture, small scale manufacturing, and the service sector.

The EUROSTAT historical series [43] on civilian working population start with 1950, but give data only for selected years between 1950 and 1960. Moreover, the data for France and Italy start only with 1955. Likewise, data compiled for Japan from OECD time series [44] start with 1962. We estimated the missing 1950 data from population censuses, and we filled the various gaps by interpolation. For a summary of the civilian labor force in the ECE countries and Japan, 1950-1975, see Table 49.

Total employment was not collected explicitly; but the data can be seen as the difference between "total working population" and "unemployment". In view of the fact that agricultural employment is difficult to assess, the data on "non-agricultural employment" may be considered as more reliable than "total employment".

The "non-agricultural employment" can be compiled from EUROSTAT statistics as "employment in industry" plus "employment in services", or as difference between "total employment" and "employment in agriculture". Data for EC countries and Japan were compiled from the above mentioned EUROSTAT and OECD sources [43];[44]. To fill the gaps caused by missing years, extrapolations were made for some countries (France, Italy, UK, Japan) on the basis of the index numbers of non-agricultural employment published in early issues of the UN Statistical Yearbooks. For other countries,

the data were added through interpolations(FRG), checked against the growth of the working population and unemployment.

2.6.3. Unemployment

Two or more sets of estimates on total unemployment covering all sectors of the economy are released by national governments. One set is prepared in connection with the estimates of the total working population. The other set or sets are based on the labor market, counting registered persons seeking work at public employment offices. The EUROSTAT publishes both sets whereas the OECD in its Main Economic Indicators [45] gives only the labor market unemployment data (except for Italy). For some countries the two sets of data are identical; this is the case for the FRG where the annual unemployment shown in connection with the working population estimates is identical with the average annual number of registered unemployed. In other countries, there is considerable difference between the two sets. One reason for the difference is the reference period. For instance, in the UK, the unemployment as part of total working population, is estimated as of 30 June, and this is consistently lower than the labor market based data for the average of the year. Just to complicate matters further, the EUROSTAT publication of the UK labor market based unemployed tends to be higher than the OECD data of UK registered unemployed, because the latter exclude from the registers students and persons leaving school.

While in the UK the registered unemployment is higher than the data estimated in connection with working population, the opposite holds true for the French statistics. The French discrepancy for the 2 sets is due, in part, to differences in definition, as persons 65 years and older are excluded from registering at public employment offices.

The greatest differences between the two sets were found for Italy, where the unemployment based on registration is nearly double the number of unemployed estimated by a sample survey in connection with the working population statistics. It may be noted that the OECD in their unemployment data for Italy shows in the Main Economic Indicators only the lower series, resulting from the sample survey [45]. For differences in unemployment data, according to source of registration, in selected countries 1970-1976, see Table 50.

In summary, it may be noted, that for the IIASA historical series on unemployment, we have used throughout the data estimated in connection with the working population. As in the case of working population, there were gaps for certain countries in the early 1950s. We have tried to fill them through extrapolations based on unemployment data published in early issues of the UN Statistical Yearbook. For a summary of the unemployment data in EC countries and Japan, 1950-1975, see Table 51.

2.6.4. Hours of Work (Manufacturing Industries)

These are the average weekly hours worked in the manufacturing industries, compiled by the International Labor Office and reproduced in the ILO Yearbooks [46] and Quarterly Bulletins [47], as well as the UN Statistical Yearbooks and Monthly Bulletins; similar data are also published by EUROSTAT and the OECD. The data are easily available for the major countries, France, FRG, UK, Japan, also Netherlands, Ireland for the years 1950 to date. Data for Belgium, 1950-1960 and Denmark, 1950 to date were estimated. For Italy the data represent average number of hours worked per manual worker, as of September; data were compiled from EUROSTAT

statistics for the years 1967-1976; the years 1950 to 1966 were estimated through extrapolation. For a summary of the hours of work in manufacturing, in EC countries and Japan, 1950-1975, see Table 52.

The summarization of the hours of work for total EC should be made by means of a weighted average. Based on percentage shares in non-agricultural employment, we estimated the weights for the EC:

France	:	22%
FRG	:	30%
Italy	:	18%
UK	:	30%
Total	:	100%

By way of simplification we used the same average weights for the entire period 1950-1975. This simplification seems to be justified in view of the orders of magnitude involved.

For summarization of work-hours into the whole of Region III, it may suffice to take the arithmetic average between total EC and Japan. For the years 1952 to 1972, there is hardly any difference in the hours worked per week for EC total (as estimated above) and Japan.

2.6.5. Wages, Hourly Earnings in Manufacturing Industries

Definitions: The wages, or (hourly) earnings in manufacturing compiled for the IIASA energy modeling exercises need to be distinguished from the (hourly) wage rates and from the (hourly) labor costs. According to the ILO, the average earnings, generally cover cash payments before deduction of taxes and social security contributions payable by workers; they include remuneration for normal working hours, overtime pay, and payment for

time not worked, i.e. annual leave, sick pay; bonuses are included, but family allowances and the value of payments in kind are not usually included in the statistics of earnings [47].

Wage rates, also according to the ILO, are based on collective agreements; they relate to normal hours of work and therefore exclude overtime payments, but may include cost of living allowances.

Labor costs, compiled by the EUROSTAT "comprise all expenditure made by employers because they employ labor, i.e. it includes the payment of wages and salaries for work done, all costs and charges directly connected with these payments as well as costs imputable to particular considerations of a social character"[48]. Needless to say, that the "average labor costs" are far higher than the "average hourly earnings". See hourly earnings and labor costs for selected countries, 1970-1975 in Table 53.

For purposes of productivity analysis, the average hourly labor cost might be a good indicator; however statistics are available for only a few recent years. For this reason, we selected the "average hourly earnings in manufacturing industries" compiled by the ILO, as published by the UN in their Statistical Yearbook since 1948. These data are quite similar to the "average gross hourly earnings" published by the EUROSTAT, 1964-1976 [48].

As stated above, we used the "earnings in manufacturing" compiled by the ILO from national statistics. These contain a number of conceptual differences that need to be kept in mind when making inter-country comparisons. These differences relate to: 1) Reference period. Not all countries compile earnings per hour. The Japanese statistics relate to monthly earnings. We estimated the hourly earnings by using the statistics on "hours

worked per week" (see above) and the number of weeks in a month (4.3). During the 1950s and 1960s, earnings were compiled by the day, in Belgium and Ireland. We overcame this handicap by extrapolations assuming the same growth rates for hourly as for daily wage rates.

2) Male and female. There was and still is a difference in wages between men and women. Many countries publish the earnings of men and women combined; not so Belgium and the UK. Moreover, the UK statistics for 1950 to 1964 relate to adults only; they are therefore consistently higher than the UK hourly earnings (men) from 1963 onwards which include all ages. Since the series overlapped for the years 1963 and 1964, we corrected this bias through extrapolation to 1950. The assumption was that the wages for all ages had the same development as that for adults only.

In order to have a check on the validity of the data, we thought it useful to compile index numbers with 1970 = 100. These index numbers show considerable similarity in the rise of wages in the various countries. In the first 20 years, 1950-1970, hourly earnings rose relatively slowly - not more than 70-75 percentage points in Belgium and the UK, about 80 percentage points in the FRG, France, Italy, Netherlands, Ireland; and nearly 90 percentage points in Japan. Whereas in the 5 years between 1970 and 1975, the rise was more than 100 percentage points in all countries, except the FRG (63 points). In fact, the FRG managed to further hold the line and remained below 200 in 1976 and 1977.

For a further check on the accuracy of our data, we thought it useful to compare the hourly earnings index 1970 to date with the index numbers released by the OECD, see Table 54. The table

shows considerable similarity between the OECD and IIASA data for all countries, except Italy. Apparently, the OECD data derive from some revision of the Italian indicators.

The summarization of hourly earnings for the regions requires two operations:

a) conversion of national currencies and

b) establishement of weights.

In order to keep the series of earnings in current prices free of exchange rate fluctuations, it is necessary to use the exchange rates to the dollar of a single period, i.e. 1967/69.

For summarization of the hourly earnings in manufacturing industries, we used these weights based on non-agricultural employment:

France	:	22%
FRG	:	30%
Italy	:	18%
UK	:	30%
		100%

The weights were not changed throughout the entire time series. For a summary of hourly earnings in manufacturing industries in EC countries and Japan, 1950-1976, see Table 55.

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56. Computer Tapes Underlying the H. Chenery Study Patterns of Development, 1950-1970. List of Variables

Table 1. The Seven World Regions in IIASA's Energy Systems Program Scenarios

Region I	North America (USA and Canada)
Region II	The Soviet Union and E. Europe
Region III	W. Europe, Japan, Australia, New Zealand, S. Africa and Israel
Region IV	Latin America
Region V	Africa (except Northern Africa and S. Africa), South and Southeast Asia
Region VI	Middle East and Northern Africa (Egypt, Algeria, Libya)
Region VII	China and Centrally Planned Asian Economies

For a list of countries belonging to each region, see the following pages.

Table 1 (continued)

Region I: North America

(highly developed market economies with energy resources)

Canada
USA

Region II: USSR and Eastern Europe

(highly developed centrally planned economies with energy resources)

Albania
Bulgaria
Czechoslovakia
German Democratic Rep.
Hungary
Poland
Romania
USSR

Region III: Western Europe, Japan, Australia, New Zealand, S. Africa

(highly developed market economies with relatively low energy resources)

EC Countries

Belgium
Denmark
France
Germany, Federal Rep. of
Ireland
Italy
Luxemburg
Netherlands
United Kingdom

Other

Australia
Israel
Japan
New Zealand
South Africa

Other Western Europe

Austria
Cyprus
Finland
Greece
Iceland
Norway
Portugal
Spain
Sweden
Switzerland
Turkey
Yugoslavia

Table 1 (continued)

Region IV: Latin America

(developing economies with some energy resources and significant population growth)

Argentina
Bahamas
Belize
Bolivia
Brazil
Chile
Colombia
Costa Rica
Cuba
Dominican Republic
Ecuador
El Salvador
Guadeloupe
Guatemala
Guyana
Haiti
Honduras
Jamaica
Martinique
Mexico
Netherl. Antilles
Nicaragua
Panama
Paraguay
Peru
Puerto Rico
Surinam
Trinidad & Tobago
Uruguay
Venezuela
other Caribbean

Table 1 (continued)

Region V: Africa (except Northern Africa and S. Africa), South and Southeast Asia

(slowly developing economies with some energy resources and significant population growth)

Africa:

Angola
Benin
Botswana
Burundi
Cameroon
Cape Verde
Central African Rep.
Chad
Congo
Ethiopia
Gabon
Gambia
Ghana
Guinea
Guinea Bissau
Ivory Coast
Kenya
Lesotho
Liberia
Madagascar
Malawi
Mali
Malta
Mauritania
Mauritius
Morocco
Mozambique
Namibia
Niger
Nigeria
Reunion
Rhodesia
Rwanda
Senegal
Sierra Leone
Somalia
Sudan
Swaziland
Tanzania, United Rep. of
Togo
Tunisia
Uganda
Upper Volta
Western Sahara
Zaire
Zambia

Asia:

Afghanistan
Bangladesh
Brunei
Burma
Comoros
Hong Kong
India
Indonesia
Korea, Republic of (South)
Macau
Malaysia
Nepal
Pakistan
Papua New Guinea
Philippines
Singapore
Sri Lanka
Taiwan
Thailand
East Timor
West South Asia n.e.s.

Table 1 (continued)

Region VI: Middle East and N. Africa

(developing economies with large energy resources)

OAPEC	Other
Algeria	Iran
Bahrain	Jordan
Egypt	Lebanon
Iraq	Oman
Kuwait	Yemen
Libyan Arab Rep.	Yemen, Democratic
Qatar	
Saudi Arabia	
Syrian Arab Rep.	
United Arab Emirates	

Region VII: Centrally Planned Asia

(Developing centrally planned economies with energy resources)

China, People's Rep.
Kampuchea, Democratic (former Cambodia)
Korea, Democratic Republic of (North)
Lao, People's Democratic Republic of
Mongolia
Viet-Nam, Socialist Republic of

Table 2. Regions I-VII, World Population Totals, 1950-2075
In Millions

Regions	1950	1955	1960	1965	1970	1975	2000	2025	2050	2075
I. US+Canada	166	182	199	214	226	237	284	314	320	324
II. Developed, C.P.E.	268	289	311	331	346	363	436	477	492	498
III. Developed, Low En.Res.	431	454	479	508	533	560	680	760	797	810
IV. Developing, Latin America	164	188	216	247	283	319	575	772	895	923
V. Developing, Africa + Asia	797	875	980	1110	1258	1422	2528	3415	3961	4102
VI. Developing, High En.Res.	67	76	86	98	114	133	247	344	404	420
VII. Developing, C.P.E.	599	648	704	767	836	912	1330	1645	1811	1853
World (I-VII)	2492	2712	2975	3275	3596	3946	6080	7727	8680	8930

Sources: 1950-1975 Compiled from United Nations. Population by Sex and Age for Regions and Countries, 1950-2000. (ESA/P/WP.60; February 1970)

Projections: Keyfitz "high" compiled from population projections sent to IIASA Energy Systems Program under letter of 7 April 1977.

Table 3. Region I-VII. World Population 65 Years and Older, as Percent of Total Population, 1950-2075

In Percent of Total Population

Regions	1950	1955	1960	1965	1970	1975	2000	2025	2050	2075
I. US+Canada	8.1	8.6	9.0	9.3	9.7	10.2	11.1	16.0	16.8	17.3
II. Developed C.P.E.	6.4	6.8	7.2	7.9	8.6	9.8	12.1	15.1	16.4	16.9
III. Developed Low En.Resources	7.9	8.6	9.0	9.4	10.1	10.9	12.4	14.1	16.1	16.5
E C E	9.8	10.4	10.9	11.4	12.3	13.1	13.6	15.4	16.8	17.4
Japan	4.9	5.2	5.7	6.3	7.1	7.8	13.2	16.8	17.3	17.5
IV. Developing, Latin America	3.5	3.4	3.4	3.5	3.7	3.9	4.1	7.4	14.4	16.6
V. Developing, Africa + Asia	3.9	3.6	3.3	3.0	3.0	3.0	4.2	7.1	13.8	16.3
VI. Developing, High En.Res.	4.4	4.0	3.8	4.3	4.7	4.0	5.6	6.1	13.5	16.4
VII. Developing C.P.E.	5.5	5.0	4.9	5.1	5.4	5.6	7.0	10.9	15.4	16.7
World (I-VII)	5.5	5.5	5.4	5.5	5.7	5.8	6.7	9.4	14.6	16.4

Sources: See Table 2

C.P.E. = Centrally Planned Economies

Table 4. Correspondence of UN Population Macro-Regions to IIASA Regions, Showing the Percentage Share of Urban Population in 1975

IIASA Regions		UN Population Macro-Regions Percentage of Urban Population, 1975
		%
I	North America	76.5
II	Eastern Europe	56.6
	USSR	60.5
III	Western Europe	77.1
	Northern Europe	75.1
	Southern Europe	59.3
	Japan	75.2
	South Africa	46.2
	Oceania	71.6
IV	Latin America	60.4
V	Eastern Africa	24.5
	Middle Africa	12.3
	Western Africa	18.5
	Middle South Asia	21.1
VI	Northern Africa (Algeria, Lybia, Egypt)	39.5
	Western South Asia	43.7
VII	China	23.5

Source: UN Population data compiled from Compendium of Housing Statistics, 1972-1974. New York, 1976.

Table 5. Regions I-VII. Urban Populations, 1950-2000

	1950	1960	1970	1975	2000
	In Millions				
Region I	106	139	168	181	245
II	108	151	193	215	327
III	244	300	363	396	555
IV	67	105	161	193	430
V	112	157	236	291	787
VI	18	29	46	60	152
VII	66	132	181	214	480
Total, I-VII	721	1013	1348	1550	2976
	As Percent of Total Population				
Region I	63.7	69.8	74.2	76.5	86.4
II	40.3	48.6	55.8	59.2	75.0
III	56.6	62.6	68.0	70.6	81.6
IV	40.9	48.5	56.9	60.4	74.8
V	14.1	16.0	18.8	20.5	31.1
VI	26.5	34.0	40.0	44.7	61.6
VII	11.1	18.7	21.7	23.5	36.1
Total, I-VII	28.7	33.6	37.0	38.7	48.1
	In Millions				
Urban Population					
Developed (I-III)	458	590	724	792	1127
Developing (IV-VII)	263	423	624	758	1849
	As Percent of Total Population				
Urban Population					
Developed (I-III)	52.9	59.7	65.5	68.3	80.5
Developing (IV-VII)	16.2	21.3	25.1	27.2	39.5

Sources: Based on N. Keyfitz Population projections and United Nations Compendium of Housing Statistics, see Tables 2 and 4.

Table 6. Regions I - VII. World Primary Energy Production (Commercial), 1950-1975

Regions		Unit	1950	1955	1960	1965	1970	1975
I.	US and Canada	10^6TCE	1195	1384	1512	1841[R]	2368[R]	2305
II.	Developed, C.P.E.	10^6TCE	471	705	985	1335	1678	2129
III.	Developed, Low Energy Resources	10^6TCE	600	680	696	730	745	875
IV.	Developing, Latin America	10^6TCE	161	228	316	405	461	420
V.	Developing Africa + Asia	10^6TCE	59	81	117	173	307	455
VI.	Developing High Energy	10^6TCE	133	243	409	761	1399	1722
VII.	Developing C.P.E.	10^6TCE	44	104	443	340	431	645
	World (I - VII)	10^6TCE	2663	3425	4478	5585	7389	8551

R = Revised

C.P.E. = Centrally Planned Economies

Sources: Data compiled from UN World Energy Supplies, 1950-1970 and later issues, standard tables 1 and 2

Table 7. Regions I - VII. World Electricity Generation, 1950-1975

Regions		Unit	1950	1955	1960	1965	1970	1975
I	US and Canada	10^9kWh	445	714	959	1302	1845	2274
II	Developed, C.P.E.	10^9kWh	136	243	406	677	988	1381
III	Developed, Low Energy Resources	10^9kWh	328	492	736	1104	1631	2086
IV	Developing, Latin America	10^9kWh	27	45	71	105	160	249
V	Developing Africa+Asia	10^9kWh	16	29	50	89	158	242
VI	Developing High Energy	10^9kWh	3	4	8	16	27	46
VII	Developing C.P.E.	10^9kWh	4	16	68	85	95	154
World (I-VII)		10^9kWh	959	1543	2298	3378	4904	6432

C.P.E. = Centrally Planned Economies

Sources: Data compiled from UN World Energy Supplies, standard table 20.

Table 8. Alternative Methods for Conversion of Hydro and Nuclear Electricity to Primary Energy Basis, World, 1950-1975

	World Totals, 1950-1975						
	Generation of Hydro/Nuclear Electricity					Total Primary Energy Production including Hydro/Nuclear Electr.	
	Physical Output	per 1000kWh		Converted to Primary Energy by Method			
		Method A	Method B	A	B	A	B
	10^9kWh	TCE	TCE	10^6TCE	10^6TCE	10^6TCE	10^6TCE
1950	343	0.123	0.55	42	189	2663	2810
1955	473	0.123	0.50	58	237	3425	3604
1960	692	0.123	0.45	85	311	4478	4704
1965	941	0.123	0.40	116	376	5585	5845
1970	1255	0.123	0.40	154	502	7389	7737
1975	1801	0.123	0.40	222	720	8551	9049

Method A: Thermal content (TCE) of 1000 kWh (UN method).

Method B: Tons of coal equivalent (TCE) required to generate 1000 kWh (based on H. Schilling, et al.[11]).

Sources: see Tables 6 and 7.

Table 9. Region VII (China) and World Consumption of Total Primary Energy, 1950-1975

	Region VII Consumption			World Consumption		
	UN Data	Estimates	Estimates as Percent of UN Data	UN Data	Total Incl. China Estimates	Estimates as Percent of UN Data
	10^6TCE	10^6TCE	%	10^6TCE	10^6TCE	%
1950	43	30.4	70	2490	2477	99
1955	105	.	.	3239	.	.
1960	447	198.3	44	4246	3997	94
1965	340	178.4	40	5220	5058	97
1970	436	251.4	58	6834	6649	97
1974	581	377.2	65	7919	7715	97
1975	625	.	.	8003	.	.

Sources: UN Consumption data see Table 10;
Estimates compiled from V. Smil, China's Energy, Praeger Publications, New York 1976.

Table 10. Primary Energy Production, Total Supplies and Apparent Inland Consumption; World Totals, 1950-1975

	World Totals, Primary Energy			Apparent Inland as Percent of Total Supplies
	Production	Total Supplies	Apparent Inland Consumption	
	10^6TCE	10^6TCE	10^6TCE	%
1950	2664	2636	2490	94.5
1955	3426	3414	3239	94.9
1960	4478	4459	4246	95.2
1965	5588	5568	5220	93.8
1970	7386[R]	7361	6863	93.2
1975	8555	8568	8003	93.4

Sources: See Table 6

R: Revised

Note: Total supplies represents production plus imports minus exports.

Table 11. Regions I-VII. Primary Energy, Total Supplies and Apparent Inland Consumption, Aggregate and Per Capita, 1950-1975

	Primary Energy Consumption					
	Aggregate			Per Capita		
	Total Supplies	Apparent Inland Consumption	Apparent Inland as Percent of Total Supplies	Total Supplies	Apparent Inland Consumption	Apparent Inland as Percent of Total Supplies
	10^6TCE	10^6TCE	%	kg CE	kg CE	%
1950 Regions:						
I	1262	1187	94.1	7602	7151	94.1
II	455	447	98.2	1698	1668	98.2
III	707	676	95.6	1640	1568	95.6
IV	74	64	86.5	451	390	86.5
V	70	62	88.6	88	78	88.6
VI	23	11	47.8	343	164	47.8
VII	44	43	97.7	73	72	98.6
I-VII	2635	2490	94.5	1057	1000	94.6
1955 Regions:						
I	1450	1394	96.1	7967	7659	96.1
II	684	673	98.4	2367	2328	98.4
III	915	866	94.6	2015	1907	94.6
IV	116	93	80.2	617	495	80.2
V	103	91	88.3	118	104	88.1
VI	40	16	40.0	526	210	39.9
VII	105	106	101.0	162	164	101.2
I-VII	3413	3239	94.9	1258	1194	94.9
1960 Regions:						
I	1642	1578	96.1	8251	7930	96.1
II	926	906	97.8	2977	2913	97.2
III	1090	1030	94.5	2276	2150	94.5
IV	155	129	88.2	718	597	83.1
V	134	127	94.8	137	130	94.9
VI	64	28	43.8	744	325	43.7
VII	448	448	100.0	636	636	100.0
I-VII	4459	4246	95.2	1499	1427	95.2

Table 11 (continued)

	Primary Energy Consumption					
	Aggregate			Per Capita		
	Total Supplies	Apparent Inland Consumption	Apparent Inland as Percent of Total Supplies	Total Supplies	Apparent Inland Consumption	Apparent Inland as Percent of Total Supplies
	10^6TCE	10^6TCE	%	kgTCE	kgTCE	%
1965 RegionS:						
I	2004	1913	95.5	9364	8939	95.5
II	1240	1222	98.5	3746	3692	98.7
III	1498	1356	90.5	2949	2669	90.5
IV	204	167	81.9	826	676	81.8
V	205	182	88.8	185	164	88.6
VI	74	38	51.4	755	388	51.4
VII	340	342	100.0	443	446	100.7
I-VII	5565	5220	93.8	1699	1594	93.8
1970 Regions:						
I	2564	2438	95.1	11345	10788	95.1
II	1573	1540	97.9	4546	4451	97.9
III	2087	1845	88.4	3916	3462	88.4
IV	284	244	85.9	1004	862	85.9
V	269	270	100.4	215	215	100.0
VI	154	61	58.4	1351	789	58.4
VII	433	436	100.7	518	522	100.8
I-VII	7364	6834	93.2	2048	1900	92.8
1975 Regions:						
I	2693	2576	95.7	11411	10915	95.7
II	2012	1965	97.7	5543	5413	97.7
III	2280	2085	91.4	4064	3717	91.5
IV	375	310	82.7	1176	972	82.7
V	345	346	100.3	243	243	100.0
VI	222	116	52.3	1669	872	52.2
VII	637	605	95.0	698	663	95.0
I-VII	8564	8003	93.4	2170	2028	93.5

Sources: Total supplies compiled from UN World Energy Supplies, 1972-76 and earlier issues; standard tables 1 and 2, col. 3,8,9.
Apparent inland consumption compiled from the same source, col.11.

Table 12. Regions I-VII. Primary Apparent Inland Consumption by Type of Fuels and Electricity, 1950-1975. In Million Metric Tons of Coal Equivalents.

	Solid Fuels 10^6TCE	Liquid Fuels 10^6TCE	Natural Gas 10^6TCE	Hydro/Nucl. Electricity 10^6TCE	Total 10^6TCE
1 9 5 0					
Region I	487	457	224	19	1187
II	376	56	13	2	447
III	574	83	1	20	678
IV	9	49	3	1	62
V(Africa)	4	4	.	.	8
V(Asia)	37	13	1	1	52
VI	1	10	.	.	11
VII	43	0	0	0	43
World(I-VII)	1531	672	242	43	2488
1 9 5 5					
Region I	434	598	338	24	1394
II	544	104	21	3	672
III	669	166	7	27	869
IV	9	71	7	3	90
V(Africa)	6	7	.	.	13
V(Asia)	45	26	3	1	75
VI	1	14	1	.	16
VII	101	3	0	1	105
World(I-VII)	1809	989	377	59	3234
1 9 6 0					
Region I	380	694	475	31	1580
II	641	178	80	7	906
III	668	308	20	37	1033
IV	11	96	15	4	126
V(Africa)	5	10	.	1	16
V(Asia)	64	35	5	2	106
VI	1	24	3	.	28
VII	431	13	1	2	447
World(I-VII)	2201	1358	599	84	4242
1 9 6 5					
Region I	448	820	606	39	1913
II	718	292	201	11	1222
III	662	606	35	50	1353
IV	11	122	29	6	168
V(Africa)	5	15	.	2	22
V(Asia)	86	63	8	3	160
VI	1	30	7	.	38
VII	319	16	1	4	340
World(I-VII)	2250	1964	887	115	5216

Table 12 continued.

	Solid Fuels 10^6 TCE	Liquid Fuels 10^6TCE	Natural Gas 10^6TCE	Hydro/Nucl. Electricity 10^6TCE	T o t a l 10^6TCE
1 9 7 0					
Region I	499	1046	840	53	2438
II	769	438	316	17	1540
III	626	1070	114	60	1870
IV	15	174	39	11	239
V(Africa)	5	22	.	2	29
V(Asia)	91	103	10	6	210
VI	1	41	31	1	74
VII	388	41	2	5	436
World(I-VII)	2394	2935	1352	155	6836
1 9 7 5					
Region I	548	1152	790	85	2575
II	848	630	467	20	1965
III	566	1188	254	80	2088
IV	17	225	52	17	311
V(Africa)	7	32	1	4	44
V(Asia)	120	124	20	7	271
VI	3	71	46	2	122
VII	514	99	5	7	625
World(I-VII)	2623	3521	1635	222	8001

Note: The data on consumption refer to apparent inland consumption and are derived from the formula "production+imports-exports-bunkers±additions to stocks". It is felt by some that liquid fuels consumption is understated because of the exclusion of consumption for non-energy purposes; it is also felt that the conversion of hydro/nuclear electricity to primary energy basis should be done at a higher factor than the one used by the UN.

Sources: Compiled from UN World Energy Supplies, standard tables 1 and 2.

Table 13. Regions I-VII. Primary Energy Apparent Inland Consumption by Type of Fuels and Electricity, 1950-1975 In Percentages

	Solid Fuels %	Liquid Fuels %	Natural Gas %	Hydro/Nucl. Electricity %	Total %
1950					
Regions:					
I	41	38	19	2	100
II	84	13	3	.	100
III	85	12	.	3	100
IV	14	79	5	2	100
V Africa	50	50	.	.	100
V Asia	71	25	2	2	100
VI	9	91	.	.	100
VII	100	.	.	.	100
World I-VII	62	27	10	1	100
1955					
Regions:					
I	31	43	24	2	100
II	82	15	3	.	100
III	77	19	1	3	100
IV	10	79	8	3	100
V Africa	46	54	.	.	100
V Asia	60	35	4	1	100
VI	6	88	6	.	100
VII	96	3	.	1	100
World I-VII	56	30	12	2	100
1960					
Regions:					
I	24	44	30	2	100
II	70	20	9	1	100
III	65	30	2	3	100
IV	9	76	12	3	100
V Africa	31	63	.	6	100
V Asia	60	33	5	.	100
VI	4	86	10	.	100
VII	96	3	.	1	100
World I-VII	52	32	14	2	100
1965					
Regions:					
I	23	43	32	2	100
II	59	24	16	1	100
III	49	45	2	4	100
IV	7	73	17	3	100
V Africa	23	68	.	9	100
V Asia	54	39	5	2	100
VI	3	79	18	.	100
VII	94	5	.	1	100
World I-VII	43	38	17	2	100

Table 13 (continued)

	Solid Fuels %	Liquid Fuels %	Natural Gas %	Hydro/Nucl. Electricity %	Total %
1970					
Regions:					
I	21	43	34	2	100
II	50	28	21	1	100
II	34	57	6	3	100
IV	6	73	16	5	100
V Africa	17	76	.	7	100
V Asia	43	49	5	3	100
VI	1	56	42	1	100
VII	89	10	.	1	100
World I-VII	35	43	20	2	100
1975					
Regions:					
I	21	45	31	3	100
II	43	32	24	1	100
III	27	57	12	4	100
IV	5	73	17	5	100
V Africa	16	73	2	9	100
V Asia	44	46	7	3	100
VI	2	58	38	2	100
VII	82	16	1	1	100
World I-VII	33	44	20	3	100

Sources and Notes see Table 12.

Table 14. The Energy Consumption Gap. Market Economies, Developed and Developing Regions; Aggregate Primary Energy Consumption, 1950-1976

	Aggregate Primary Energy Cons.		Share of Developed Regions		Gap Ratio	
	Total Supplies 10^6TCE	Apparent Inland 10^6TCE	Total Supplies %	Apparent Inland %	Total Supplies	Apparent Inland
1950						
Regions I and III	1969	1863	92.2	93.2	11.8	13.6
Regions IV-VI	167	137				
Total	2136	2000				
1955						
Regions I and III	2365	2260	90.1	91.9	9.1	11.3
Regions IV-VI	259	200				
Total	2624	2460				
1960						
Regions I and III	2732	2608	88.6	90.2	7.7	9.2
Regions IV-VI	353	284				
Total	3085	2892				
1965						
Regions I and III	3502	3269	87.9	89.4	7.3	8.4
Regions IV-VI	483	387				
Total	3985	3656				
1970						
Regions I and III	4651	4283	86.8	88.2	6.6	7.4
Regions IV-VI	707	575				
Total	5358	4858				
1971						
Regions I and III	4896	4408	86.8	88.0	6.6	7.3
Regions IV-VI	744	602				
Total	5640	5010				
1972						
Regions I and III	5095	4635	86.6	87.9	6.5	7.2
REgions IV-VI	789	640				
Total	5884	5275				
1973						
Regions I and III	5364	4842	85.9	87.5	6.1	7.0
Regions IV-VI	884	693				
Total	6248	5535				
1974						
Regions I and III	5314	4760	85.1	86.7	5.7	6.5
Regions IV-VI	927	733				
Total	6241	5493				
1975						
Regions I and III	4973	4661	84.1	85.8	5.3	6.0
Regions IV-VI	942	772				
Total	5915	5433				
1976						
Regions I and III	5381	4906	84.1	85.3	5.3	5.8
Regions IV-VI	1017	843				
Total	6398	5749				

Sources: All data compiled from UN World Energy Supplies, first by countries, then summarized by IIASA regions.

Table 15. The Energy Consumption Gap. World Developed and Developing Regions: Aggregate Primary Energy Consumption, 1950-1976

	Aggregate Primary Energy Cons.		Share of Developed Regions		Gap Ratio	
	Total Supplies 10^6TCE	Apparent Inland 10^6TCE	Total Supplies %	Apparent Inland %	Total Supplies	Apparent Inland
1950						
Regions I-III	2424	2310	92.0	92.8	11.5	12.8
Regions IV-VII	211	180				
World	2635	2490				
1955						
Regions I-III	3049	2933	89.3	90.6	8.4	9.6
Regions IV-VII	364	306				
World	3413	3239				
1960						
Regions I-III	3658	3514	82.0	82.8	4.6	4.8
Regions IV-VII	801	732				
World	4459	4246				
1965						
Regions I-III	4742	4491	85.2	86.0	5.8	6.2
Regions IV-VII	823	729				
World	5565	5220				
1970						
Regions I-III	6224	5823	84.5	85.2	5.5	5.8
Regions IV-VII	1140	1011				
World	7364	6834				
1971						
Regions I-III	6549	6027	84.3	84.8	5.4	5.6
Regions IV-VII	1216	1083				
World	7765	7110				
1972						
Regions I-III	6785	6335	83.9	84.7	5.2	5.5
Regions IV-VII	1305	1142				
World	8090	7477				
1973						
Regions I-III	7126	6619	83.1	84.3	4.9	5.4
Regions IV-VII	1445	1236				
World	8571	7855				
1974						
Regions I-III	7144	6605	82.4	83.4	4.7	5.0
Regions IV-VII	1525	1314				
World	8669	7919				
1975						
Regions I-III	6985	6626	81.6	82.8	4.4	4.8
Regions IV-VI	1579	1377				
World	8564	8003				
1976						
Regions I-III	7401	6828	81.5	82.1	4.4	4.6
Regions IV-VII	1677	1490				
World	9078	8318				

Note and Sources, see Table 14.

Table 16. The Energy Consumption Gap. Market Economies, Developed and Developing Regions: Per Capita Primary Energy Consumption, 1950-1976

	Per Capita Primary Energy Cons.		Gap Ratio		Population
	Total Supplies TCE	Apparent Inland TCE	Total Supplies	Apparent Inland	10^6
1950					
Regions I and III	3.30	3.12	20.6	24.0	597
Regions IV-VI	0.16	0.13			1028
Total	1.35	1.26			1625
1955					
Regions I and III	3.72	3.55	16.2	19.7	636
Regions IV-VI	0.23	0.18			1139
Total	1.48	1.39			1775
1960					
Regions I and III	4.03	3.85	14.4	17.5	678
Regions IV-VI	0.28	0.22			1282
Total	1.57	1.48			1960
1965					
Regions I and III	4.85	4.53	14.7	16.8	722
Regions IV-VI	0.33	0.27			1455
Total	1.83	1.68			2177
1970					
Regions I and III	6.13	5.64	14.3	15.7	759
Regions IV-VI	0.43	0.36			1655
Total	2.22	2.02			2414
1971					
Regions I and III	6.38	5.75	14.5	16.4	767
Regions IV-VI	0.44	0.35			1699
Total	2.29	2.03			2466
1972					
Regions I and III	6.58	5.99	14.6	16.2	774
Regions IV-VI	0.45	0.37			1742
Total	2.34	2.10			2516
1973					
Regions I and III	6.86	6.19	14.0	15.9	782
Regions IV-VI	0.49	0.39			1786
Total	2.43	2.16			2568
1974					
Regions I and III	6.74	6.03	13.2	15.1	789
Regions IV-VI	0.51	0.40			1829
Total	2.38	2.10			2618
1975					
Regions I and III	6.24	5.85	12.5	14.3	797
Regions IV-VI	0.50	0.41			1874
Total	2.21	2.03			2671
1976					
Regions I and III	6.68	6.09	12.6	13.8	805
Regions IV-VI	0.53	0.44			1918
Total	2.35	2.11			2723

Sources and Notes, see Table 14.

Table 17. World Developed and Developing Regions: Per Capita Primary Energy Consumption, 1950-1976

	Per Capita Primary Energy Cons.		Gap Ratio		Population
	Total Supplies TCE	Apparent Inland TCE	Total Supplies	Apparent Inland	10^6
1950					
Regions I-III	2.80	2.67	21.5	24.3	865
Regions IV-VII	0.13	0.11			1627
World	1.06	1.00			2492
1955					
Regions I-III	3.30	3.17	16.5	18.6	925
Regions IV-VII	0.20	0.17			1787
World	1.26	1.19			2712
1960					
Regions I-III	3.70	3.55	9.3	9.6	989
Regions IV-VII	0.40	0.37			1986
World	1.50	1.43			2975
1965					
Regions I-III	4.50	4.27	12.2	12.9	1053
Regions IV-VII	0.37	0.33			2222
World	1.70	1.59			3275
1970					
Regions I-III	5.63	5.27	12.2	12.6	1105
Regions IV-VII	0.46	0.42			2491
World	2.05	1.91			3596
1971					
Regions I-III	5.87	5.40	12.2	12.9	1116
Regions IV-VII	0.48	0.42			2550
World	2.12	1.94			3666
1972					
Regions I-III	6.02	5.62	12.0	12.8	1127
Regions IV-VII	0.50	0.44			2608
World	2.17	2.00			3735
1973					
Regions I-III	6.26	5.82	11.6	12.7	1138
Regions IV-VII	0.54	0.46			2667
World	2.25	2.06			3805
1974					
Regions I-III	6.22	5.75	11.1	12.0	1149
Regions IV-VII	0.56	0.48			2726
World	2.24	2.04			3875
1975					
Regions I-III	6.02	5.71	10.6	11.7	1160
Regions IV-VII	0.57	0.49			2786
World	2.17	2.02			3946
1976					
Regions I-III	6.31	5.83	10.7	11.2	1172
Regions IV-VII	0.59	0.52			2845
World	2.26	2.07			4017

Note and Sources, see Table 14.

Table 18. The Energy Consumption Gap. Per Capita Apparent Inland Consumption of Primary Energy in Developed and Developing Regions. 1950-1976, Annual Data

	Market Economies Only			World Market Economies and CPE		
	Per Capita Consumption Developed (Reg.I;III) TCE	Developing (Reg.IV-VI) TCE	Gap Ratio	Per Capita Consumption Developed (Reg.I-III) TCE	Developing (Reg.IV-VII) TCE	Gap Ratio
1950	3.12	0.13	24.00	2.67	0.11	24.27
1	3.35	0.15	22.33	2.86	0.13	22.00
2	3.31	0.15	22.07	2.86	0.14	20.43
3	3.38	0.15	22.53	2.95	0.14	21.07
4	3.31	0.16	20.69	2.94	0.15	19.60
1955	3.55	0.18	19.72	3.17	0.17	18.65
6	3.69	0.18	20.50	3.30	0.18	18.33
7	3.67	0.20	18.35	3.34	0.20	16.70
8	3.61	0.20	18.05	3.33	0.28	11.89
9	3.67	0.21	17.48	3.40	0.32	10.63
1960	3.85	0.22	17.50	3.55	0.37	9.59
1	3.89	0.24	16.21	3.62	0.29	12.48
2	4.05	0.24	16.88	3.77	0.29	13.00
3	4.23	0.25	16.29	3.96	0.30	13.20
4	4.37	0.26	16.81	4.12	0.32	13.73
1965	4.45	0.27	16.78	4.26	0.33	12.91
6	4.72	0.28	16.86	4.44	0.35	12.69
7	4.82	0.28	17.21	4.55	0.31	14.68
8	5.09	0.30	16.97	4.78	0.35	13.66
9	5.38	0.32	16.81	5.04	0.37	13.62
1970	5.64	0.36	15.67	5.27	0.42	12.55
1	5.75	0.35	16.43	5.40	0.42	12.86
2	5.99	0.37	16.19	5.62	0.44	12.77
3	6.19	0.39	15.87	5.82	0.46	12.65
4	6.04	0.40	15.10	5.75	0.48	11.98
1975	5.85	0.41	14.27	5.71	0.49	11.65
6	6.09	0.44	13.84	5.83	0.52	11.21
7	.					

Source: Data on Apparent Inland Consumption of Primary Commercial Energy compiled for individual countries from UN World Energy Supplies, summarized by IIASA regions.

Table 19. Regions I-VII Primary Energy Imports, Exports and Bunker Fuels 1950-1975

		Imports (General)	Exports	Bunker Fuels		Imports (General)	Exports	Bunker Fuels
		10^6TCE	10^6TCE	10^6TCE		10^6TCE	10^6TCE	10^6TCE
Regions	1950				1965			
I		112	45	16		258	95	24
II		24	40	.		76	171	.
III		180	73	25		916	148	73
IV		98	185	11		151	352	22
V		38	27	6		88	56	16
VI		22	132	11		46	733	24
VII		.	.	.		2	2	1
I-VII		474	502	69		1537	1557	160
Regions	1955				1970			
I		141	75	22		362	166	27
II		41	62	.		122	227	4
III		347	112	35		1581	239	107
IV		121	233	14		221	398	26
V		60	38	13		169	207	23
VI		36	239	14		46	1291	33
VII		2	1	.		3	1	.
I-VII		748	760	98		2504	2529	220
Regions	1960				1975			
I		189	59	24		564	176	30
II		47	106	.		194	311	6
III		513	119	45		1695	290	120
IV		123	284	17		258	303	23
V		66	49	13		185	295	25
VI		37	382	20		55	1555	29
VII		6	1	.		8	16	.
I-VII		981	1000	119		2959	2946	233

Source: UN World Energy Supplies, standard tables 1 and 2.

Table 20. Regions I-VII. Primary Energy Supplies and Trade Flows, 1950-1975

	Total Supplies	Net Trade Flows	Net Imports as Percent of Total Supplies		Total Supplies	Net Trade Flows	Net Imports as Percent of Total Supplies
	10^6TCE	10^6TCE	%		10^6TCE	10^6TCE	%
Regions 1950				1965			
I	1262	- 67	5.3		2004	- 163	8.1
II	455	+ 16	.		1240	+ 95	.
III	707	- 107	15.1		1498	- 768	51.3
IV	74	+ 87	.		204	+ 201	.
V	70	- 11	15.7		205	- 32	15.6
VI	23	+ 110	.		74	+ 687	.
VII	44	.	.		340	.	.
I-VII	2635	.	.		5565	.	.
Regions 1955				1970			
I	1450	- 66	4.6		2564	- 196	7.6
II	684	+ 21	.		1573	+ 105	.
III	915	- 235	25.7		2087	- 1342	64.3
IV	116	+ 112	.		284	+ 177	.
V	103	- 22	21.4		269	+ 38	.
VI	40	+ 203	.		154	+ 1245	.
VII	105	- 1	.		433	- 2	.
I-VII	3413	.	.		7364	.	.
Regions 1960				1975			
I	1642	- 130	7.9		2693	- 388	14.4
II	926	+ 59	.		2012	+ 117	.
III	1090	- 394	36.1		2280	- 1405	61.6
IV	155	+ 161	.		375	+ 45	.
V	134	- 17	12.7		345	+ 110	.
VI	64	+ 345	.		222	+ 1500	.
VII	448	- 5	.		637	+ 8	.
I-VII	4459	.	.		8564	.	.

Sources: See Tables 11 and 19

Note: -: Net Imports
+: Net Exports

Table 21. Region I by Countries: Primary Energy Production, Primary Energy Supplies and Trade Flows, 1950-1975

	Production	Total Supplies	Imports	Exports	Net Trade Flows	Net Imports as Percent of Supplies
	10^6TCE	10^6TCE	10^6TCE	10^6TCE	10^6TCE	%
1950						
Canada	31	78	47	.	- 47	60.3
USA	1164	1184	65	45	- 20	1.7
Region I	1195	1262	112	45	- 67	5.3
1955						
Canada	53	92	44	5	- 39	42.4
USA	1331	1358	97	70	- 27	2.0
Region I	1384	1450	141	75	- 66	4.6
1960						
Canada	79	110	45	14	- 31	28.2
USA	1433	1532	144	45	- 99	6.5
Region I	1512	1642	189	59	-130	7.9
1965						
Canada	139	157	58	40	- 18	11.5
USA	1702 R	1847	200	55	-145	7.9
Region I	1841	2004	258	95	-163	8.1
1970						
Canada	211	200	76	87	+ 11	.
USA	2157 R	2364	286	79	-207	8.8
Region I	2368	2564	362	166	-196	7.6
1975						
Canada	268	240	80	108	+ 28	.
USA	2037	2453	484	68	-416	17.0
Region I	2305	2693	564	176	-388	14.4

R = Revised

Source: See Tables 6, 20.

Table 22

Region III by Groups of Countries: Primary Energy Production, Total Supplies, and Trade Flows; 1950-1975

	Production 10^6TCE	Total Supplies 10^6TCE	Imports 10^6TCE	Exports 10^6TCE	Net Trade Flows 10^6TCE	Net Imports as Percent of Total Supplies %
1950						
EC	475	530	123	68	- 55	10.4
Japan	44	48	4	.	- 4	8.3
Others	81	129	53	5	- 48	37.2
Total	600	707	180	73	- 107	15.1
1955						
EC	528	672	251	107	- 144	21.4
Japan	49	67	18	.	- 18	26.9
Others	103	176	78	5	- 73	41.5
Total	680	915	347	112	- 235	25.7
1960						
EC	512	751	348	109	- 239	31.8
Japan	61	116	56	1	- 55	47.4
Others	123	223	109	9	- 100	44.8
Total	696	1090	513	119	- 394	36.1
1965						
EC	512	989	605	128	- 477	48.2
Japan	62	203	142	1	- 141	69.5
Others	156	306	169	19	- 150	52.3
Total	730	1498	916	148	- 768	51.3
1970						
EC	492	1265	970	197	- 773	61.1
Japan	55	398	343	.	- 343	86.2
Others	198	424	268	42	- 226	53.3
Total	745	2087	1581	239	-1342	64.3
1975						
EC	547	1307	975	215	- 760	58.1
Japan	37	458	424	3	- 421	91.9
Others	291	515	296	72	- 224	43.5
Total	875	2280	1695	290	-1405	61.6

Source: See Tables 6 and 14-19.

Table 23

USA: Primary Energy Production, Total Supplies and Net Imports, 1950-1978

	Production 10^6TCE	Imports 10^6TCE	Exports 10^6TCE	Net Imports 10^6TCE	Total Supplies 10^6TCE	Import Dependency %
1950	1164	65	45	20	1184	1.7
1	1281	65	83	(+18)	1263	.
2	1250	75	74	1	1251	0.1
3	1264	82	58	24	1288	1.9
4	1206	81	51	30	1236	2.4
1955	1331	97	70	27	1358	2.0
6	1421	112	92	20	1441	1.4
7	1434	124	109	15	1449	1.0
8	1337	129	62	67	1404	4.8
9	1403	140	48	92	1495	6.2
1960	1433	144	45	99	1532	6.5
1	1450	151	42	109	1559	7.0
2	1504	169	45	124	1628	7.6
3	1592	172	56	116	1708	6.8
4	1653	184	54	130	1783	7.3
1965	1702[R]	200	55	145	1847	7.9
6	1814	209	54	155	1969	7.9
7	1912	210	64	146	2058	7.1
8	1976	237	59	178	2154	8.3
9	2055	263	62	201	2256	8.9
1970	2157[R]	286[R]	79	207	2364	8.8
1	2138	325	62	263	2401	11.0
2	2169	390	61	329	2498	13.2
3	2145	500	58	442	2587	17.1
4	2081	487	62	425	2506	17.0
1975	2045[R]	484	68	416	2461	16.9
6	2050	577	62	515	2565	20.1
7[E]	2057	689	60	629	2686	23.4
8[E]	2078	647	56	591	2669	22.1

Sources: Compiled from United Nations, World Energy Supplies, 1950-1974 and 1972-1975.

[R]Revised.

[E]Extrapolated from data in US Department of Energy Monthly Energy Review, April 1979

Table 24

EC: Primary Energy Production, Total Supplies and Net Imports, 1950-1976

	Production 10^6TCE	Imports 10^6TCE	Exports 10^6TCE	Net Imports 10^6TCE	Total Supplies 10^6TCE	Import Dependency %
1950	475	123	68	55	530	10.4
1	502	163	67	96	598	16.1
2	514	177	82	95	609	15.6
3	512	186	96	90	602	15.0
4	621	213	108	105	726	14.5
1955	528	251	107	144	672	21.4
6	537	272	98	174	711	24.5
7	541	281	94	187	728	25.7
8	534	294	98	196	730	26.8
9	519	306	100	206	725	28.4
1960	512	348	109	239	751	31.8
1	510	381	111	270	780	34.6
2	518	434	121	313	831	37.7
3	518	497	129	368	886	41.5
4	526	542	119	423	949	44.6
1965	512	605	128	477	989	48.2
6	488	663	141	522	1010	51.7
7	474	702	142	560	1034	54.2
8	476	772	156	616	1092	56.4
9	479	862	178	684	1163	58.8
1970	492	970	197	773	1265	61.1
1	575	1008	202	806	1381	58.4
2	502[R]	1056	218	838	1340	62.5
3	522	1136	246	890	1412	63.0
4	523	1095	235	860	1383	62.2
1975	548	975	219	756	1304	58.0
6	567	1054	231	823	1390	59.2
7						

Sources: See Table 23.

[R]Revised.

Table 25

Japan: Primary Energy Production, Total Supplies and Net Imports, 1950-1976

	Production 10^6TCE	Imports 10^6TCE	Exports 10^6TCE	Net Imports 10^6TCE	Total Supplies 10^6TCE	Import Dependency %
1950	44	4	.	4	48	8.3
1	49	7	.	7	56	12.5
2	49	10	.	10	59	16.9
3	53	17	.	17	70	24.3
4	49	17	.	17	66	25.8
1955	49	18	.	18	67	26.9
6	54	23	.	23	77	29.9
7	60	33	.	33	93	35.5
8	59	30	.	30	89	33.7
9	57	38	.	38	95	40.0
1960	61	56	1	55	116	47.4
1	65	74	1	73	138	52.9
2	66	85	1	84	150	56.0
3	64	103	1	102	166	61.4
4	64	123	1	122	186	65.6
1965	62	142	1	141	203	69.5
6	65	163	1	162	227	71.4
7	61	199	2	197	258	76.4
8	60	237	1	236	296	79.7
9	59	281	1	280	339	82.6
1970	55	343	1	342	397	86.2
1	49	369	3	366	415	88.2
2	45	399	3	396	441	89.8
3	37	454	2	452	489	92.4
4	38	453	4	449	487	92.2
1975	37	424	3	421	458	91.9
6	38	426	1	425	463	91.8
7						

Sources: See Table 23.

Table 26.

Region III. Dollar Exchange Rates, 1969; 1975; and Mid-1978

	1969	1975	1978, July 10
Belgium	1$ = 49.67 B.Francs	1$ = 39.53 B.Francs	1$ = 32.12 B.Francs
Denmark	1$ = 7.491 Kronor	1$ = 6.178 Kronor	1$ = 5.5835 Kronor
France	1$ = 5.558 F.Francs	1$ = 4.486 F.Francs	1$ = 4.431 F.Francs
F.R.G.	1$ = 3.690 D.Mark	1$ = 2.622 D.Mark	1$ = 2.039 D.Mark
Ireland	1$ = 0.4165 £	1$ = 0.4941 £	1$ = 1.8940 £
Italy	1$ = 625.50 Lira	1$ = 683.55 Lira	1$ = 846.50 Lira
Netherlands	1$ = 3.624 Guilder	1$ = 2.688 Guilder	1$ = 2.2025 Guilder
U.K.	1$ = 0.4166 £	1$ = 0.4942 £	1$ = 1.8940 £
Japan	1$ = 357.8 Yen	1$ = 305.2 Yen	1$ = 200.9 Yen

Source: UN Monthly Bulletin of Statistics.

Table 27. Global GDP in Constant Prices and Dollars of 1975, by Regions, 1950-1978

Year	World Regions I-VII	Region I USA; Canada	Region II USSR; Eastern Europe	Region III				Region IV Latin America	Region V			Region VI Middle East	Region VII China
				EC	Japan	Other	Total		Africa	Asia	Total		
	In 10^9 Dollars of 1975												
1950	1818	727	135	443	58	180	681	86	33	71	104	24	61
1955	2371	893	233	567	83	219	869	111	42	86	128	35	102
1960	2954	1008	364	709	134	268	1111	140	46	106	152	47	132
1965	3843	1270	491	898	217	356	1471	182	57	132	189	74	166
1970	4965	1487	693	1131	382	458	1971	234	74	173	247	111	222
1971	5189	1534	736	1165	406	483	2054	250	78	181	259	120	236
1972	5481	1622	772	1209	441	513	2163	268	83	194	277	135	244
1973	5885	1711	853	1286	491	537	2314	294	86	209	295	149	269
1974	6009	1697	903	1300	484	553	2337	313	90	217	307	176	276
1975	6087	1678	927[E]	1279	496	555	2330	323[E]	92[E]	233[E]	325[E]	180[E]	324[E]
1976	6456	1777	1011[E]	1339	527	565	2431	339[E]	95[E]	255[E]	350[E]	196[E]	352[E]
1977	.	1863	.	1369	553	574	2496	.	.	.	.	.	.
1978	.	1921	.	1412	588	587	2587	.	.	.	.	.	.
	Index 1975 = 100												
1950	29.9	43.3	14.6	34.6	11.7	32.4	29.2	26.6	35.9	30.5	32.0	13.3	18.8
1955	39.0	53.2	25.1	44.3	16.7	39.5	37.3	34.2	45.7	36.9	39.4	19.4	31.5
1960	48.5	60.1	39.3	55.4	27.0	48.3	47.7	43.3	50.0	45.5	46.8	26.1	40.7
1965	63.1	75.7	53.0	70.2	43.8	64.1	63.1	56.2	62.0	56.7	58.2	41.1	51.2
1970	81.6	88.6	74.8	88.4	77.0	82.5	84.6	72.7	80.4	74.2	76.0	61.7	68.5
1971	85.2	91.4	79.4	91.1	81.9	87.0	88.2	77.3	84.8	77.7	79.7	66.7	72.8
1972	90.0	96.7	83.3	94.5	88.9	92.4	92.8	82.8	90.2	83.3	85.2	75.0	75.3
1973	96.7	102.0	92.1	100.5	99.0	96.8	99.3	90.9	93.5	89.7	90.8	82.8	83.0
1974	98.7	101.1	97.4	101.6	97.6	99.6	100.3	96.8	97.8	93.1	94.5	97.8	85.2
1975	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1976	106.1	105.9	109.0	104.7	106.3	102.2	104.3	105.0	103.3	109.4	107.7	108.9	108.6
1977	.	111.0	.	107.0	111.5	103.9	107.1	.	.	.	.	.	.
1978	.	114.5	.	110.4	118.4	106.1	111.0	.	.	.	.	.	.

Sources: 1975 GDP at 1975 prices and dollars, compiled from World Bank Atlas 1977; Data extrapolated on the basis of index numbers implicit in national accounts for individual countries, summarized by regions.

Table 28. The GDP Gap. Market Economies, Developed and Developing Regions: Growth of GDP in Constant Prices of 1975, Aggregate and Per Capita, 1950-1976

	GDP at Constant Prices of 1975		Aggregate GDP		Per Capita GDP	Population
	Aggregate	Per Capita	Share of Developed Regions	Gap Ratio	Gap Ratio	
	10^9 $	$	%	.	.	10^6
1950						
Regions I+III	1408	2358	86.8	6.6	11.3	597
" IV-VI	214	208				1028
Total	1622	998				1625
1955						
Regions I+III	1762	2770	86.5	6.4	11.5	636
" IV-VI	274	241				1139
Total	2036	1147				1775
1960						
Regions I+III	2119	3125	86.2	6.3	11.8	678
" IV-VI	339	264				1282
Total	2458	1254				1960
1965						
Regions I+III	2741	3796	86.0	6.2	12.4	722
" IV-VI	445	306				1455
Total	3186	1463				2177
1970						
Regions I+III	3458	4556	85.4	5.8	12.7	759
" IV-VI	592	358				1655
Total	4050	1678				2414
1971						
Regions I+III	3588	4678	85.1	5.7	12.6	767
" IV-VI	629	370				1699
Total	4217	1710				2466
1972						
Regions I+III	3785	4890	84.8	5.6	12.5	774
" IV-VI	680	390				1742
Total	4465	1775				2516
1973						
Regions I+III	4025	5147	84.5	5.5	12.5	782
" IV-VI	738	413				1786
Total	4763	1855				2568
1974						
Regions I+III	4034	5113	83.5	5.1	11.8	789
" IV-VI	796	435				1829
Total	4830	1845				2618
1975						
Regions I+III	4008	5029	82.9	4.8	11.4	797
" IV-VI	828	442				1874
Total	4836	1811				2671
1976[P]						
Regions I+III	4212	5232	82.6	4.8	11.4	805
" IV-VI	885[E]	461				1918
Total	5097[E]	1812				2723

E: Estimate
P: The 1976 estimates for developing countries are preliminary estimates.
Sources: 1975 GDP in US-$, compiled for individual countries from the World Bank Atlas of 1977, were summarized by IIASA regions and extrapolated on the basis of the growth of GDP in constant prices, for individual countries, published by the United Nations.

Table 29. The GDP Gap. World Developed and Developing Regions: Growth of GDP in Constant Prices of 1975, Aggregate and Per Capita, 1950-1976

	GDP at Constant Prices		Aggregate GDP		Per Capita GDP	Population
	Aggregate	Per Capita	Share of Developed Regions	Gap Ratio	Gap Ratio	
	10^9 $	$	%	.	.	10^6
1950						
Regions I-III	1543	1784	84.9	5.6	10.6	865
" IV-VII	275	169				1627
World	1818	730				2492
1955						
Regions I-III	1995	2157	84.1	5.3	10.3	925
" IV-VII	376	210				1787
World	2371	874				2712
1960						
Regions I-III	2483	2511	84.1	5.3	10.6	989
" IV-VII	471	237				1986
World	2954	993				2975
1965						
Regions I-III	3232	3069	84.1	5.3	11.2	1053
" IV-VII	611	275				2222
World	3843	1173				3275
1970						
Regions I-III	4151	3757	83.6	5.1	11.5	1105
" IV-VII	814	327				2491
World	4965	1381				3596
1971						
Regions I-III	4324	3875	83.3	5.0	11.4	1116
" IV-VII	865	339				2550
World	5189	1415				3666
1972						
Regions I-III	4557	4043	83.1	4.9	11.4	1127
" IV-VII	924	354				2608
World	5481	1467				3735
1973						
Regions I-III	4878	4286	82.9	4.8	11.3	1138
" IV-VII	1007	378				2667
World	5885	1547				3805
1974						
Regions I-III	4937	4297	82.2	4.6	10.9	1149
" IV-VII	1072	393				2726
World	6009	1551				3875
1975						
Regions I-III	4935	4254	81.1	4.3	10.3	1160
" IV-VII	1152	413				2786
World	6087	1543				3946
1976[P]						
Regions I-III	5223	4456	80.9	4.2	10.2	1172
" IV-VII	1237[E]	436[E]				2845
World	6460[E]	1608[E]				4017

Sources see Table 28. P = preliminary E = estimate

Table 30. Regions I and III. GDP Deflators, 1950-1978

	Region I	Region III	
	USA	EC	Japan
1950	58.7	47.5	38.2
1	62.7	49.3	45.7
2	63.5	52.9	49.0
3	64.4	53.9	53.0
4	65.3	55.1	53.8
5	66.7	56.9	53.3
6	68.8	58.9	55.6
7	71.2	61.4	58.7
8	72.3	64.7	57.9
9	73.9	65.4	59.5
1960	75.2	66.5	61.0
1	75.8	68.9	65.8
2	77.2	71.9	68.2
3	78.4	75.1	71.2
4	79.6	78.1	74.4
5	81.3	81.3	78.2
6	83.5	84.3	82.0
7	86.5	86.4	85.9
8	90.4	89.1	89.8
9	94.9	93.9	93.7
1970	100.0	100.0	100.0
1	105.1	107.3	104.5
2	109.5	114.2	109.6
3	115.8	123.4	122.2
4	127.0	137.7	147.5
5	139.2	158.4	158.2
6	146.4	175.0	167.2
7	155.0	191.8	176.4
8	166.5	207.4	184.9

Sources: Region I, see Implicit Price Deflators for GNP 1929-1978, in Economic Report of the President, January 1979.
Region III, see deflators implicit in GDP at constant and current prices of individual EC countries and Japan.

Table 31. Annual Investments (Gross Fixed Capital Formation) in All Sectors of the Economy, by Regions in 1960; 1970; 1975.

Data in Constant Prices and Dollars of 1975

Year	Region I	Region II			Region III				Region IV	Region V			Region VI
	USA + Canada	USSR	Eastern Europe	Total	EC	Japan	Other Developed Market Ec.	Total	LA	Africa	Asia	Total	ME, NA
	In 10^9 Dollars (75)												
1960	175	43*	17*	60	148	40	61	249	25	6.4	14.0	20.4	7^E
1970	257	90*	36*	126	270	134	109	513	47	14.4	29.9	44.3	17^E
1975	288	111*	64*	175	274	153	138	565	71	21.1	48.7	69.8	61
	As Percent of GDP												
1960	17	17*	15*	16	21	30	23	22	18	14	13	14	15^E
1970	17	18*	19*	18	24	35	24	26	20	19	17	18	15^E
1975	17	17*	23*	19	21	31	25	24	22	23	21	22	34

E = Partially estimated

* = Data relate to Net Capital Formation and Net Material Product

Note: Data for Region VII (China) are not available.

Table 32. USA. GNP and Annual Investments, Total and in the Energy Sector, 1947-1978

Data in Constant Prices of 1972

Years	GNP	Domestic Private GFCF*		Energy Sector Investments as Percent of GNP
		Total	Energy Sector	
	10^9\$(72)	10^9\$(72)	10^9\$(72)	%
1947	468.3	70.1	7.859	1.678
8	487.7	82.3	10.747	2.204
9	490.7	65.6	10.971	2.236
1950	533.5	93.7	11.815	2.215
1	576.5	94.1	11.213	1.945
2	598.5	83.2	12.285	2.053
3	621.8	85.6	13.228	2.127
4	613.7	83.4	13.140	2.147
1955	654.8	104.1	13.495	2.061
6	668.8	102.9	13.423	2.007
7	680.9	97.2	14.749	2.166
8	679.5	87.7	13.639	2.007
9	720.4	107.4	12.825	1.780
1960	736.8	105.4	12.698	1.723
1	755.3	103.6	13.046	1.727
2	799.1	117.4	12.684	1.587
3	830.7	124.5	12.204	1.469
4	874.4	132.1	14.176	1.621
1965	925.9	150.1	14.248	1.539
6	981.0	161.3	16.130	1.644
7	1007.7	152.7	17.493	1.736
8	1051.8	159.5	19.072	1.813
9	1078.8	168.0	20.641	1.913
1970	1075.3	154.7	20.941	1.947
1	1107.5	166.8	21.464	1.938
2	1171.1	188.3	22.973	1.962
3	1235.0	207.2	23.869	1.933
4	1217.8	183.6	24.960	2.050
5	1202.3	142.6	.	.
6	1271.0	173.4	.	.
7	1332.7	196.3	.	.
1978 Prel.	1385.1	210.1	.	.

*Excludes investment by government sector

Sources: GNP and Domestic Private Investment at 1972 prices, see Economic Report of the President, January 1979, Table B-2, p. 184, 185.
Energy Sector investments compiled from preliminary data, computer printouts, sent by US Department of Labor, BLS, Office of Economic Growth, with letter of 26 April 1978.

Table 33. USA. GNP and Annual Investments in the Energy Sector, by Type of Fuels and Electricity, 1947-1974

Data in Constant Prices of 1972

Years	Coal Mining	Crude Oil, Nat.Gas	Petroleum Refining	Public Utilities	Total Energy Sector
	10^6\$	10^6\$	10^6\$	10^6\$	10^6\$
1947	646	2613	770	3830	7859
8	753	3443	1099	5452	10747
9	327	3331	858	6455	10971
1950	809	4030	544	6432	11815
1	312	3930	624	6347	11213
2	305	4538	795	6647	12285
3	167	4546	1166	7349	13228
4	198	4972	1228	6742	13140
5	114	5709	1044	6628	13495
6	192	5396	1132	6703	13423
7	405	5181	1361	7802	14749
8	302	4700	1077	7560	13639
9	376	4952	662	6835	12825
1960	287	4781	754	6876	12698
1	420	5082	774	6770	13046
2	351	4888	721	6724	12684
3	302	4442	622	6838	12204
4	873	5256	606	7441	14176
5	346	4837	878	8187	14248
6	610	4877	924	9719	16130
7	425	4735	1315	11018	17443
8	318	4981	1309	12464	19072
9	385	5420	1263	13573	20641
1970	1169	3961	1347	14464	20941
1	719	3600	1361	15784	21464
2	722	4097	1154	17000	22973
3	1064	3976	1057	17772	23869
4	1108	5057	1556	17239	24960

Source: Compiled from computer printouts, sent by US Department of Labor, BLS, Office of Economic Growth with letter of 26 April 1978.

Table 34. European Community Countries. Annual Investments by Broad Sectors of the Economy, 1975 Data in Current Prices and National Currencies

Sector	Belgium (10^9BFr)	France (10^9FFr)	FRG (10^9DM)	Italy (10^{12}Lira)	Netherlands (10^9Fl)	UK (10^6£)	Ireland (10^6£)	Denmark (10^9Kr)
1. Agriculture, forestry, fishery	11.5	14.1	.	1.8	2.1	622	81	3.5
2. Energy	46.5	22.2	14.5[E]	1.9	5.1	3274	37	2.1
3. Mining and manufacturing	112.7	50.7	.	5.3	7.8	3576	188	
4. Construction	8.9	7.3	.	0.3	0.8	412	17	28.1
5. Trade, transport, communication, finance	272.8	194.3	.	12.6	22.3	10308	463	
6. Government and other non-market services	84.9	46.8	.	1.9	8.8	3016	61	6.6
1-6 Including deductible T.V.A.	537.3	.	224.9	.	46.9	21208	.	.
T.V.A. deductible	26.1	.	10.4	.	2.9	611	.	.
1-6 Total GFCF excluding deductible T.V.A.	511.2	335.4	214.5	23.8	44.0	20597	847	40.3
			IN PERCENTAGES					
1. Agriculture, forestry, fishery	2.1	4.2	.	7.6	4.5	2.9	9.6	8.7
2. Energy	8.7	6.6	6.5[E]	8.0	10.9	15.4	4.4	5.2
3. Mining and manufacturring	21.0	15.1	.	22.3	16.6	16.9	22.2	
4. Construction	1.7	2.2	.	1.3	1.7	1.9	2.0	69.7
5. Trade, transport, communication, finance	50.8	57.9	.	52.8	47.5	48.7	54.7	
6. Government and other non-market services	15.7	14.0	.	8.0	18.8	14.2	7.2	16.4
1-6 Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

E = Estimated. Sources: see Table 35.

Table 35. European Community Countries. GDP and Annual Investment in the Energy Sector, 1970-1976 (Data in Current Prices and National Currencies).

	Belgium		France		FRG		Italy		Netherlands		UK		Ireland		Denmark	
	En. Inv. 10^9 BFr	GDP	En. Inv. 10^9 FFr	GDP	En. Inv. 10^9 DM	GDP	En. Inv. 10^{12} Lira	GDP	En. Inv. 10^9 Fl	GDP	En. Inv. 10^6 £	GDP	En. Inv. 10^6 £	GDP	En. Inv. 10^9 Kr	GDP
1970	19.3	1281	11.6	783	7.8[E]	679	1.0	58	2.5	115	998	50724	25	1626	1.3	117
1971	27.8	1403	11.8	872	10.6[E]	756	1.1	63	3.5	130	1087	56826	30	1860	1.4	128
1972	28.0	1566	13.2	981	12.3[E]	827	1.1	69	3.9	147	1064	62881	26	2223	1.6	145
1973	24.3	1779	15.2	1113	12.3[E]	920	1.3	83	3.7	168	1143	71963	46	2687	1.6	165
1974	32.1	2091	18.8	1272	13.8[E]	987	1.8	101	4.1	190	1851	81922	42	2920	2.0	184
1975	46.5	2305	22.2	1437	14.5[E]	1030	1.9	115	5.1	209	3274	103129	37	3621	2.1	204
1976	34.5	2603	26.7	1669	.	1123	.	144	4.7	237	4098	121966	.	4416	.	233

Source: Compiled from EUROSTAT National Accounts Detailed Tables, 1970-1976; standard table 7.

E: Estimated, see Table 36.

Table 36. FRG. Estimated Annual Investments for Various Sources of Energy, 1950-1975. All Data in Current Prices .

Year	Solid Fuels	Hydro-Carbons	Crude Oil & Nat.Gas	Oil Refining	Utilities Electr. (Public & Industry)	Utilities Gas	Total Energy Sector
	10^6DM	10^6DM	10^6DM	10^6DM	10^6DM	10^6DM	10^6DM
1950	.	.	.	.	972	186	.
1951	.	.	.	.	1090	233	.
1952	.	.	.	.	1201	271	.
1953	.	.	.	.	1422	311	.
1954	.	.	.	.	1791	336	
1955	.	.	.	.	2123	361	.
1956	.	.	.	.	1842	330	.
1957	.	.	.	.	2041	309	.
1958	.	.	.	.	2112	327	.
1959	.	.	.	.	2123	365	.
1960	.	.	.	.	2420	290	.
1961	.	.	.	.	2773	291	.
1962	1106	30	87	796	3260	360	5639
1963	.	.	.	.	3450	488	.
1964	1032	a	142	1074	3773	709	6730a
1965	1045	a	172	650	3846	620	6333a
1966	839	a	276	924	3802	707	6548a
1967	888	a	147	1668	3936	703	7342a
1968	768	a	105	533	3422	543	5421a
1969	551	a	58	828	3815	675	5927a
1970	755	166E	139	1034	4885	778	7757
1971	1251	a	228	1371	6580	1122	10552a
1972	1038	a	205	1586	8197	1237	12263a
1973	903	a	170	1518	8475	1250	12316a
1974	982	a	183	1683	9638	1363	13849a
1975	1563	a	332	1444	9642	1523	14504a

Source: The investments in mining and manufacturing are compiled from "Industrie Statistik" published in FRG Statistisches Jahrbuch 1977 and earlier issues. Public Utilities investment compiled from "Investitionen der Unternehmen der öffentlichen Energieversorgung" also published in F.R.G. Statistisches Jahrbuch 1977 and earlier issues.

E = estimated

a = Data not available for hydrocarbon

Table 37. 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 Fr.Fr.	UK £
Industry Sector				
Solid Fuels				
Steam Coal	.	219.30	261.30	25.1
Bituminous Coal	31.00[a]	.	.	.
Anthracite	39.10[a]	.	.	.
Natural Gas				
350×10^6kcal Consumption	69.00	.	548.90	48.2
5000×10^6kcal 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	181.4
Residential Consump.	403.20[b]	.	.	.
Transportation				
Gasoline, Leaded Regular	176.00[b]	.	.	.

Sources: If not otherwise indicated, data are compiled from OECD Energy Statistics 1975/77, Paris 1979.

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

b: Compiled from US Department of Energy Monthly Energy Review, April 1979, p.18.
Prices shown in 1972 Dolars 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 38. 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*

	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				
350x10^6kcal Consumption	69.00	.	122.35	97.36
5000x10^6kcal 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]	.	.	.
Transportation				
Gasoline, Leaded Regular	176.00[b]	.	.	.

Sources: see Table 37.

*: 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 39. USA. The Growth of Current Energy Prices, by Groups of Fuels and Electricity, 1950-1978

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	Natural Gas	Petroleum Products	Electricity	(Gasoline, Motor Oil, Coolant)
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	93.5	.	92.2	91.5	94.2	94.2
8	90.4	93.1	69.0	89.5	97.0	95.3	94.9	.	93.1	94.4	95.0	95.8
9	94.9	95.0	74.9	90.1	98.5	96.1	97.4	.	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	103.9	.	107.1	106.3	106.6	101.0
2	109.5	111.7	128.9	110.1	107.8	114.7	106.8	.	112.7	106.7	112.0	102.4
3	115.8	126.5	145.1	122.3	127.4	122.1	115.4	.	117.9	123.1	117.6	111.9
4	127.0	196.1	221.2	156.6	221.2	154.0	149.3	.	132.6	194.9	138.9	149.6
5	139.2	230.8	256.7	209.2	255.0	182.6	165.1	.	159.0	211.0	157.3	159.8
6	146.4	250.1	245.4	276.8	271.2	196.1	176.9	.	185.4	226.2	167.2	166.3
7	155.0	284.6	259.1	273.8	302.5	219.9	193.7	.	220.6	256.4	178.3	175.8
8	166.5	303.7	286.2	413.0	318.2	236.7	205.8p	.	232.8p	267.5p	191.4p	182.6p

p = preliminary

Notes to Table 39.

Sources and Definitions of US Energy Price Data.

All industry sector energy prices shown in Table 39 are from the series of producer price indices by major commodities 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 President's Economic Report, and as "wholesale price" in the Statistical Yearbook, etc.

All household energy prices shown in Table 39 are the Bureau of Labor (BLS) consumer price indices by expenditure classes.

The following price indices were used for groupings on Table 39:

Groupings on Table 39. 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 (which includes crude oil and electr.)	Economic Report of the President 1979, p.248
Solid Fuels	"	Coal; Coke (foundry by product)	US Statistical Abstract; Survey of Current Business
Natural Gas	"	Gas Fuels	
Petroleum Products	"	Refined Petroleum Products	
Electricity	"	Electric Power	
Household Sector			
Total Energy	BLS consumer price indices by expenditure classes; US city average all urban consumers.	Total energy, including: gas (piped); electricity; fuel oil; coal and bottled gas; and gasoline, motor oil, coolants	Economic Report of the President 1979, p.241. US Statistical Abstract; Bureau of Labor Statistics..
Solid Fuels	"	Separate index no longer published	
Natural Gas	"	Utility piped gas	
Petroleum Products	"	Fuel oil No.2	
Electricity	"	Household electricity	
Transport Sector	"	Gasoline, motor oil, coolants	Economic Report of the President, 1979, p.241.

Table 40. FRG. The Growth of Current Energy Prices, by Groups of Fuels and Electricity, 1950-1978

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	Natural Gas	Petroleum Products	Electricity	Regular Gasoline (1 January)
1950	52.3	.	41.0	.	79.8	68.8	.	.	..	.	.	.
1	55.4	.	.	.	.	.	.	.	.	.	.	.
2	59.2	.	.	.	.	.	.	.	.	.	.	.
3	60.8	.	.	.	.	.	.	.	.	.	.	.
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	.	.	.	.	.	.
7	66.2	.	73.9	99.8	116.2	99.8	.	.	.	.	.	.
8	68.5	.	77.8	101.8	109.5	101.8	.	.	.	.	.	.
9	69.2	.	77.6	102.3	105.5	102.3	.	.	.	.	.	.
1960	71.1	.	77.5	102.4	107.9	102.4	.	.	.	.	.	.
1	74.1	.	77.5	102.0	101.1	102.0	.	.	.	.	.	.
2	77.2	.	78.9	101.4	108.2	101.4	.	.	.	.	.	.
3	79.6	.	80.9	100.9	107.4	100.9	.	.	.	.	.	.
4	81.3	.	83.0	100.8	99.6	100.8	.	.	.	.	.	.
5	84.7	.	87.1	102.3	95.7	102.3	.	.	.	.	.	.
6	87.7	.	87.0	103.0	95.3	103.0	89.3	.	.	.	.	.
7	88.8	.	87.1	103.0	105.8	103.0	90.5	.	.	.	.	.
8	90.1	.	82.5	102.2	102.4	101.4	95.8	.	.	.	.	111.4
9	93.4	.	85.2	100.5	96.2	99.9	95.7	87.8	100.4	94.7	99.5	107.1
1970	100.0	.	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1	107.9	.	111.9	101.6	109.5	102.7	105.4	108.7	101.1	110.4	102.4	102.7
2	114.2	.	118.4	108.8	106.7	109.6	110.1	116.0	106.7	102.3	111.3	106.7
3	120.9	.	124.2	110.6	129.8	114.7	128.2	125.2	108.8	168.8	117.6	111.8
4	129.3	.	154.7	123.6	181.8	123.3	149.8	147.8	119.0	220.5	128.3	137.3
5	139.7	.	191.2	185.1	181.4	144.1	165.5	169.0	136.1	211.8	151.3	149.0
6	144.3	.	205.5	207.5	193.4	150.8	176.4	178.5	148.1	233.3	157.9	154.1
7	149.5	.	205.2	220.3	191.2	151.7	178.4	182.6	151.8	232.8	159.1	155.5
8	155.5	.	218.6	228.3	185.2	157.2	183.6	192.8	157.3	227.9	166.0	156.8

Notes to Table 40. 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 the "Preise und Preisindizes for Industrielle Produkte (Erzeugerpreise)", Fachserie 17, Reihe 2 [35]; the other are the basic materials' prices, published in the Index der Grundstoffpreise, Fachserie 17, Reihe 3 [36]. Both are monthly publications, with annual data published in the Statistisches Jahrbuch.

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 for groupings on Table 40:

Groupings on Table 40.	FRG Energy Price Index Numbers		
Industry Sector	Series		Source
Total Energy	Basic materials [Grundstoff] prices	Total coal; crude oil; and petroleum products. Excludes electricity	Stat.Bundesamt. Fachserie 17, Reihe 3 [36]; and Statistisches Jahrbuch
N O T A P P L I C A B L E			
Solid Fuels	Producer prices [Erzeuger Preise] for industrial products	Coal mining products (coal; coke and briquettes).	Fachserie 17, Reihe 2; [35] and Statistisches Jahrbuch
Natural Gas	"	Natural Gas	"
Petroleum Prod.	"	Petroleum Products	"
Electricity	"	Total electricity	"
Household Prices	Prices and price indices	Total electricity, gas,	Fachserie 17 [37]
Total energy	for the cost of living	coal and liquid fuels, excl. gasoline	Reihe 7 and Statistisches Jahrbuch
Solid Fuels	"	Coal and other solid fuels	"
Natural Gas	"	Gas (city and natural)	"
Petroleum Prod.	"	Liquid fuels excluding gasoline	"
Electricity	"	Electricity	"
Transport Sector	Prices in national currencies per 100 lit.	Average prices as of 1 January for regular gasoline	OECD Energy Statistics 1955/77, p.190

Table 41. France. The Growth of Current Energy Prices, by Sectors of Fuels and Electricity, 1950-1978

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	Natural Gas	Petroleum Products	Electricity	Regular Gasoline (1 January)
1950	38.0	.	.	.	.	.	.	.	.	.	.	.
1	39.3	.	.	.	.	.	.	.	.	.	.	.
2	43.7	.	.	.	.	.	.	.	.	.	.	.
3	45.9	55.8	.	.	61.3	61.7	.	.	.	.	.	.
4	46.7	56.0	.	.	61.6	61.7	.	.	.	.	.	.
5	47.4	56.2	49.4	.	63.0	61.1	.	.	.	.	.	.
6	49.6	58.2	50.0	.	65.4	60.9	.	.	.	.	.	.
7	52.6	64.9	53.5	.	79.0	60.2	.	.	.	.	.	.
8	62.2	71.3	60.9	102.0	86.6	64.0	.	.	.	.	.	.
9	64.4	79.0	69.8	118.6	91.0	74.6	.	.	.	.	.	.
1960	65.0	79.0	68.1	118.7	90.3	75.5	.	.	.	.	.	.
1	67.2	79.4	70.1	102.5	89.7	76.7	.	.	.	.	.	.
2	70.4	79.5	69.2	99.9	88.8	76.7	76.1	73.9	81.6	.	73.8	.
3	74.6	80.2	70.4	100.6	88.2	79.9	78.2	77.2	80.4	.	76.8	.
4	77.6	80.1	70.9	106.4	86.4	82.9	79.8	79.4	80.0	.	79.9	.
5	79.5	79.8	71.3	100.6	85.1	84.2	80.1	80.2	79.9	.	80.4	.
6	81.9	80.4	71.3	101.2	85.0	84.7	83.0	.	.	.	.	.
7	84.2	81.6	71.0	100.4	86.2	86.0	85.0	.	.	.	.	.
8	88.0	85.7	73.1	100.0	90.8	91.1	88.1	86.0	89.2	.	86.0	91.5
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	101.0
2	112.6	113.4	128.0	126.6	108.8	109.3	109.7	112.1	110.5	.	109.1	104.8
3	121.3	117.6	132.2	131.5	112.6	114.0	114.1	118.1	115.5	.	113.8	104.8
4	135.3	170.7	194.0	194.5	176.6	133.6	156.8	145.0	139.0	.	132.8	152.3
5	152.5	191.6	229.4	218.7	190.1	154.6	169.2	166.3	163.4	.	143.4	160.0
6	167.4	210.5	252.9	237.6	207.4	173.1	187.3	184.3	174.4	.	162.6	166.7
7	181.9	232.9	269.9	257.7	236.8	185.9	209.2	198.7	185.5	.	174.0	197.9
8	197.9	251.4	286.9	296.7	255.7	202.5	227.3	230.9	200.3	.	187.6	207.5

Notes to Table 41. 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 household in all of France, index numbers based on 1970=100.

The following price indices were used for groupings on Table 41:

Groupings on Table 41. French Energy Price Index Numbers

Industry Sector	Series		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 Statistique [39] and Annuaire Statistique de la France [38]
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	"
Petrol. Prod.	"	Data not available	"
Electricity	"	Total electricity	"
Transport Sector	Prices in national currency per 100 lit.	Average prices as of 1 Jan. for regular gasoline	OECD Energy Statistics 1955/1977, p.190

Table 42. UK. The Growth of Current Energy Prices, by Sectors of Fuels and Electricity, 1950-1978

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	Natural Gas	Petroleum Products	Electricity	Regular Gasoline (1 January)
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	.	.	.	.	.	.
6	61.0	.	70.3	129.4	116.9	80.3	58.2	.	.	.	.	.
7	63.2	.	74.9	135.8	121.3	83.3	64.9	.	.	.	.	.
8	65.4	.	79.1	142.0	102.2	85.0	71.3	.	.	.	.	.
9	66.1	.	79.1	141.2	93.3	81.3	79.0	.	.	.	.	.
1960	66.1	.	80.8	142.5	88.9	80.0	79.0	.	.	.	.	.
1	68.3	.	83.7	144.9	81.8	84.3	79.4	.	.	.	.	.
2	70.8	.	86.6	148.0	91.1	85.9	79.5	62.3	81.7	.	.	.
3	72.5	.	86.6	148.2	86.1	87.5	80.2	64.8	83.3	.	.	.
4	74.7	81.0	86.6	148.0	80.6	87.0	80.1	66.0	86.5	.	.	.
5	78.5	86.4	86.6	146.2	75.3	91.0	79.8	68.5	87.3	.	.	.
6	82.1	89.8	88.1	147.8	79.6	94.2	80.4	75.3	89.7	.	.	.
7	84.5	91.8	85.1	146.9	92.5	96.5	81.6	78.4	90.5	.	.	.
8	88.2	94.2	82.1	147.6	101.1	98.6	85.7	82.1	96.8	.	.	84.6
9	93.1	96.3	83.6	129.4	100.0	98.5	92.6	86.4	100.8	.	98.1	94.0
1970	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	.	100.0	100.0
1	108.9	110.6	119.7	72.3	148.7	110.2	111.1	122.2	109.4	.	106.2	103.0
2	117.7	114.0	128.8	65.5	142.4	112.7	113.4	124.3	115.3	.	113.2	106.0
3	127.0	117.6	134.9	67.9	139.2	113.1	117.6	128.4	116.5	.	117.8	108.0
4	144.1	164.9	145.5	65.7	329.3	142.5	170.7	143.2	122.4	.	136.0	126.3
5	184.1	208.3	219.7	94.5	409.8	189.6	191.6	191.9	141.2	.	172.2	226.9
6	202.6	250.2	271.2	143.4	469.6	227.7	210.5	236.5	172.9	.	198.7	242.3
7	233.6	289.1[E]	324.2	204.9	594.6	262.7	232.9	275.7	201.2	.	215.6	240.7
8	257.7	332.2[E]	358.8[E]	226.8[E]	658.1[E]	290.8	250.8	307.4	207.2	.	.	234.3

E = Estimated

Notes to Table 42. Sources and Definitions of UK Energy Price Data.

From the considerable variety of UK energy price compilations the following series were selected because they were readily available and covered the longest periods of time. For industry sector, total energy we selected the series on "index numbers of wholesale prices"; this series gives a total for "coal, gas and electricity" purchased by the manufacturing industry, and a total for "fuel" (which includes petroleum products but may exclude electricity) purchased by selected broad sectors of industry. We used the total price index for "fuels", that has risen somewhat faster than the index for "coal, gas and electricity". Because the components of either totals were not available, we compiled index numbers for individual energy groups from the "prices of fuels used by industry". These represent delivered prices, given in £ per ton of coal; heavy fuel oil; gas oil; and in pence per therm for gas and pence per kWh for electricity. Beginning with 1974, the method of compilation changed significantly which may account for some lack of comparability of earlier with present prices.

The following price indices were used for groupings on Table 42:

Groupings on Table 42. UK Energy Price Index Numbers

Industry Sector	Series		Source
Total Energy	Index numbers of the wholesale prices; materials purchased by selected broad sectors of industry	"Fuel" includes coal and petroleum products; may exclude crude oil and electricity	UK Statistical Abstract [40], 1977, p.457, table 18.2; also Digest of UK Energy Statistics [41], 1974, table 89.
Solid Fuels Natural Gas Petroleum Prod. Electricity	Prices of fuels used by industry	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 [41] 1978, table 88 prices of fuels used by industry. For backdating see also earlier issues of the Digest and IIASA RM-76-18 of March 1976.
Household Sector			
Total Energy	General index of retail prices	Fuel and light (incl. oil for domestic heating, excl.gasoline)	UK Digest of Energy Statistics 1978 [41], p.119, table 85.
Solid Fuels	"	Coal and smokelessfuel	"
Natural Gas	"	Gas	"
Petrol.Prod.	"	Data not available	
Electricity	"	Electricity	"
Transport Sector	Prices in national curr. per 100 lit.	Average prices as of 1 Jan. for regular gasoline	OECD Energy Statistics 1955/1977, p.190

Table 43. USA. The Growth of Real Energy Prices, by Groups of Fuels and Electricity, 1950-1978

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	Natural Gas	Petroleum Products	Electricity	(Gasoline, Motor Oil, Coolant)
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	108.1	.	106.6	105.8	108.9	108.9
8	90.4	103.0	76.3	99.0	107.4	105.4	105.0	.	103.0	104.5	105.1	106.0
9	94.9	100.1	78.9	94.9	103.8	101.3	102.5	.	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	98.9	.	101.9	101.2	101.4	96.1
2	109.5	102.0	117.8	100.6	98.5	104.8	97.6	.	103.0	97.5	102.3	93.5
3	115.8	109.2	125.3	105.6	110.0	105.4	99.6	.	101.8	106.2	101.5	96.6
4	127.0	154.5	174.2	123.3	174.2	121.3	117.5	.	104.4	153.5	109.4	117.8
5	139.2	165.8	184.4	150.3	183.2	131.2	118.6	.	114.2	151.6	113.0	114.8
6	146.4	170.8	167.6	189.1	185.3	134.0	120.8	.	126.7	154.5	114.2	113.6
7	155.0	183.6	167.1	241.1	195.1	141.9	125.0	.	142.3	165.4	115.0	113.4
8	166.5	182.4	171.9	248.1	191.2	142.2	123.6	.	139.8	160.7	115.0	109.7

Source: Energy prices shown on Table 39 adjusted for general price increase with GNP deflator.

Table 44. FRG. The Growth of Real Energy Prices by Groups of Fuels and Electricity, 1950-1978

Index Numbers, 1970=100

Year	GDP Deflator	Industry Sector Prices					Household Sector Prices					Transport Prices
		Total Energy	Solid Fuels	Natural Gas	Petroleum Products	Electri-city	Total Energy	Solid Fuels	Natural Gas	Petroleum Products	Electri-city	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	158.7	174.0	158.7	.	.	.	.	.	.
5	62.3	.	103.2	154.9	172.6	154.5	.	.	.	.	.	.
6	63.8	.	106.7	151.3	170.8	151.3	.	.	.	.	.	.
7	66.2	.	111.6	150.8	175.5	150.8	.	.	.	.	.	.
8	68.5	.	113.6	148.6	159.9	148.6	.	.	.	.	.	.
9	69.2	.	112.1	147.8	152.5	147.8	.	.	.	.	.	.
1960	71.1	.	109.0	144.0	151.8	144.8	.	.	.	.	.	.
1	74.1	.	104.6	137.7	136.4	137.7	.	.	.	.	.	.
2	77.2	.	102.2	131.3	140.2	131.3	.	.	.	.	.	.
3	79.6	.	101.6	126.8	134.9	126.8	.	.	.	.	.	.
4	81.3	.	102.1	124.0	122.5	124.0	.	.	.	.	.	.
5	84.7	.	102.8	120.8	113.0	120.8	.	.	.	.	.	.
6	87.7	.	99.2	.	108.7	117.4	.	.	.	.	.	.
7	88.8	.	98.1	.	119.1	116.0	101.9	.	.	.	.	.
8	90.1	.	91.6	113.4	113.7	112.5	106.3	.	.	.	.	123.6
9	93.4	.	91.2	107.6	103.0	107.0	102.5	93.8	107.5	101.4	106.5	114.7
1970	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	.	103.7	94.2	101.5	95.2	97.7	100.7	93.7	102.3	94.9	95.2
2	114.2	.	103.7	95.3	93.4	96.0	96.4	101.1	93.4	89.6	97.5	93.4
3	120.9	.	102.7	91.5	107.4	94.9	106.0	103.6	90.0	139.6	97.3	92.5
4	129.3	.	119.6	95.6	140.6	95.4	115.9	114.3	92.0	170.5	99.2	106.2
5	139.7	.	136.9	132.5	129.8	103.1	118.5	121.0	97.4	151.6	108.3	106.7
6	144.3	.	142.4	143.8	134.0	104.5	122.2	123.7	102.6	161.7	109.4	106.8
7	149.5	.	137.3	147.4	127.9	101.5	119.3	122.1	101.5	155.7	106.4	104.0
8	155.5	.	140.6	146.8	119.1	101.1	118.1	124.0	101.2	146.6	106.8	100.8

Source: Energy prices shown on Table 40, adjusted for general price increase with GDP deflator.

Table 45. France. The Growth of Real Energy Prices by Groups of Fuels and Electricity, 1950-1978

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	Natural Gas	Petroleum Products	Electricity	Regular Gasoline (1 January)
1950	38.0	.	.	.	.	.	.	.	.	.	.	.
1	39.3	.	.	.	.	.	.	.	.	.	.	.
2	43.7	.	.	.	.	.	.	.	.	.	.	.
3	45.9	121.6	.	.	133.6	134.4	.	.	.	.	.	.
4	46.7	119.9	.	.	131.9	132.1	.	.	.	.	.	.
5	47.4	118.6	104.2	.	132.9	128.9	.	.	.	.	.	.
6	49.6	117.3	100.8	.	131.9	122.8	.	.	.	.	.	.
7	52.6	123.4	101.7	.	150.2	114.4	.	.	.	.	.	.
8	62.2	114.6	97.9	164.0	139.2	102.9	.	.	.	.	.	.
9	64.4	122.7	106.8	184.2	141.3	115.8	.	.	.	.	.	.
1960	65.0	121.5	104.8	182.6	138.9	116.2	.	.	..	.	.	.
1	67.2	118.2	104.3	152.5	133.5	114.1	.	.	.	.	.	.
2	70.4	112.9	98.3	141.9	126.1	108.3	108.1	105.0	115.9	.	104.8	.
3	74.6	107.5	94.4	134.3	118.2	107.1	104.8	103.5	107.8	.	102.9	.
4	77.6	103.2	91.4	137.1	111.3	106.8	102.8	102.3	103.1	.	103.0	.
5	79.5	100.4	89.7	126.5	107.0	105.9	100.8	100.9	100.5	.	101.1	.
6	81.9	98.2	87.1	123.6	103.8	103.4	101.3	.	.	.	.	.
7	84.2	96.9	84.3	119.2	102.4	102.1	101.0	.	.	.	.	.
8	88.0	97.4	83.1	113.6	103.2	103.5	100.1	97.7	101.4	.	97.7	104.0
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
1	105.9	104.9	118.4	107.2	102.5	98.6	100.8	100.5	100.4	.	98.9	95.4
2	112.6	100.7	113.7	112.4	96.6	97.1	97.4	99.6	98.1	.	96.9	93.1
3	121.3	96.9	109.0	108.4	92.8	94.0	94.1	97.4	95.2	.	93.8	86.4
4	135.3	126.2	143.4	143.8	130.5	98.7	115.9	107.2	102.7	.	98.2	112.6
5	152.5	125.6	150.4	143.4	124.7	101.4	111.0	109.0	107.1	.	94.0	104.9
6	167.4	125.7	151.1	141.9	123.9	103.4	111.9	110.1	104.4	.	97.1	99.6
7	181.9	128.0	148.4	141.7	130.2	102.2	115.0	109.2	102.0	.	95.7	108.8
8	197.9	127.0	145.0	149.9	129.2	102.3	114.9	116.7	101.2	.	94.8	104.9

Source: Energy prices shown on Table 41 adjusted for general price increase, with GDP deflator.

Table 46. UK. The Growth of Real Energy Prices by Groups of Fuels and Electricity, 1950-1978

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	Natural Gas	Petroleum Products	Electricity	Regular Gasoline (1 January)
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	.	.	.	.	.	.
6	61.0	.	115.2	212.1	191.6	131.6	95.4	.	.	.	.	.
7	63.2	.	118.5	214.9	191.9	131.8	102.7	.	.	.	.	.
8	65.4	.	120.9	217.1	156.3	130.0	109.0	.	.	.	.	.
9	66.1	.	119.7	236.6	141.1	123.0	119.5	.	.	.	.	.
1960	66.1	.	122.2	215.6	134.5	121.0	119.5	.	.	.	.	.
1	68.3	.	122.5	212.2	119.8	123.4	116.3	.	.	.	.	.
2	70.8	.	122.3	209.0	128.7	121.3	112.3	88.0	115.4	.	.	.
3	72.5	.	119.4	204.4	118.8	120.7	110.6	89.4	114.9	.	.	.
4	74.7	108.4	115.9	198.1	107.9	116.5	107.2	88.4	115.8	.	.	.
5	78.5	110.1	110.3	186.2	95.9	115.9	101.7	87.3	111.2	.	.	.
6	82.1	109.4	107.3	180.0	97.0	114.7	97.9	91.7	109.3	.	.	.
7	84.5	108.6	100.7	173.8	109.5	114.2	96.6	92.8	107.1	.	.	.
8	88.2	106.8	93.1	167.3	114.6	111.7	97.2	93.1	109.8	.	.	95.9
9	93.1	103.4	89.8	139.0	107.4	105.8	99.5	92.8	108.3	.	105.4	101.0
1970	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	.	100.0	100.0
1	108.9	101.6	109.9	66.4	136.5	101.2	102.0	112.2	100.5	.	97.5	94.6
2	117.7	96.9	109.4	55.6	121.0	95.8	96.3	105.6	98.0	.	96.2	90.1
3	127.0	92.6	106.2	53.5	109.6	89.1	92.6	101.1	91.8	.	92.8	85.0
4	144.1	114.4	101.0	45.6	228.5	98.9	118.5	99.4	84.9	.	94.4	87.6
5	184.1	113.1	119.3	51.3	222.6	103.0	104.1	104.2	76.7	.	93.5	122.7
6	202.6	119.3	129.3	68.4	223.9	108.6	100.4	112.8	82.5	.	94.8	115.5
7	233.6	123.8	138.8	87.7	254.5	112.5	99.7	118.0	86.1	.	92.3	103.0
8	257.7	128.9	139.2	88.0	255.4	112.8	97.3	119.3	80.4	.	.	90.9

Source: Energy prices shown on Table 42 adjusted for general price increases with GDP deflator.

Table 47. Real Energy Prices for the Combined Industry, Household and Transportation Sectors in the USA, FRG, France and the UK, 1968-1978

Index numbers, 1970=100

	USA	FRG	France	UK
1968	104.9	.	101.6	105.0
1969	102.3	107.1	100.6	104.7
1970	100.0	100.0	100.0	100.0
1971	99.4	96.7	98.8	103.1
1972	98.1	95.1	98.4	98.1
1973	100.9	95.6	92.9	92.3
1974	122.1	110.1	118.2	105.8
1975	124.2	113.2	117.6	123.3
1976	126.6	115.9	113.0	127.4
1977	131.8	112.8	116.6	124.9
1978	129.6	110.8	117.1	.

Sources: Index numbers of real energy prices paid by the industry household and transportation sectors, 1968-1978 shown on Tables 43-46 for the USA, FRG, France and the UK, weighted by estimated energy payments for each category of fuel and electricity paid by the purchasing sectors in these countries. See Table 48 for estimated weights.

Note: FRG, France, UK household sector prices of petroleum products, see table on "Light, Medium Fuel Oil Prices Paid by the Industry Sector" in OECD Energy Statistics, 1975-1977.

Table 48. Weights assigned to Energy Consumption by Sectors in 1972 for the USA, FRG, France and the UK.

1. USA

	Industry	Domestic	Transport	Total
Coal	1.84	1.01	-	2.85
Oil	5.52	17.74	74.82	98.08
Gas	5.46	12.47	-	17.93
Electricity	15.67	30.61	-	46.28
Total	28.49	61.83	74.82	165.14

2. FRG

	Industry	Domestic	Transport	Total
Coal	1.73	2.04	-	3.77
Oil	2.40	2.82	10.84	16.06
Gas	0.63	3.85	-	4.48
Electricity	5.56	6.12	-	11.68
Total	10.32	14.83	10.84	35.99

3. France

	Industry	Domestic	Transport	Total
Coal	1.03	1.23	-	2.26
Oil	2.10	3.19	11.52	16.81
Gas	0.46	2.12	-	2.58
Electricity	2.73	3.96	-	6.69
Total	6.32	10.50	11.52	28.34

4. UK

	Industry	Domestic	Transport	Total
Coal	1.02	2.07	-	3.09
Oil	2.93	1.66	12.13	16.72
Gas	0.68	2.81	-	3.49
Electricity	3.88	5.25	-	9.13
Total	8.51	11.79	12.13	32.43

Table 49. Region III. EC Countries and Japan. Civilian Working Population, 1950--1975

Year	Belgium 10^3	Denmark 10^3	France 10^3	FRG 10^3	Ireland 10^3	Italy 10^3	Netherlands 10^3	UK 10^3	EC-Total (excl.Lux.) 10^3	Japan 10^3
1950	3597	1977	20000[E]	23022[E]	1254[E]	19384[E]	3745	22829	95808	35574[E]
1955	3555	2060	19048	25236	1198	19780	3853	23738	98468	38944[E]
1960	3564	2016	18951	26225	1109	20338	4069	23980	100252	45216
1965	3684	2204	19813	26565	1112	19530	4418	25075	102401	47870
1970	3735	2332	20750	26318	1110	19123	4641	24928	102937	51530
1975	3915	2453	21678	25872	1128	19472	4741	25459	104718	52820[P]

Sources: Compiled from EUROSTAT and OECD Statistics.

E = Estimated

P = Preliminary

Table 50. Estimates of Total Unemployment (France, Italy, UK); (all Sectors of the Economy) 1970-1976.

	France		Italy		United Kingdom		
	A) Unemployment Estimated in Connection with Working Population Estimates	B) Unemployment Based on Labor Market Data	A) Unemployment Estimated in Connection with Working Population Estimates (Sample Survey)	B) Unemployment Based on Labor Market Data	A) Unemployment Estimated in Connection with Working Population Estimates as of 30 June	B) Unemployment Based on Labor Market Annual Average a) All Job Seekers	B) Unemployment Based on Labor Market Annual Average b) Excluding Students and Persons Leaving School
	10^3	10^3	10^3	10^3	10^3	10^3	10^3
1970	356	262	609	888	555	612	602
1971	446	338	609	1038	724	792	776
1972	492	383	697	1048	804	876	855
1973	576	394	668	1005	575	619	611
1974	615	498	560	997	542	615	600
1975	914	840	654	1107	866	978	929
1976	.	933	.	1183	.	1360	.

Sources: A = EUROSTAT, Population and Employment 1950-1976, p. 64;

B = EUROSTAT, op. cit., p. 74, and OECD, Main Economic Indicators, 1960-1975.

Table 51. EC Countries and Japan. Unemployment (all Sectors of the Economy), 1950-1975

Year	Belgium	Denmark	France	FRG	Ireland	Italy	Netherlands	UK	EC Total excluding Luxemburg	Japan
	10^3	10^3	10^3	10^3	10^3	10^3	10^3	10^3	10^3	10^3
1950	184	55	250[E]	1869	45	1400[E]	80	290	4173	900[E]
1955	132	66	283	1074	62	1480	53	211	3361	1185
1960	117	31	233	271	63	836	50	326	1927	750
1965	63	26	269	147	51	714	36	299	1605	570
1970	69	17	356	149	65	609	56	555	1876	590
1975	168	120	914	1074	90	654	206	866	4092	1000[R]

E = Estimates; P = Preliminary; R = Revised.

Source: Compiled from EUROSTAT and OECD statistics.

Table 52. EC Countries and Japan. Hours of Work in Manufacturing Industries, 1950-1975

Years	Belgium	Denmark	France	FRG	Ireland	Italy	Netherlands	UK	EC Total (excl.Lux.)	Japan
1950	42.1[E]	45.0[E]	44.4	48.2	45.0	48.3[E]	48.8	47.4	47.1[E]	47.1
1955	42.2[E]	45.1[E]	44.7	48.8	45.1	48.3[E]	49.0	48.7	47.8[E]	48.4
1960	43.6[E]	45.1[E]	45.7	45.6	45.4	47.8[E]	48.5	47.4	46.6	47.8
1965	42.9	44.0[E]	45.6	44.1	44.0	45.6[E]	46.1	46.1	45.3	44.3
1970	39.9	42.7[E]	44.8	43.8	42.7	42.6	44.2	44.9	44.1	43.3
1975	34.8	41.3[E]	41.7	40.4	41.3	41.5	41.2	42.7	41.6	38.8

Sources: Based on ILO data published in the UN Statistical Yearbook and Monthly Bulletin of Statistics

Table 53. Selected European Countries. Hourly Earnings and Labor Costs in Manufacturing Industries, 1970-1975

	France		FRG		Italy		U.K.	
	Hourly Earnings	Hourly Labor Cost	Hourly Earnings	Hourly Labor Cost	Hourly Earnings	Hourly Labor Cost	Hourly Earnings	Hourly Labor Cost
	French Franc		D Mark		Lira		£	
1970	4.66	.	5.96	.	606	.	64.40	.
1971	5.18	.	6.66	.	703	.	72.00	.
1972	5.82	14.96	7.24	12.16	788	1702	82.10	.
1973	7.05	17.30	8.03	13.70	966	2020	92.90	106.45
1974	8.39	20.40	8.94	15.30	1209	2480	111.60	127.00
1975	9.82	23.90	9.69	16.70	1794	3040	139.90	163.00

Sources: Hourly earnings compiled from ILO - UN Statistics, i.e. UN Monthly Bulletin of Statistics; Hourly labour costs compiled from EUROSTAT

Table 54.

EC Countries and Japan. Hourly Earnings in Manufacturing Industries, 1970-1977

Index Numbers, 1970 = 100

	Belgium		Denmark		France		FRG		Ireland		Italy		Netherlands		UK		Japan	
	OECD	IIASA	OECD	IIASA	OECD	IIASA	OECD	IIASA	OECD	IIASA	OECD	IIASA	OECD	IIASA	OECD	IIASA	OECD **	IIASA
1970	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
1	111	114	114	115	111	111	113	112	116	116	113	116	112	111	112	112	114	115
2	126	130	129	129	124	124	123	121	133	132	125	130	126	127	128	128	132	134
3	147	151	153	149	141	151	135	135	159	162	155	159	143	144	144	144	163	168
4	178	189	186	179	169	180	151	150	191	196	191	199	169	168	169	173	205	222
5	210	216	222	210	198	210	165	163	245	260	241*	296	192	191	220	217	229	256
6	235	240	248	235	227	238	174	174	288	298	292*	407	208	208	264	242	258	277
7	256	.	273	.	.	.	187	.	.	.	374*	.	223	.	276	.	282	.

* = The OECD adjusted data were selected for the time series.

** = Monthly wage rates.

Sources: IIASA data represent data compiled from ILO statistics, published by the United Nations.
OECD data see Main Economic Indicators, April 1978.

Table 55. EC countries and Japan. Hourly Earnings in Manufacturing Industries, 1950-1976; National Values in Current Prices, Converted to US Dollars at 1969 Exchange Rates

Year	Belgium	Denmark	France	FRG	Ireland	Italy	Netherland	UK	EC	Japan
1950	0.47	0.43	0.15	0.35	0.23	0.23	0.25	0.40	0.30	0.13
1955	0.57	0.59	0.26	0.47	0.31	0.30	0.34	0.57	0.42	0.23
1960	0.69	0.76	0.38	0.70	0.39	0.37	0.49	0.77	0.59	0.31
1965	1.00	1.23	0.54	1.12	0.59	0.62	0.82	1.05	0.88	0.53
1970	1.45	2.23	0.84	1.62	1.02	0.97	1.33	1.55	1.31	1.07
1975	3.13	4.68	1.77	2.63	2.64	2.34[E]	2.54	3.36	2.61	2.74
1976	3.47	5.24	2.00	2.80	3.04	2.83[E]	2.77	3.74	2.91	2.97

E = Estimates

Source: Data based on ILO data in national currencies.

Table 56. Computer Tapes Underlying the H. Chenery Study Patterns of Development, 1950-1970

List of Variables.

The tape contains data on economic and social indicators covering 101 countries, for the period 1950-70.

Specifications of the tape as follows:

TRACK	BPI	LABEL	CHAR/REC	RECORDS/BLOCK
9	1600	I DATA	80 characters	100

This tape consists of data in the form of 13 card decks. The format and definitions of variables of each deck are listed below:

1. Deck No. 1 Column 79-80 contains 01.

Format (2F4.0, F8.0, F7.1, 5F9.4)
Variables (C, T, YPC, N, F, GDS, GDI, XPR, MPR)

Variables	Definition
C =	Country
T =	Time (T1 = 1950...T21 = 1970)
YPC =	GNP per capita in 1964 US$
N =	Population (million)
F =	Capital inflow (net imports of goods and services) as percent of GDP
GDS =	Gross domestic savings as percent of GDP
GDI =	Gross domestic investment as percent of GDP
XPR =	Total exports as percent of GDP
MPR =	Total imports as percent of GDP

2. Deck No. 2 Column 79-80 contains 02.

Format (2F4.0, F8.1, F7.1, 3F9.4)
Variables (C, T, YPC, N, F, PCN, GCN)

C,T,YPC,N,F	As above
PCN =	Private consumption as percent of GDP
GCN =	Government consumption as percent of GDP

3. Deck No. 3 Column 79-80 contains 03.

Format (2F.0, F8.1, F7.1, F8.4, 2F7.4)
Variables (C, T, YPC, N, F, TXR, GGR)

C,T,YPC,N,F	As above
TXR =	Tax revenue as percent of GDP
GGR =	Gross government revenue as percent of GDP

4. Deck No. 4 Column 79-80 contains 04.

Format (2F4.0, F8.1, F7.1, 5F9.4)
Variables (C, T, YPC, N, F, PRI, IND, UTL, SER)

C,T,YPC,N,F As above
PRI = Primary output (agr. & mining) as percent of GDP
IND = Industrial output (maunf. & construction) as percent of GDP
UTL = Utilities (elect., gas & water, transp. & communications incl. storage) as percent of GDP
SER = Service output as percent of GDP

5. Deck No. 5 Column 79-80 contains 05.

Format (2F4.0, F8.1, F7.1, 2F9.4)
Variables (C, T, YPC, N, F, FCS)

C,T,YPC,N,F As above
FCS = Food consumption as percent of GDP

6. Deck No. 6 Column 79-80 contains 06.

Format (F4.0, F8.0, F7.1, F7.2, F8.4, 4F6.4)
Variables (C, T, YPC, N, F, XPR, PRIEXP, INDEXP, SEREXP)

C,T,YPC,N,F,
XPR As above
PRIEXP = Primary exports as percent of GDP
INDEXP = Manufactured exports as percent of GDP
SEREXP = Service exports as percent of GDP

7. Deck No. 7 Column 79-80 contains 07.

Format (2F4.0, F8.1, F7.1, F8.4, 2F6.1)
Variables (C, T, YPC, N, F, DR, BR)

C,T,YPC,N,F As above
DR = Crude death rate
BR = Crude birth rate

8. Deck No. 8 Column 79-80 contains 08.

Format (2F4.0, F7.1, F6.1, F7.4, F5.1, 2F4.0, F3.0, F6.1)
Variables (C, T, YPC, N, F, BR, URB, SCHEN, ALF, IMR)

C,T,YPC,N,F,
BR As above
URB = Urban as percent of total population
SCHEN = Primary and secondary school enrollment ratio
ALF = Primary share of labor force (agriculture and mining)
IMR = Infant mortality rate

9. Deck No. 9 Column 79-80 contains 09.

Format (2F4.0, F8.1, F7.1, 2F9.4)
Variables (C, T, YPC, N, F, EDEXP)

C,T,YPC,N,F As above
EDEXP = Eduation expenditure by government as percent of GDP

10. Deck No. 10 Column 79-80 contains 10.

Format (2F4.0, F8.1, F7.1, 2F9.4)
Variables (C, T, YPC, N, F, SCHEN)

C,T,PYC,N,F,
SCHEN As above

11. Deck No. 11 Column 79-80 contains 11.

Format (2F4.0, F7.4, 4F8.4, F7.4)
Variables (C, T, ALF, ILF, SLF, YPC, F, N)

C,T,ALF,YPC,
F,N As above
ILF = Industrial share of labor force (manuf. and constr.)
SLF = Service labor force (all other sectors)

12. Deck No. 12 Column 79-80 contains 12.

Format (2F4.0, F8.1, F7.1, 2F9.4)
Variables (C, T, YPC, N, F, URB)

C,T,YPC,N,F,
URB As above

13. Deck No. 13 Column 79-80 contains 13.

Format (2F4.0, F8.1, F7.1, 3F6.3, 4F7.4)
Variables (C, T, YPC, N, LOW, MED, HIGH, PRI, IND, UTL, SER)

C,T,YPC,N,PRI,
IND,UTL,SER As above
LOW = Income share of lowest 40%
MED = Income share of middle 40%
HIGH = Income share of highest 20%.

KEY TO COUNTRIES

Country	Code	Country	Code
1. Afghanistan	AF	51. Lebanon	LE
2. Algeria	AL	51. Liberia	LBR
3. Angola	AN	53. Libya	LBY
4. Argentina	AR	54. Malagasy	MAG
5. Australia	AU	55. Malawi	MAI
6. Austria	AUA	56. Malaysia	MA
7. Belgium	BE	57. Mali	MLI
8. Bolivia	BO	58. Mexico	ME
9. Brazil	BR	59. Morocco	MOR
10. Burma	BA	60. Mozambique	MOZ
11. Cambodia	CB	61. Netherlands	NE
12. Cameroon	CM	62. New Zealand	NZ
13. Canada	CAN	63. Nicaragua	NI
14. Central African Republic	CA	64. Niger	NIR
15. Ceylon	CE	65. Nigeria	NGA
16. Chad	CD	66. Norway	NO
17. Chile	CH	67. Pakistan	PAK
18. China (Taiwan)	CHA	68. Panama	PAN
19. Colombia	CO	69. Papua	PNG
20. Congo (Zaire)	CON	70. Paraguay	PA
21. Costa Rica	CR	71. Peru	PE
22. Dahomey	DA	72. Philippines	PH
23. Denmark	DE	73. Portugal	PO
24. Dominican Republic	DO	74. Puerto Rico	PR
25. Ecuador	EC	75. Rhodesia	RHO
26. El Salvador	ES	76. Saudi Arabia	SAU
27. Ethopia	ET	77. Senegal	SE
28. Finland	FI	78. Sierra Leone	SL
29. France	FR	79. Singapore	SI
30. Germany	GE	80. Somalia	SO
31. Ghana	GH	81. South Africa	SA
32. Greece	GR	82. Spain	SP
33. Guatemala	GU	83. Sudan	SU
34. Guinea	GUI	84. Sweden	SWE
35. Haiti	HA	85. Switzerland	SWI
36. Honduras	HO	86. Syria	SYR
37. Hong Kong	HK	87. Tanzania	TA
38. India	IN	88. Thailand	TH
39. Indonesia	IND	89. Togo	TO
40. Iran	IRN	90. Tunisia	TUN
41. Iraq	IRQ	91. Turkey	TU
42. Ireland	IRE	92. Uganda	UG
43. Israel	IS	93. U.A.R.	UAE
44. Italy	IT	94. U.K.	UK
45. Ivory Coast	IVC	95. U.S.A.	USA
46. Jamaica	JM	96. Upper Volta	UV
47. Japan	JA	97. Uruguay	UR
48. Jordan	JO	98. Venezuela	VE
49. Kenya	KE	99. Vietnam Republic	VN
50. Korea	KO	100. Yugoslavia	YU
		101. Zambia	ZA

PART THREE:

BIBLIOGRAPHICAL REFERENCES

[1] Energy Systems Program. Energy in a Finite World-A Global Systems Analysis. International Institute for Applied Systems Analysis, Laxenburg, Austria. Forthcoming.

[2] Chenery, H. Patterns of Development 1950-1970. Oxford University Press, 1975.

[3] United Nations Statistical Yearbook. New York. Various issues.

[4] United Nations Monthly Bulletin of Statistics. New York.

[5] United Nations. Population by Sex and Age for Regions and Countries 1950-2000. ESA/P/WP.60, February 1976. New York.

[6] Keyfitz, N. Projected Population 1975-2075 at Five Year Intervals for World, Male and Female. Sent to IIASA with letter of April 7, 1977.

[7] United Nations. Global Review of Human Settlements. Statistical Annex A/Conf.70/A1/1 Add.1. Pergamon Press. New York, 1976.

[8] United Nations. Compendium of Housing Statistics 1972-1974. New York, 1976.

[9] Häfele, W., and W. Sassin. The Global Energy System. In Annual Review of Energy. Vol.2, no.10, 1977.

[10] United Nations. World Energy Supplies 1950-1974 and later issues. New York.

[11] Darmstadter, J. Energy in the World Economy. Resources for the Future. Johns Hopkins Press, Baltimore, 1977.

[12] US Department of Commerce. Statistical Abstract of the United States. Various issues. Washington DC.

[13] Schilling, H.D. and R. Hildebrandt. Primärenergie, Elektrische Energie. In Rohstoffwirtschaft International, Vol.6, Verlag Glückauf, Essen, 1977.

[14] Smil, V. China's Energy. Praeger, New York, 1976.

[15] EUROSTAT. Quarterly Bulletin of Energy Statistics. Luxembourg. Various issues.

[16] World Bank Atlas. Washington DC, 1977.

[17] United Nations. Yearbook of National Accounts Statistics. New York. Current and earlier issues.

[18] EUROSTAT. National Accounts Aggregates 1950-1976. Luxembourg, 1978.

[19] OECD. Main Economic Indicators, Historical Statistics 1955-1971. Paris 1973 and 1960-1975 Paris 1976 and Main Economic Indicators Quarterly Accounts.

[20] World Bank. World Tables 1976. Johns Hopkins University Press, Baltimore and London, 1976.

[21] Doblin, C. Capital Formation, Capital Stock and Capital Output Ratios. RM-78-70. International Institute for Applied Systems Analysis, Laxenburg, Austria, 1978.

[22] US Department of Labor, BLS, Office of Economic Growth. Forthcoming study on Investments and Capital Stocks for Approximately 170 Industries 1947-1975. Data printouts to be made available upon request to the Office of Economic Growth, Washington DC.

[23] EUROSTAT. National Accounts Detailed Tables 1970-1976. Luxembourg, 1978.

[24] UN Economic Commission for Europe. New Issues Affecting the Energy Economy of the ECE in the Medium and Long-Term (preliminary version of January 1978). ECE (XXXIII)/2 and addenda. Geneva 1978.

[25] FRG Statistisches Jahrbuch 1979 and earlier issues. Bonn.

[26] OPEC. Annual Statistical Bulletin 1977, Vienna, 1978.

[27] EUROSTAT. A Comparison of Fuel Prices: Oil, Coal, Gas 1955-1970. Special Number 1. Luxembourg, 1974.

[28] EUROSTAT. Fuel Oil Prices 1960-1974. Special Number 2. Luxembourg, 1974.

[29] Doblin, C. Data Provided for W.D. Nordhaus Study: The Demand for Energy. RM-76-18. International Institute for Applied Systems Analysis, Laxenburg, Austria, 1976.

[30] OECD. Energy Statistics 1975-1977. Paris, 1979.

[31] Council of Economic Advisers. Economic Report of the President, January 1979. Government Printing Office, Washington DC, 1979.

[32] US Department of Energy. Monthly Energy Review. April 1979.

[33] US Department of Commerce. Survey of Current Business. Various issues.

[34] US Department of Labor, BLS. Monthly Labor Review.

[35] Statistisches Bundesamt. Fachserie 17, Reihe 2. Index der Grundstoffpreise. Wiesbaden. Various issues.

[36] Statistisches Bundesamt. Fachserie 17, Reihe 3. Index der Erzeugerpreise. Wiesbaden. Various issues.

[37] Statistisches Bundesamt. Fachserie 17, Reihe 7. Preise und Preisindizes für die Lebenshaltung. Wiesbaden. Various issues.

[38] INSEE. Annuaire Statistique de la France 1976 and earlier issues.

[39] INSEE. Bulletin Mensuel de Statistique. Paris. Various issues.

[40] UK Statistical Abstract. Her Majesty's Printing Office, London. Various issues.

[41] UK Digest of UK Energy Statistics. Her Majesty's Printing Office, London. Various issues.

[42] Hogan, W. Dimension of Energy Demand. Harvard University, Cambridge, Massachusetts. Draft paper, July 1979.

[43] EUROSTAT. Population and Employment 1950-1976. Luxembourg, 1978.

[44] OECD. Labor Force Statistics 1962-1973. Paris, 1976.

[45] OECD. Main Economic Indicators 1960-1975. Paris 1976.

[46] ILO. Statistical Yearbook. Geneva. Various issues.

[47] ILO. Bulleting of Labor Statistics. Geneva. Various issues.

[48] EUROSTAT. Hourly Earnings 1974-1976. Luxembourg. Various issues.