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TIME-SERIES DATA ON END-USERS CONSUMPTION OF ENERGY
AND ENERGY PRICES IN IRELAND, 1960 to 1988

by

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Introduction

There are several partially overlapping sources of information on energy consumption and energy prices. These include Booth (1966, 1967), OECD (1974, 1975, 1976) and the Department of Transport and Power, now the Department of Energy. However, anyone who has tried to reconcile some of the divergent figures, to produce a twenty or thirty year time series, knows that at best they can only obtain an approximate picture.

This memorandum describes such an attempt. The time-series presented here cover the period 1960 to 1988 for consumption of fuel by end-user and corresponding prices. The fuels are broken down into the five main categories, coal, turf, oil, electricity and gas (including LPG). Measurement of "end-users" consumption means that fuels delivered to other fuel processors are excluded, e.g., turf in the production of briquettes or gas used in electricity production. Fuels for non-energy use, such as feedstock for NET, are also excluded. Prices are measured inclusive of indirect taxes and dealers' margins where relevant.

Owing to scarce resources for searching out data on prices, the aim in this work has been the calculation of

broadly representative prices. Total coverage was not justifiable under the circumstances. For example, for most years, the price of Dublin Gas is used for the price of gas until the arrival of natural gas when a weighted average of Dublin Gas prices and Bord Gais industrial prices was used. Another example is where one series of data ceased to be available and another took over. If, as is usually the case, the observations for overlapping years differ, then rates of change would be derived from the earlier series and joined on at a year in which the levels or growth rates in the two series were most similar. In general it is the growth rate that is of most importance for the type of analysis which would be applied to these data, and the growth rates which emerge should be reasonable.

The information given in this memorandum is in the following order:

- Equivalence and conversion factors.
- Indirect taxes.
- Consumption of fuels and fuel shares.
- Prices of fuels and real prices.

Equivalence and Conversion Factors

Definition: 1TOE = 10^7 Kcal = 397 therms = 41,868 G.Joules
= 11.62K Kwh

Coal	1 tonne	=	0.665 TOE
Sod peat	1 tonne	=	0.313 TOE
Briquettes	1 tonne	=	0.443 TOE
Motor gasoline	1 tonne	=	1.0650 TOE
Gas/Diesel oil	1 tonne	=	1.0344 TOE
Fuel oil	1 tonne	=	0.9849 TOE
Natural gas	10^5 cu.ft.	=	2.5448 TOE
Towngas (pre natural gas)	10^5 cu.ft.	=	1.20 TOE
LPG	428 galls. = 1 tonne	=	1.1263 TOE
Electricity	100 Kwh	=	0.086 TOE

Abbreviations

K = kilo = 1000

LPG = Liquid Petroleum Gas

TOE = tonnes of oil equivalent

cal = calorie

wh = watt-hour

Indirect Taxes: Turnover Tax, Value-Added Tax, and LPG Excise Tax.¹

Year	Date	Coal, Turf, Gas	Electricity	Motor Spirit	LPG, Gas Oil	Fuel Oil	LPG Excise	
							Date	Tax
							Per cent	p/gall
1960		0	0	0	0	0		0
1		⋮	⋮	⋮	⋮	⋮		⋮
2		⋮	⋮	⋮	⋮	⋮		⋮
3	1/11	2.5625	2.5625	2.5625	2.5625	2.5625		⋮
4		⋮	⋮	⋮	⋮	⋮		⋮
5		⋮	⋮	⋮	⋮	⋮		⋮
6		⋮	⋮	⋮	⋮	⋮		⋮
7		⋮	⋮	⋮	⋮	⋮		⋮
8		⋮	⋮	⋮	⋮	⋮		⋮
9		⋮	⋮	⋮	⋮	⋮		⋮
1970	1/5	5.263	5.263	5.263	5.263	5.263		⋮
1		⋮	⋮	⋮	⋮	⋮		⋮
2		⋮	⋮	⋮	⋮	⋮		⋮
3	3/9	6.75	6.75	6.75	6.75	6.75		⋮
4		⋮	⋮	⋮	⋮	⋮		⋮
5	1/7	0	0	6.75	0	0		⋮
6	1/3	⋮	⋮	10.0	⋮	⋮	28/1	2
7		⋮	⋮	⋮	⋮	⋮		⋮
8		⋮	⋮	⋮	⋮	⋮		⋮
9		⋮	⋮	⋮	⋮	⋮		⋮
1980		⋮	⋮	⋮	⋮	⋮	27/2	7
1	1/9	0	0	15	0	0		7
2	1/5	⋮	⋮	18	⋮	⋮		⋮
3	1/5	5	(1/3)	23	5	5	9/2	8
4		⋮	⋮	⋮	⋮	⋮		⋮
5	1/3	10	⋮	23	10	10		⋮
6	1/3	⋮	⋮	25	⋮	⋮		⋮
7		⋮	⋮	⋮	⋮	⋮	20/1	17
8	1/3	⋮	5	⋮	⋮	⋮		⋮
9		⋮	⋮	⋮	⋮	⋮		⋮

1. Excise tax is already included in the prices quoted for motor spirit, gas oil and fuel oil so no adjustment need be made and the details are not entered here.

End-Users Consumption of Fuel

Two sources are available to cover the period 1960 to 1988. *Energy in Ireland* goes back as far as 1972 so that OECD data has to be used at least up until that date. The problem is to choose a suitable year for the change of source. In 1974 the two sources give similar figures:

(K TOE)	Coal	Turf	Oil	Gas	Electricity	Total
OECD	455	575	3,792	215	548	5,585
Energy in Ireland	466	571	3,775	218	551	5,581

such that we use *Energy in Ireland* figures from 1974 on and OECD before that year.

The OECD data were converted into TOE using their own conversion factors as follows:

1 tonne hard coal	=	0.65 TOE
1 tonne peat	=	0.3 TOE
10 ⁹ Kcal Towngas	=	100 TOE
1 tonne LPG	=	1.125 TOE
1 tonne motor & aviation gas	=	1.128 TOE
1 tonne jet fuel	=	1.13 TOE
1 tonne kerosene	=	1.1 TOE
1 tonne diesel oil	=	1.095 TOE
1 tonne gas oil + fuel oil (unfortunately combined)	=	1.02 TOE (approx.)

The category headed *Total Internal Final Consumption* was used, less *Consumption by Energy Sector*. As only commercial peat is given, hand won peat had to be added from information

of Agricultural Output in the Irish Statistical Bulletins.

The following are the tables and category headings in *Energy in Ireland* from which figures were extracted for 1974 onwards:

Coal	Directly consumed	Table 3.1
Peat	Directly consumed	Table 2.1 plus
Briquettes	Gross consumptions	Table 2.2
Oil	Total of Oil Sales	Table 4.1
Gas	Total	Table 6.1
Electricity	Total	Table 5.2

All consumption figures are gross of stocks held by end-users as there is no information on stocks held by households or firms. It is possible that stocks increased as a precautionary measure in the few years after each oil crisis, that is in 1974 and 1975 and again in 1980 and 1981. Figures for those years might correspondingly overstate actual consumption. Price elasticities might be underestimated accordingly.

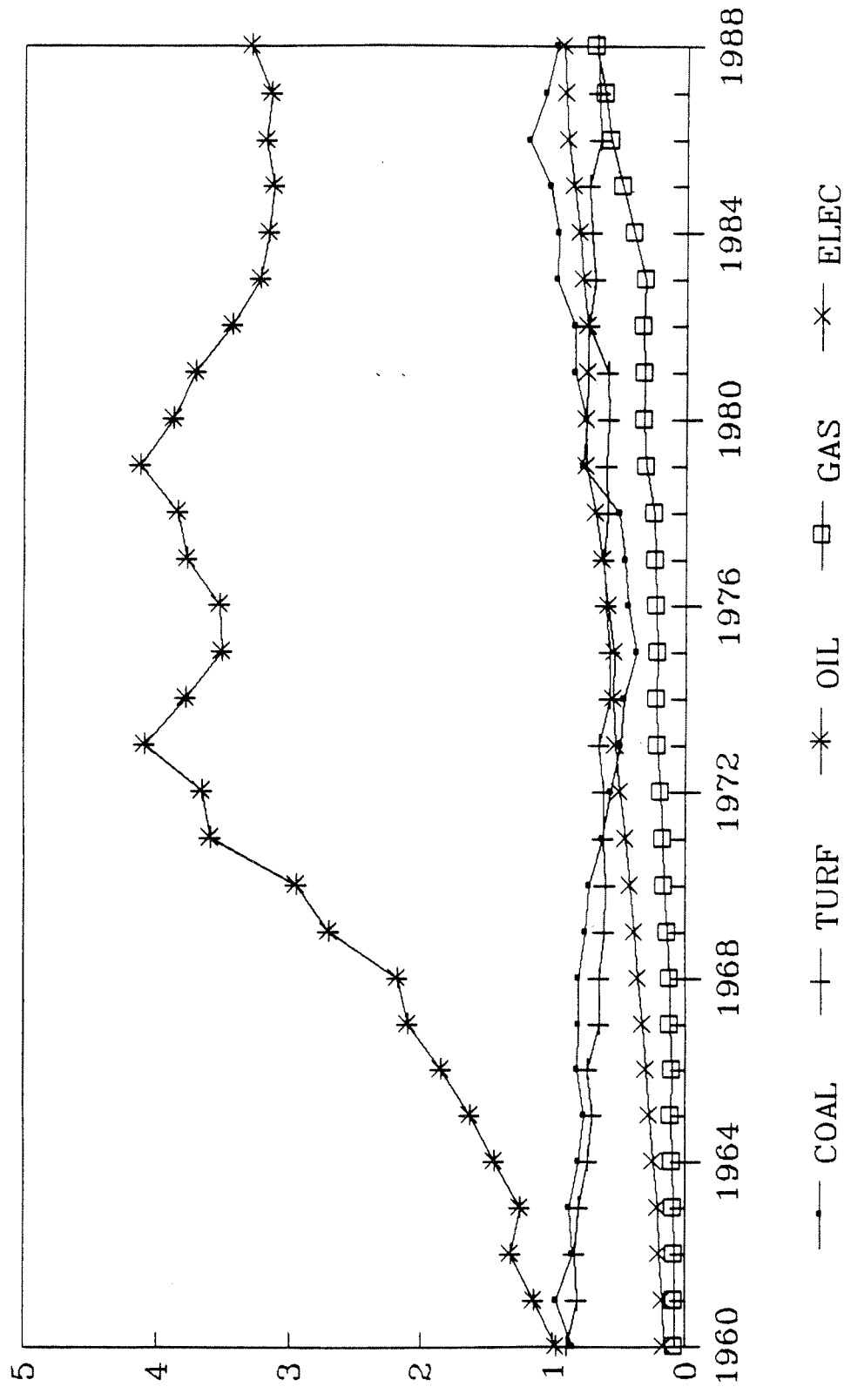
End-Users Consumption of Fuel in MTOE

	COAL	TURF	OIL	GAS	ELECTRICITY	TOTAL
1960	0.85	0.89	0.97	0.08	0.16	2.9
1961	0.97	0.81	1.14	0.08	0.17	3.2
1962	0.85	0.83	1.31	0.08	0.19	3.3
1963	0.87	0.80	1.24	0.09	0.20	3.2
1964	0.80	0.73	1.44	0.10	0.24	3.3
1965	0.76	0.70	1.62	0.10	0.26	3.4
1966	0.81	0.73	1.84	0.10	0.29	3.7
1967	0.80	0.64	2.10	0.12	0.32	4.0
1968	0.80	0.64	2.18	0.11	0.35	4.1
1969	0.75	0.61	2.70	0.14	0.38	4.6
1970	0.72	0.60	2.95	0.16	0.41	4.8
1971	0.63	0.62	3.59	0.17	0.45	5.5
1972	0.56	0.62	3.65	0.19	0.49	5.5
1973	0.49	0.65	4.09	0.21	0.53	6.0
1974	0.47	0.57	3.78	0.22	0.55	5.6
1975	0.37	0.57	3.50	0.21	0.54	5.2
1976	0.43	0.60	3.52	0.22	0.58	5.4
1977	0.46	0.62	3.77	0.23	0.63	5.7
1978	0.50	0.59	3.84	0.24	0.68	5.8
1979	0.78	0.60	4.12	0.30	0.75	6.6
1980	0.75	0.58	3.87	0.31	0.75	6.3
1981	0.84	0.59	3.71	0.32	0.74	6.2
1982	0.84	0.73	3.43	0.33	0.74	6.1
1983	0.97	0.69	3.22	0.31	0.78	6.0
1984	0.96	0.71	3.16	0.40	0.80	6.0
1985	1.02	0.73	3.12	0.48	0.85	6.2
1986	1.18	0.65	3.18	0.57	0.89	6.5
1987	1.06	0.66	3.14	0.62	0.91	6.4
1988	0.98	0.68	3.29	0.68	0.93	6.6

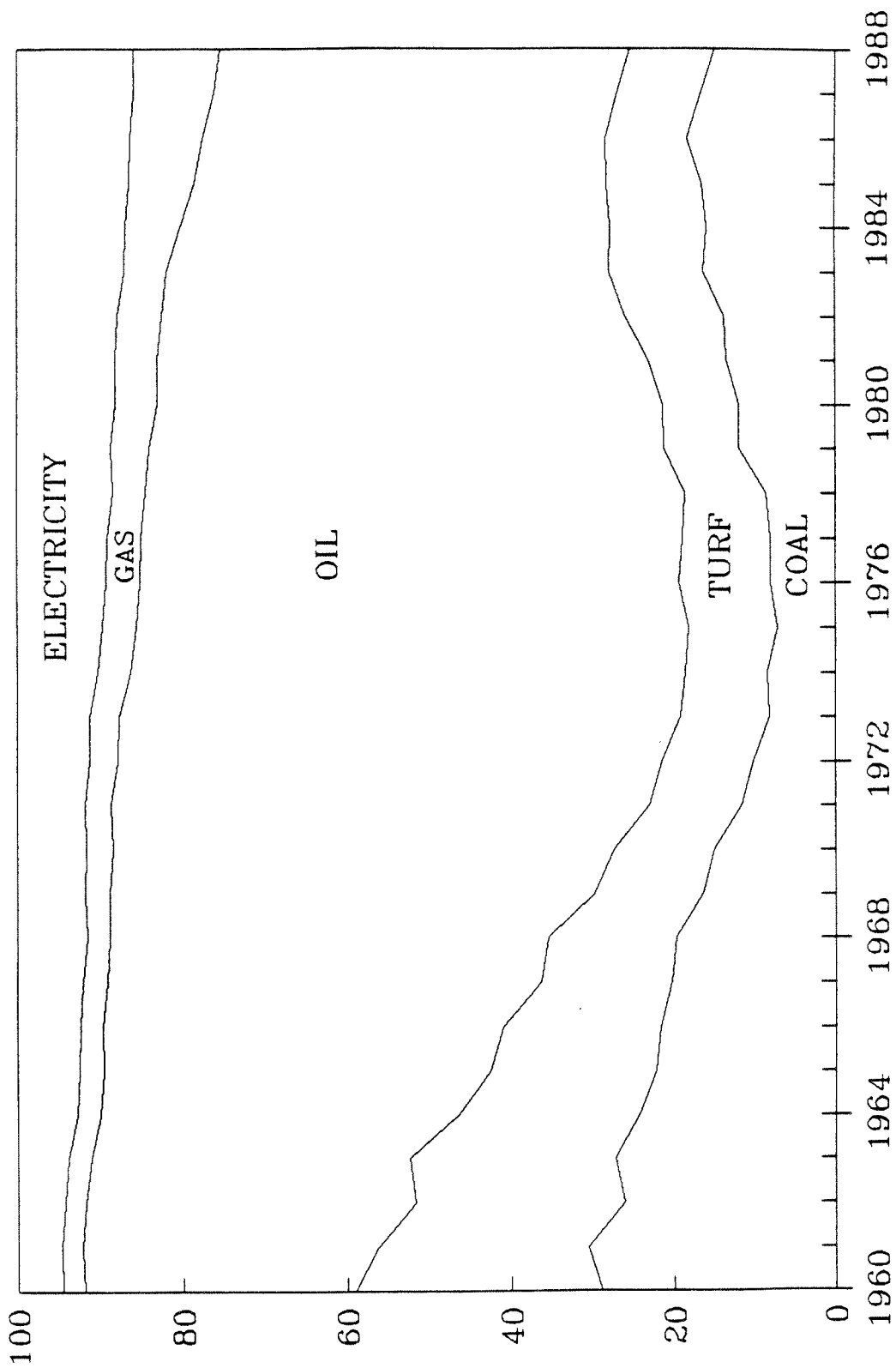
Shares of each Fuel in Total End-Users Consumption. %

	COAL	TURF	OIL	GAS	ELECTRICITY	TOTAL
1960	28.8	30.2	32.9	2.7	5.4	100.00
1961	30.6	25.5	36.0	2.6	5.4	100.00
1962	26.1	25.4	40.2	2.5	5.8	100.00
1963	27.2	25.0	38.8	2.8	6.3	100.00
1964	24.2	22.1	43.6	2.9	7.3	100.00
1965	22.1	20.3	47.1	3.0	7.6	100.00
1966	22.1	19.9	50.1	0.0	7.9	100.00
1967	20.1	16.1	52.8	2.9	8.0	100.00
1968	19.6	15.7	53.4	2.7	8.6	100.00
1969	16.4	13.3	59.0	3.0	8.3	100.00
1970	14.9	12.4	61.0	3.3	8.5	100.00
1971	11.5	11.4	65.8	3.1	8.2	100.00
1972	10.2	11.3	66.3	3.4	8.9	100.00
1973	8.2	10.9	68.5	3.6	8.9	100.00
1974	8.4	10.2	67.6	3.9	9.8	100.00
1975	7.1	11.0	67.5	4.0	10.4	100.00
1976	8.0	11.2	65.8	4.1	10.8	100.00
1977	8.1	10.9	66.0	4.0	11.0	100.00
1978	8.6	10.1	65.7	4.0	11.6	100.00
1979	11.9	9.2	62.9	4.6	11.4	100.00
1980	12.0	9.3	61.8	5.0	12.0	100.00
1981	13.6	9.5	59.9	5.1	11.9	100.00
1982	13.8	12.0	56.6	5.4	12.2	100.00
1983	16.3	11.6	54.0	5.1	13.1	100.00
1984	15.9	11.8	52.4	6.6	13.3	100.00
1985	16.4	11.8	50.3	7.8	13.7	100.00
1986	18.2	10.0	49.2	8.8	13.8	100.00
1987	16.6	10.3	49.1	9.7	14.2	100.00
1988	14.9	10.4	50.1	10.4	14.2	100.00

END-USERS CONSUMPTION OF FUELS (MTOE)



SHARES OF FUELS IN END-USEERS CONSUMPTION (PERCENT)



Prices of Fuels at End-Use

Coal: Data kindly supplied by CSO entitled "Coal Price Index as derived from CPI data" were used for 1960 to 1970. Coverage is limited to domestic purchases, which were 84 per cent of end-use purchases. For 1971 on, prices per tonne were obtained from Bord na Mona who collect data on competing fuels.

Peat: Bord na Mona supplied data for 1960 to 1964, thereafter up to 1971 the price of sales of machine turf to "others" (that is not to the ESB) was derived from the Annual Reports for 1969/70 onwards. They are measured on a financial year basis. Finally these prices were converted to growth rates to be grafted on to the succeeding data at 1971. For 1971 on, prices charged to end-users were obtained from Bord na Mona of two representative products, bagged peat and briquettes. These were weighted by their respective quantities given in *Energy in Ireland* (roughly 75 and 25 per cent).

Petroleum: The prices of (premium) motor spirit, gas oil and (medium) fuel oil were weighted by their respective sales to give an aggregate petroleum price. These three products represent about 90 per cent of petroleum sales.

Prices were supplied by a major oil company. The numerous price changes required that the price be weighted by the number of months during which that price was charged. Ideally, monthly sales should have been used to allow for seasonal fluctuations in sales.

Annual quantities weights to aggregate the three fuels' prices were derived from Booth (II Table 15 and III Table 10) for 1960 to 1963. For 1972 to 1988 quantity weights can be derived from *Energy in Ireland*. For the intervening years, 1964 to 1971, a smooth interpolation was used. The proportions derived from OECD's *Statistics of Energy 1959-1975* shows that this procedure was reasonable, although the fuels' breakdown was not quite comparable.

Gas: This consists of two categories, LPG and piped gas. Car gas at 7 per cent of LPG sales has not been treated separately. For 1960 to 1966, for LPG the price changes of butane imports were used. LPG price changes in the domestic market in Dublin can be derived for 1966 to 1975 from an internal report of the Department. We have national average prices for all LPG sales from 1976 onwards supplied in confidence by a representative supplier.

The average price of piped gas sales in Dublin for 1960 to 1977 were supplied by Dublin gas. From 1978 the market is split into "premium" (i.e., potential gas-oil users) and "non-premium". With the help of Dublin Gas and Bord Gais, prices and quantities of each category were obtained to yield an overall piped gas price.

The prices of LPG and piped gas were then combined to give an overall gas price. Quantity weights were taken from OECD for 1960 to 1971 and from *Energy in Ireland* for 1972 to 1988.

Electricity: "Units sold to customers" and "Revenue from electricity sales" are given in the appendices to ESB annual reports. An average price per unit sold can thus be calculated. Data refer to financial years and are converted to calendar years pro rata time.

Prices of Fuels at End-use, £ per TOE

	COAL	TURF	OIL	GAS	ELECTRICITY
1960	10.9	17.0	34.5	47.1	101.3
1961	12.1	17.2	33.9	46.6	102.3
1962	13.0	18.4	32.2	47.8	101.3
1963	14.0	18.6	31.6	48.3	100.2
1964	15.4	18.6	33.0	49.5	100.6
1965	15.3	18.9	33.4	49.3	98.0
1966	15.3	20.3	33.9	52.4	98.2
1967	15.8	21.4	34.4	51.0	99.6
1968	16.5	21.4	35.3	52.1	101.8
1969	17.7	21.2	35.0	53.1	105.4
1970	20.2	23.2	35.2	54.2	109.7
1971	22.7	25.8	39.7	57.9	117.9
1972	27.5	27.5	40.4	62.8	127.1
1973	29.6	30.1	41.6	67.5	142.1
1974	50.4	36.9	68.3	100.7	205.2
1975	55.8	46.8	93.8	125.0	250.6
1976	58.2	50.0	119.1	138.8	286.3
1977	76.5	57.0	135.9	161.9	324.2
1978	83.9	63.4	136.5	170.2	327.3
1979	96.4	78.2	162.5	180.2	387.0
1980	126.6	103.3	239.6	269.0	528.3
1981	153.5	124.2	313.2	348.0	662.7
1982	163.0	157.4	376.8	366.8	759.2
1983	165.0	174.2	436.2	376.5	823.6
1984	184.5	176.8	459.0	351.2	864.4
1985	220.2	202.8	484.8	338.1	893.0
1986	212.9	220.2	386.8	245.7	883.1
1987	203.3	227.4	395.5	228.7	815.1
1988	208.6	226.2	382.8	206.2	804.2

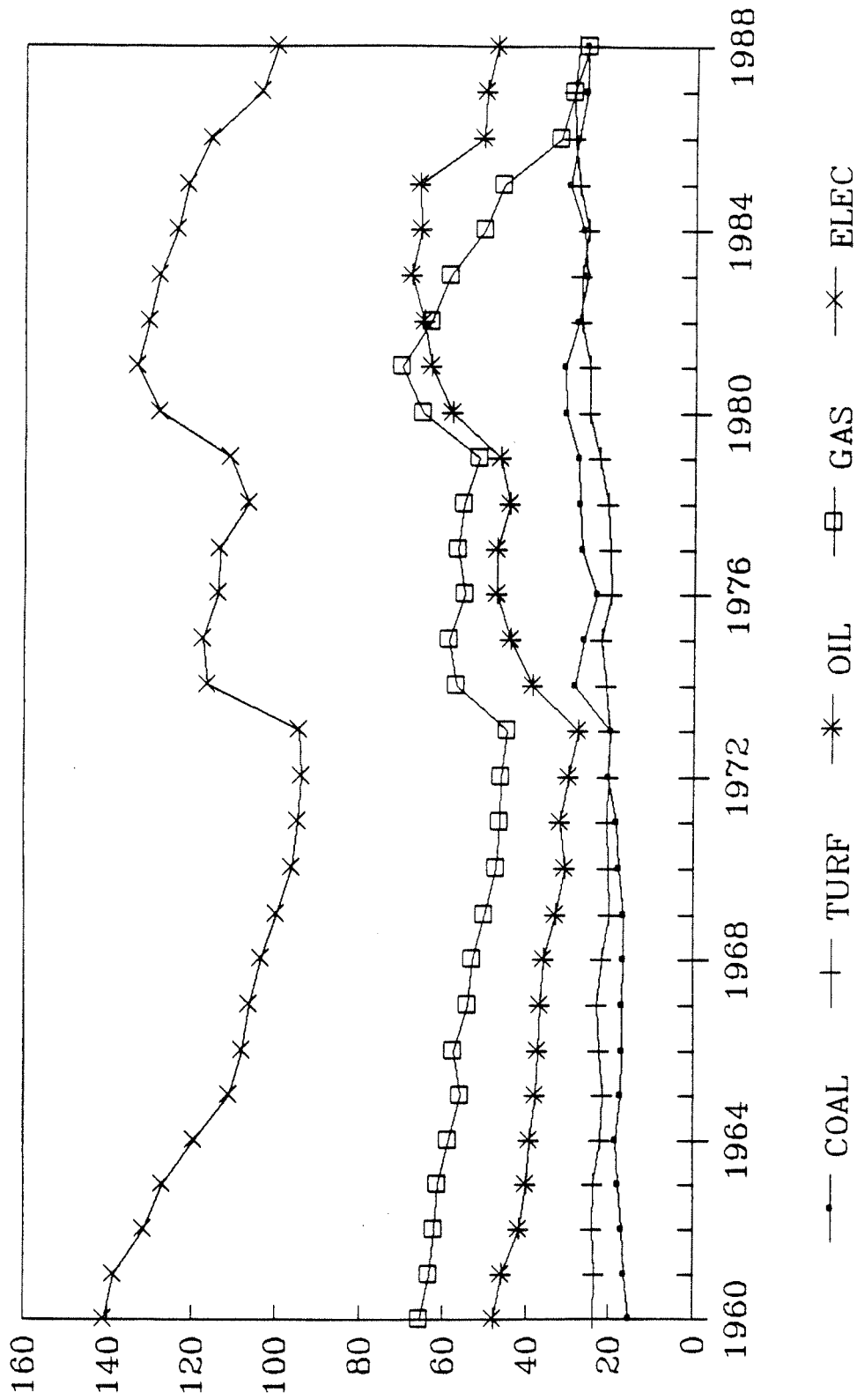
Real Prices of Fuels at End-Use (Mid Nov. 1968 prices)
 (prices from the previous table were deflated by the CPI,
 base Mid November 1968 = 100)

	COAL	TURF	OIL	GAS	ELECTRICITY
1960	15.2	23.6	48.0	65.5	140.9
1961	16.4	23.3	45.9	63.1	138.6
1962	16.9	23.9	41.8	62.1	131.6
1963	17.7	23.6	40.1	61.2	127.0
1964	18.3	22.1	39.2	58.8	119.5
1965	17.3	21.4	37.8	55.8	110.9
1966	16.8	22.3	37.3	57.6	107.9
1967	16.8	22.8	36.6	54.3	106.1
1968	16.8	21.7	35.9	52.9	103.5
1969	16.7	20.1	33.1	50.2	99.7
1970	17.7	20.3	30.8	47.4	95.9
1971	18.2	20.7	31.9	46.5	94.6
1972	20.3	20.3	29.8	46.4	93.9
1973	19.6	20.0	27.6	44.8	94.2
1974	28.6	20.9	38.7	57.1	116.3
1975	26.2	22.0	44.0	58.6	117.5
1976	23.1	19.9	47.3	55.2	113.8
1977	26.8	19.9	47.5	56.6	113.4
1978	27.3	20.6	44.4	55.3	106.4
1979	27.7	22.4	46.6	51.7	111.1
1980	30.7	25.1	58.2	65.3	128.3
1981	30.9	25.0	63.1	70.2	133.6
1982	28.1	27.1	64.9	63.1	130.7
1983	25.7	27.1	68.0	58.7	128.3
1984	26.5	25.4	65.9	50.4	124.0
1985	30.0	27.6	66.0	46.0	121.5
1986	27.9	28.9	50.7	32.2	115.7
1987	25.9	28.9	50.3	29.1	103.7
1988	25.9	28.1	47.6	25.7	100.0

Weighted Price of Total Fuels at End-Use

	Weighted Price of total fuels £ per TOE	Real Weighted price of total fuels Mid Nov. 1968 prices	CPI Mid Nov. 1968 = 100
1960	26.38	36.69	71.9
1961	26.96	36.53	73.8
1962	28.10	36.50	77.0
1963	28.31	35.88	78.9
1964	30.95	36.76	84.2
1965	31.81	35.98	88.4
1966	32.71	35.94	91.0
1967	34.30	36.53	93.9
1968	35.60	36.18	98.4
1969	36.71	34.73	105.7
1970	38.41	33.58	114.4
1971	43.17	34.65	124.6
1972	46.10	34.05	135.4
1973	49.21	32.63	150.8
1974	78.33	44.40	176.4
1975	103.50	48.55	213.2
1976	125.40	49.84	251.6
1977	144.37	50.50	285.9
1978	148.18	48.16	307.7
1979	173.43	49.78	348.4
1980	249.49	60.57	411.9
1981	317.07	63.93	496.0
1982	366.90	63.16	580.9
1983	409.40	63.79	641.8
1984	428.76	61.52	696.9
1985	452.60	61.59	734.8
1986	394.21	51.66	763.1
1987	389.83	49.60	786.0
1988	381.90	47.49	804.1

REAL PRICES OF FUELS AT END-USE (MID-NOV 1968 PRICES)



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