

ENERGY CONSUMPTION DATA BASE
VOLUME III, CHAPTER 4, PART 1
SMALL INDUSTRIES
SIC 20-25, 27, 30-32, 34-39
FINAL REPORT

Prepared for: FEA

OFFICE OF ENERGY INFORMATION
AND ANALYSIS
CONSUMPTION STUDIES DIVISION

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4.1 Small Industries

a. Summary

(1) Stone, Clay, and Glass Products (SIC 32)

The largest industry covered under the minor industries is Stone, Clay, and Glass Products. As a whole, this industry consumed 1.2 quads of the nation's energy in 1974. Within this 2-digit industry group, five specific industries accounted for over two-thirds of the energy consumed. Hydraulic cement (SIC 3241) consumed 35 percent while Glass Containers was the second largest consumer with 11 percent of the energy. The other three industries, consuming from 6 to 8 percent of the total, are listed in order of importance:

• SIC 3274	Lime	7.4%
• SIC 3273	Ready-mix Cement	6.6%
• SIC 3251	Brick and Structural Clay	6.3%

The other 33 percent of the energy consumed is distributed among the remaining 19 smaller 4-digit industries.

The primary fuel used in SIC 32 is natural gas, consuming 53 percent of the total energy consumed. The second largest fuel consumed is coal which accounts for 18 percent of the consumption. Due to the limited availability of natural gas, coal is becoming increasingly more popular as an energy source. Also, the nature of cement manufacturing is such that most of the ash and particulates created by coal combustion can be fed back into the cement process. Electricity and all fuel oil account for most of the remaining 29 percent of energy consumed (see Figure III-4.11).

Most of the energy in SIC 32 is consumed as direct heat. In Cement, SIC 3241, direct heat in the form of kilns accounts for 85 percent of all the energy consumed. In the glass industry, most energy is spent in the melting process (50%), and in the lime manufacturing process, over 75 percent of the energy is consumed in the calcining process.

For the total industry, the direct heat accounts for over 55 percent of the energy consumed. Machine Drive comprises an additional 43 percent of the energy. Space heat and other uses (air conditioning, process steam) comprise the remaining 2 percent of energy use (see Figure III-4.12).

For the most part, fuel types are fairly consistent along functional use lines. Petroleum products are used mainly for direct heat, and electricity is used for machine drive. Notable exceptions are the glass industry, where electricity is used to "boost" melting, and the ready-mix cement industry, where diesel fuel and gasoline are used primarily for machine drive and transportation in delivery mixing trucks.

Figure III-4.11 Fuel Type Distribution in SIC 32 - 1974

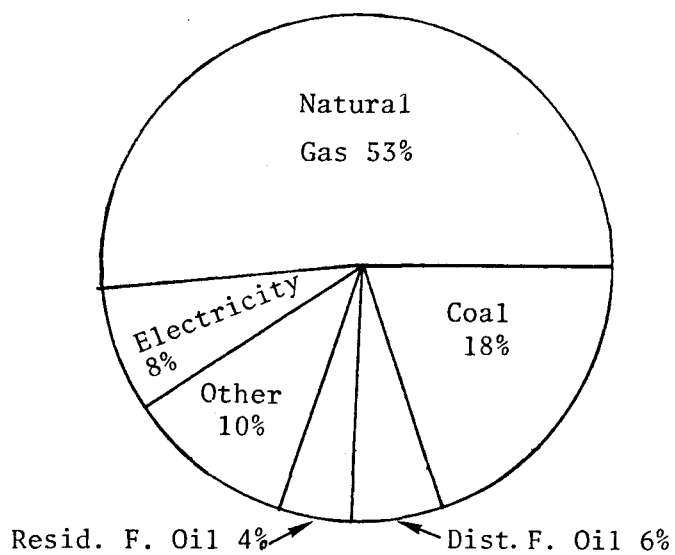
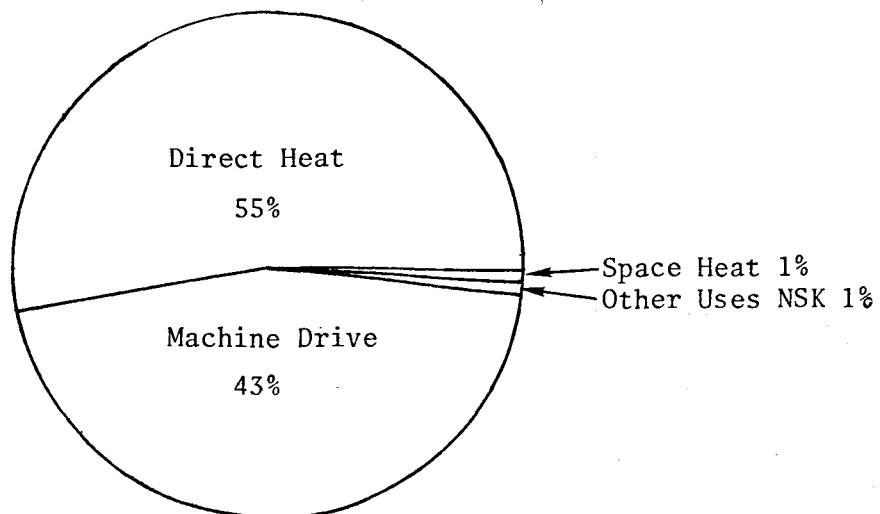


Figure III-4.12 Functional Use Breakdown of SIC 32 - 1974



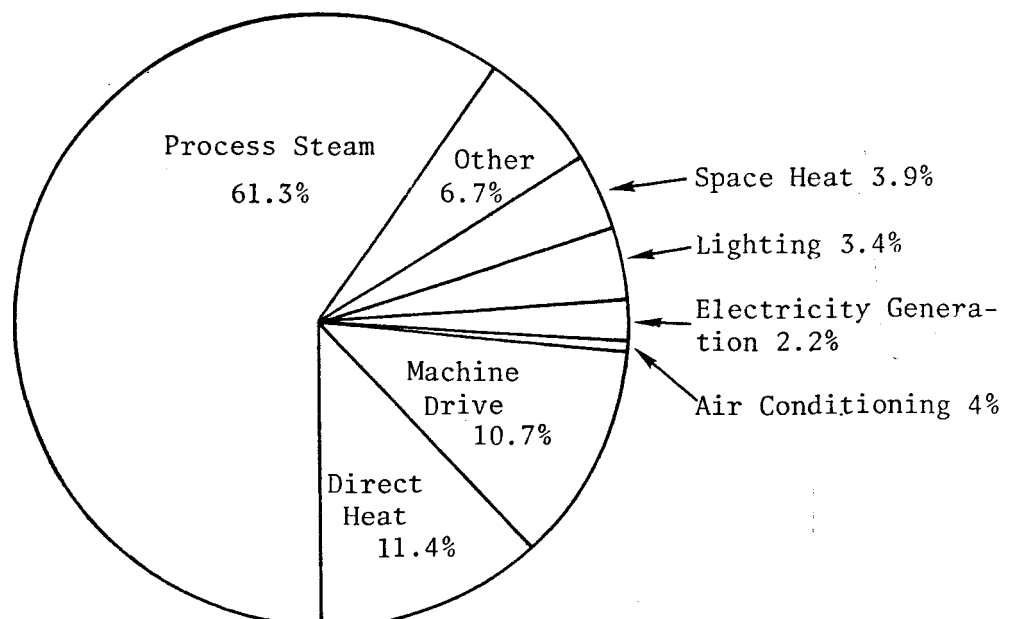
(2) Food and Kindred Products (SIC 20)

Food and Kindred Products (SIC 20) uses 7 percent of the total energy for all 2-digit industrial groups. In 1974, its energy consumption was about 960 trillion Btu's.

The major fuels consumed in the industry are natural gas, purchased electricity, and coal. According to Census data, the importance of coal has been diminishing over the past 7 years, declining from 15 percent to 8 percent of the total fuels used. Electricity on the other hand, has increased in use from 9 percent in 1967 to 13 percent in 1974. Natural gas and total fuels have remained fairly constant, increasing in 1971 and decreasing slightly in 1974. Table 4.11 outlines the shift in fuels used from 1967 to 1974.

Process Steam accounts for the major amount of fuel used in SIC 20. Process Steam consumed 61.3 percent of the primary fuels used in the industry. Direct heat and machine drive each consume about 11 percent of the remaining fuels (See Figure 4.13). Electricity generation is a minor use (2%), with space heating, air conditioning, and lighting making up the balance of energy consumed in SIC 20.

Figure III-4.13 Functional Uses in Food and Kindred Products - 1974



(3) Textile Mill Products (SIC 22)

The Textile Mill Product Industry (SIC 22) consumed approximately 400 trillion Btu's of energy in 1974. The industry is concentrated in the South Atlantic Region which accounts for 59 percent of production according to Census of Manufactures value added shares. The energy consumption in the South Atlantic Region corresponds closely to production, consuming 61 percent of the total energy in SIC 22 in 1974.

However, the industry varies quite dramatically within the SIC grouping. The range of industries classified as Textile Mill Products are listed below:

- | | |
|-------------------------------|------------------|
| • Weaving mills | SIC 22, 222, 223 |
| • Knitting mills | SIC 225 |
| • Textile finishing | SIC 226 |
| • Floor covering mills | SIC 227 |
| • Yarns and Thread mills | SIC 228 |
| • Miscellaneous Textile goods | SIC 229 |

Those industries classified primarily as dry processes, e.g. knitting mills, rely heavily on electrical power. The wet processes, e.g. yarns and thread mills, consume primarily petroleum products and natural gas for steam raising and direct heat. Most industries are a mix of wet and dry processes and consume a mix of all fuel types.

Natural gas is the major fuel used in the total industry group, accounting for 26 percent of the energy consumed in 1974. Electricity provided an additional 23 percent and other petroleum products and coal each provided between 5 and 10 percent of the energy used in textile mills. Figure 4.14 outlines the distribution of fuels in 1974.

Functional uses correspond closely to fuel types. The major uses of electricity, machine drive and air conditioning consume 14 and 10 percent of the energy, respectively. Process steam consumes the greatest proportion of all fuels requiring 53 percent of the energy used in the industry. Minor fuel uses (under 10 percent) are direct heat, space heat, lighting and electricity generation as shown in Figure 4.15.

Figure III-4.14 Fuel Type Distribution in Textile Mill Products (SIC 22)

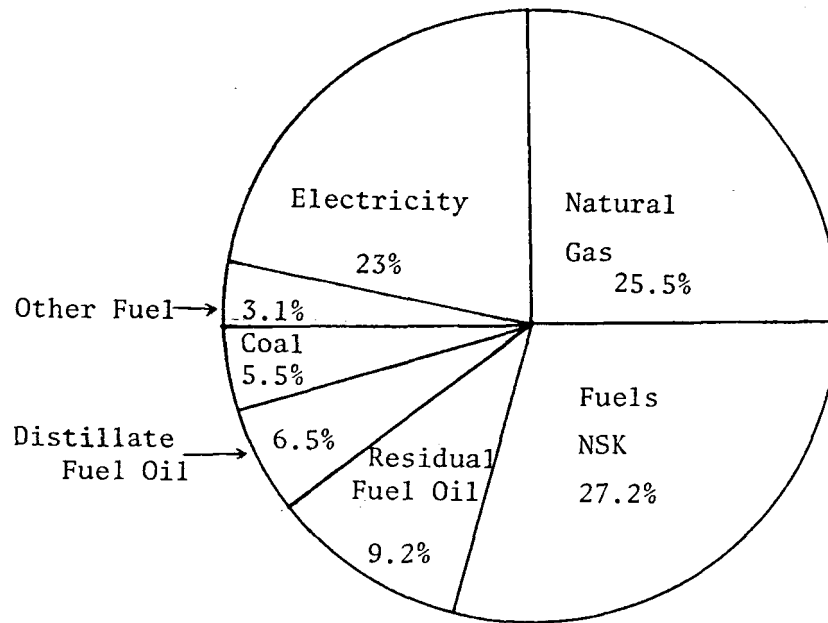
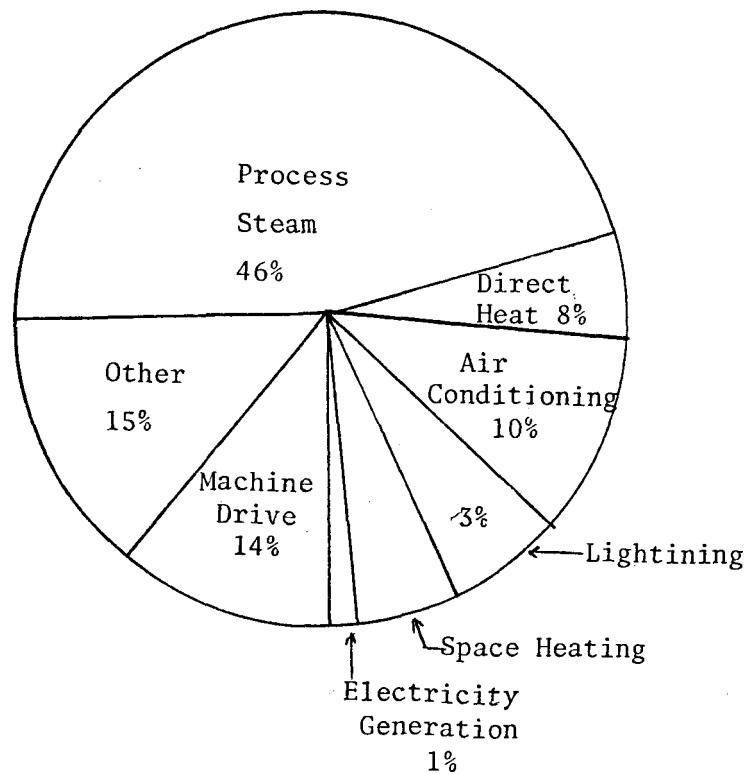


Figure III-4.15 Functional Use Breakdown for Textile Mill Products (SIC 22)



b. Data Base Consumption and Expenditure Data

The following tables represent a more detailed example of the data contained in the data base but are by no means exhaustive. For a complete description of the data available, refer to Volume II, the ECDB User's Manual.

Among the data displayed in this section are regional consumption by industry, year, and fuel type (Table III-4.11), total U.S. Btu consumption according to fuel type and functional use for Food and Kindred Products (SIC 20), Textile Mill Products (SIC 22), and Stone, Clay, and Glass (SIC 32) (Table III-4.12), and regional expenditures for energy used by industry, year, and fuel type. The designation "-1" which occurs in these tables indicates that the data is not available.

Table III-4.11 Regional Distribution of Fuels Used in Small Industries by SIC Code - 1967, 1971, 1974

SIC 20 Food & Kindred	YR	NO.	MID.	SO.	E.N.	E.S.	W.N.	W.S.	MIN.	PAC.	U.S.
		EAST	ATL.	ATL.	CEN.	CEN.	CEN.	CEN.			
COAL THOU TONS	67	6.	479.	205.	3088.	467.	1841.	0.	445.	69.	6600.
	71	4.	324.	138.	2085.	315.	1243.	0.	301.	46.	4456.
	74	0.	82.	26.	1216.	119.	1583.	0.	0.	0.	3026.
COKE THOU TONS	67	0.	0.	0.	4.	0.	16.	0.	21.	15.	56.
	71	0.	0.	0.	12.	0.	44.	0.	57.	40.	153.
	74	0.	0.	0.	53.	0.	0.	0.	0.	0.	53.
DIST. OIL THOU BAR	67	596.	2950.	1338.	1020.	164.	918.	102.	253.	754.	8095.
	71	801.	3969.	1800.	1372.	221.	1235.	137.	341.	1014.	10891.
	74	841.	2824.	2194.	2423.	661.	1403.	129.	264.	725.	11464.
RES. OIL THOU BAR	67	1254.	2761.	2024.	2266.	129.	845.	54.	102.	1001.	9439.
	71	1312.	2888.	2117.	3324.	135.	884.	57.	107.	1047.	9872.
	74	970.	3993.	2201.	3579.	265.	878.	17.	3.	610.	10415.
NAT. GAS BILL CF	67	3.	25.	26.	78.	15.	61.	46.	29.	63.	346.
	71	5.	35.	35.	108.	21.	85.	63.	40.	86.	478.
	74	4.	24.	37.	12.	30.	88.	56.	31.	78.	461.
ELECTRI. BILL KWH	67	1.	3.	3.	6.	1.	3.	2.	1.	3.	24.
	71	2.	5.	4.	8.	2.	5.	3.	1.	4.	34.
	74	1.	6.	5.	9.	2.	5.	4.	2.	5.	37.
OTH. ENRGY TRILL BTU	67	9.	33.	26.	50.	10.	19.	10.	4.	26.	187.
	71	8.	28.	22.	43.	9.	17.	8.	3.	22.	161.
	74	5.	23.	16.	23.	5.	14.	5.	5.	28.	123.
TOT. FUEL TRILL BTU	67	28.	116.	90.	222.	42.	147.	76.	54.	124.	899.
	71	31.	130.	101.	249.	47.	165.	86.	61.	140.	1011.
	74	24.	111.	90.	222.	53.	176.	76.	44.	133.	935.

Table 4.11 - (Continued) SIC 21 - Tobacco Manufactures

CONSUMPTION IN TRADITIONAL UNITS

	YR	NO. EAST	MID. ATL.	SO. ATL.	E.N. CEN.	E.S. CEN.	W.N. CEN.	W.S. CEN.	MTN.	PAC.	U.S.
COAL	67	0.	0.	314.	0.	20.	0.	0.	0.	0.	334.
THOU TONS	71	0.	0.	163.	0.	10.	0.	0.	0.	0.	173.
	74	0.	0.	210.	0.	11.	0.	0.	0.	0.	221.
COKE	67	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
THOU TONS	71	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	74	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
DIST. OIL	67	0.	0.	226.	0.	4.	0.	0.	0.	0.	231.
THOU BAR	71	0.	0.	198.	0.	4.	0.	0.	0.	0.	201.
	74	0.	76.	108.	0.	0.	0.	0.	0.	0.	190.
RES. OIL	67	0.	0.	181.	0.	10.	0.	0.	0.	0.	191.
THOU BAR	71	0.	0.	476.	0.	25.	0.	0.	0.	0.	503.
	74	0.	0.	559.	0.	0.	0.	0.	0.	0.	648.
NAT. GAS	67	0.	0.	2.	0.	1.	0.	0.	0.	0.	3.
BILL CF	71	0.	0.	2.	0.	2.	0.	0.	0.	0.	4.
	74	0.	0.	2.	0.	2.	0.	0.	0.	0.	4.
ELECTRI.	67	0.	0.	1.	0.	0.	0.	0.	0.	0.	1.
BILL KWH	71	0.	0.	1.	0.	0.	0.	0.	0.	0.	1.
	74	0.	0.	1.	0.	0.	0.	0.	0.	0.	1.
UTH. ENRGY	67	0.	0.	2.	0.	1.	0.	0.	0.	0.	3.
TRILL BTU	71	0.	0.	2.	0.	0.	0.	0.	0.	0.	2.
	74	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
TOT. FUEL	67	0.	0.	16.	0.	3.	0.	0.	0.	0.	19.
TRILL BTU	71	0.	0.	15.	0.	3.	0.	0.	0.	0.	18.
	74	0.	1.	14.	0.	3.	0.	0.	0.	0.	19.

Table 4.11 - (Continued) SIC 22, Textile Mill Products

	YR	NO. EAST	MID. ATL.	SOU. ATL.	E.N. CEN.	E.S. CEN.	W.N. CEN.	W.S. CEN.	MTN.	PAC.	U.S.
COAL THOU TONS	67	8.	57.	1813.	20.	78.	1.	0.	0.	0.	1975.
	71	6.	44.	1418.	15.	61.	0.	0.	0.	0.	1546.
	74	0.	23.	802.	37.	24.	0.	0.	0.	0.	886.
COKE THOU TONS	67	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	71	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	74	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
DIST. OIL THOU BAR	67	331.	401.	841.	8.	88.	6.	1.	0.	0.	1676.
	71	919.	1112.	2334.	21.	243.	16.	2.	0.	0.	4648.
	74	566.	965.	2679.	106.	139.	0.	0.	0.	12.	4466.
RES. OIL THOU BAR	67	1749.	1187.	2178.	34.	49.	1.	16.	0.	0.	5215.
	71	2199.	1492.	2737.	43.	62.	2.	20.	0.	0.	6554.
	74	1592.	888.	3269.	0.	91.	0.	0.	0.	0.	5836.
NAT. GAS BILL CF	67	2.	3.	39.	2.	7.	0.	1.	0.	1.	55.
	71	3.	6.	71.	3.	13.	0.	3.	0.	2.	101.
	74	4.	5.	68.	5.	14.	0.	3.	0.	0.	99.
ELECTRI. BILL KWH	67	1.	2.	15.	0.	2.	0.	0.	0.	0.	20.
	71	1.	2.	18.	0.	3.	0.	0.	0.	0.	25.
	74	1.	2.	20.	0.	3.	0.	0.	0.	0.	27.
OTH. ENRGY TRILL BTU	67	16.	24.	38.	6.	8.	1.	0.	0.	4.	97.
	71	9.	14.	22.	3.	5.	1.	0.	0.	2.	55.
	74	6.	9.	18.	2.	3.	0.	0.	0.	0.	38.
TOT. FUEL TRILL BTU	67	32.	39.	200.	7.	28.	1.	3.	0.	4.	315.
	71	30.	43.	223.	6.	31.	1.	4.	0.	5.	351.
	74	28.	33.	211.	10.	29.	1.	5.	0.	1.	317.

Table 4.11 - (Continued) SIC 23 - Apparel

CONSUMPTION IN TRADITIONAL UNITS

	YR	NO. EAST	MID. ATL.	SO. ATL.	E.N. CEN.	E.S. CEN.	W.N. CEN.	W.S. CEN.	MTN.	PAC.	U.S.
COAL THOU TONS	67	0.	7.	81.	15.	1.	4.	0.	0.	0.	109.
	71	0.	10.	110.	21.	2.	5.	0.	0.	0.	147.
	74	0.	8.	18.	10.	1.	2.	0.	0.	0.	39.
COKE THOU TONS	67	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	71	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	74	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
DIST. OIL THOU BAR	67	31.	376.	118.	32.	9.	20.	0.	0.	118.	704.
	71	42.	507.	160.	43.	12.	27.	0.	0.	159.	950.
	74	53.	407.	140.	75.	49.	12.	0.	0.	1.	736.
RES. OIL THOU BAR	67	9.	68.	21.	37.	16.	5.	0.	0.	0.	155.
	71	12.	92.	28.	50.	21.	7.	0.	0.	0.	209.
	74	29.	167.	28.	4.	0.	0.	0.	0.	0.	228.
NAT. GAS BILL CF	67	0.	1.	2.	3.	2.	1.	0.	0.	0.	10.
	71	0.	2.	3.	4.	3.	1.	0.	0.	1.	14.
	74	0.	2.	3.	3.	2.	1.	1.	0.	1.	15.
ELECTRI. BILL KWH	67	0.	1.	1.	1.	0.	0.	0.	0.	0.	4.
	71	0.	2.	1.	1.	1.	0.	0.	0.	0.	6.
	74	0.	2.	1.	0.	1.	1.	1.	0.	1.	7.
OTH. ENRGY TRILL BTU	67	4.	15.	4.	4.	4.	3.	0.	0.	2.	36.
	71	3.	11.	3.	3.	3.	2.	0.	0.	1.	26.
	74	1.	7.	5.	1.	2.	1.	0.	0.	0.	18.
TOT. FUEL TRILL BTU	67	4.	22.	13.	11.	8.	4.	0.	0.	4.	67.
	71	5.	23.	14.	11.	9.	5.	0.	0.	4.	71.
	74	3.	28.	15.	9.	8.	5.	4.	2.	3.	65.

Table 4.11 - (Continued) SIC 24 - Lumber

CONSUMPTION IN TRADITIONAL UNITS

	YR	NO. EAST	MID. ATL.	SO. ATL.	E.N. CEN.	E.S. CEN.	W.N. CEN.	W.S. CEN.	MTN.	PAC.	U.S.
COAL THOU TONS	67	0.	2.	4.	229.	5.	22.	0.	0.	6.	267.
	71	0.	1.	3.	158.	3.	15.	0.	0.	4.	184.
	74	0.	10.	0.	24.	4.	0.	0.	0.	0.	113.
COKE THOU TONS	67	0.	0.	0.	0.	0.	0.	0.	0.	0.	-1.
	71	0.	0.	0.	0.	0.	0.	0.	0.	0.	4.
	74	0.	0.	0.	0.	0.	0.	0.	0.	0.	-1.
DIST. OIL THOU BAR	67	324.	105.	722.	224.	95.	18.	43.	114.	832.	2477.
	71	720.	232.	1604.	498.	210.	40.	95.	254.	1848.	5501.
	74	46.	354.	931.	191.	984.	32.	131.	194.	1525.	5861.
RES. OIL THOU BAR	67	193.	33.	360.	22.	20.	10.	4.	33.	431.	1106.
	71	152.	26.	283.	17.	16.	8.	3.	26.	339.	870.
	74	31.	49.	437.	29.	51.	0.	27.	5.	423.	1318.
NAT. GAS BILL CF	67	0.	2.	3.	5.	16.	0.	11.	3.	13.	54.
	71	1.	3.	4.	7.	21.	1.	15.	3.	17.	71.
	74	0.	3.	8.	6.	15.	2.	11.	3.	16.	71.
ELECTRI. BILL KWH	67	0.	0.	1.	1.	1.	0.	1.	1.	3.	7.
	71	0.	1.	2.	1.	1.	0.	1.	1.	4.	11.
	74	0.	1.	2.	1.	2.	0.	1.	1.	5.	15.
OTH. ENRGY TRILL BTU	67	3.	8.	27.	6.	8.	2.	7.	6.	27.	94.
	71	3.	7.	26.	5.	8.	2.	6.	6.	26.	90.
	74	6.	6.	16.	5.	7.	3.	10.	2.	26.	85.
TOT. FUEL TRILL BTU	67	8.	12.	39.	19.	29.	3.	22.	12.	60.	203.
	71	10.	14.	47.	23.	34.	3.	26.	14.	72.	243.
	74	7.	14.	40.	17.	35.	7.	27.	9.	74.	253.

Table 4.11 - (Continued) SIC 25 - Furniture

CONSUMPTION IN TRADITIONAL UNITS

	YR	NO. EAST	MID. ATL.	SO. ATL.	E.N. CEN.	E.S. CEN.	W.N. CEN.	W.S. CEN.	MTN.	PAC.	U.S.
COAL	67	10.	23.	98.	64.	3.	0.	0.	0.	0.	198.
THOU TONS	71	11.	26.	112.	73.	3.	0.	0.	0.	0.	225.
	74	0.	17.	72.	23.	1.	0.	0.	0.	0.	113.
COKE	67	0.	0.	-1.	0.	0.	0.	0.	0.	0.	-1.
THOU TONS	71	0.	0.	9.	0.	0.	0.	0.	0.	0.	9.
	74	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
DIST. OIL	67	13.	41.	27.	16.	6.	0.	0.	0.	0.	103.
THOU BAR	71	72.	230.	155.	89.	34.	0.	0.	0.	0.	580.
	74	37.	204.	418.	135.	68.	11.	0.	0.	6.	879.
RES. OIL	67	31.	48.	26.	43.	0.	0.	1.	0.	0.	148.
THOU BAR	71	74.	117.	63.	104.	0.	0.	2.	0.	0.	360.
	74	57.	47.	194.	45.	55.	0.	0.	0.	0.	398.
NAT. GAS	67	0.	0.	0.	1.	0.	0.	0.	0.	0.	2.
BILL CF	71	0.	2.	2.	8.	2.	1.	2.	0.	1.	19.
	74	0.	2.	5.	8.	4.	1.	1.	0.	2.	24.
ELECTRI.	67	0.	0.	1.	1.	0.	0.	0.	0.	0.	2.
BILL KWH	71	0.	1.	1.	1.	0.	0.	0.	0.	0.	4.
	74	0.	1.	1.	1.	0.	0.	0.	0.	1.	4.
OTH. ENRGY	67	3.	7.	7.	6.	2.	1.	2.	0.	2.	30.
TRILL BTU	71	2.	4.	4.	3.	1.	0.	1.	0.	1.	17.
	74	1.	3.	2.	1.	1.	0.	0.	0.	1.	9.
TOT. FUEL	67	3.	9.	11.	14.	4.	1.	3.	0.	3.	47.
TRILL BTU	71	4.	11.	14.	18.	5.	2.	4.	0.	4.	60.
	74	2.	9.	16.	15.	8.	2.	2.	0.	4.	59.

Table 4.11 - (Continued) SIC 27 - Printing, Publishing

CONSUMPTION IN TRADITIONAL UNITS

	YR	NO. EAST	MID. ATL.	SO. ATL.	E.N. CEN.	E.S. CEN.	W.N. CEN.	W.S. CEN.	MTN.	PAC.	U.S.
COAL THOU TONS	67	0.	1.	0.	30.	0.	1.	0.	0.	0.	33.
	71	0.	1.	0.	16.	0.	0.	0.	0.	0.	18.
	74	0.	0.	0.	10.	0.	0.	0.	0.	0.	16.
COKE THOU TONS	67	0.	0.	0.	0.	0.	0.	0.	0.	0.	-1.
	71	0.	0.	0.	0.	0.	0.	0.	0.	0.	-1.
	74	0.	0.	0.	0.	0.	0.	0.	0.	0.	-1.
DIST. OIL THOU BAR	67	65.	229.	20.	152.	0.	31.	0.	0.	0.	560.
	71	100.	371.	33.	247.	0.	49.	0.	0.	0.	907.
	74	138.	268.	44.	240.	29.	3.	0.	0.	0.	887.
RES. OIL THOU BAR	67	196.	191.	48.	92.	7.	1.	0.	0.	0.	571.
	71	143.	139.	35.	67.	5.	0.	0.	0.	0.	416.
	74	37.	130.	20.	38.	0.	0.	0.	0.	0.	321.
NAT. GAS BILL CF	67	0.	2.	1.	6.	1.	1.	0.	0.	1.	15.
	71	1.	5.	2.	16.	2.	1.	0.	0.	3.	38.
	74	1.	3.	1.	11.	2.	3.	3.	0.	3.	30.
ELECTRI. BILL KWH	67	0.	1.	0.	1.	0.	0.	0.	0.	0.	6.
	71	1.	2.	1.	2.	0.	0.	0.	0.	1.	9.
	74	1.	2.	1.	2.	0.	1.	1.	0.	1.	9.
OTH. ENRGY TRILL BTU	67	3.	6.	1.	6.	1.	1.	0.	0.	1.	23.
	71	4.	7.	2.	7.	1.	1.	0.	0.	1.	27.
	74	2.	6.	1.	5.	0.	1.	1.	0.	2.	18.
TOT. FUEL TRILL BTU	67	5.	15.	4.	21.	3.	2.	0.	0.	4.	60.
	71	8.	24.	6.	33.	5.	3.	0.	1.	6.	106.
	74	5.	20.	7.	25.	4.	6.	6.	1.	8.	89.

Table 4.11 - (Continued) SIC 30 - Rubber and Miscellaneous Plastics

CONSUMPTION IN TRADITIONAL UNITS

	YR	NO. EAST	MID. ATL.	SO. ATL.	E.N. CEN.	E.S. CEN.	W.N. CEN.	W.S. CEN.	MTN.	PAC.	U.S.
COAL THOU TONS	67	2.	179.	22.	1671.	57.	3.	0.	0.	0.	1933.
	71	1.	115.	14.	1075.	37.	2.	0.	0.	0.	1244.
	74	0.	68.	0.	1082.	41.	0.	0.	0.	0.	1190.
DIST. OIL THOU BAR	67	198.	451.	263.	180.	130.	32.	2.	0.	14.	1271.
	71	453.	1029.	600.	412.	297.	73.	5.	0.	33.	2902.
	74	554.	1147.	379.	782.	258.	20.	0.	0.	0.	3141.
RES. OIL THOU BAR	67	1271.	561.	216.	321.	4.	60.	0.	0.	7.	2440.
	71	1238.	547.	210.	313.	4.	59.	0.	0.	7.	2377.
	74	1307.	1166.	1298.	138.	148.	29.	0.	0.	0.	4086.
NAT. GAS BILL CF	67	1.	5.	4.	16.	5.	4.	3.	0.	4.	43.
	71	2.	9.	7.	29.	8.	7.	6.	0.	7.	77.
	74	3.	6.	12.	33.	12.	4.	8.	0.	6.	84.
ELECTRI. BILL KWH	67	1.	2.	1.	3.	1.	1.	1.	0.	1.	10.
	71	1.	3.	2.	5.	1.	1.	1.	0.	1.	15.
	74	2.	3.	2.	6.	2.	1.	1.	0.	1.	19.
OTH. ENRGY TRILL BTU	67	6.	7.	3.	7.	3.	2.	2.	0.	1.	30.
	71	5.	6.	3.	6.	2.	1.	1.	0.	1.	26.
	74	5.	7.	3.	5.	1.	1.	1.	0.	2.	26.
TOT. FUEL TRILL BTU	67	18.	31.	17.	69.	15.	11.	9.	0.	11.	180.
	71	22.	38.	20.	84.	18.	14.	11.	0.	13.	219.
	74	25.	40.	35.	91.	23.	10.	13.	0.	13.	251.

Table 4.11 - (Continued) SIC 31 - Leather

CONSUMPTION IN TRADITIONAL UNITS

	YR	NO. EAST	MID. ATL.	SO. ATL.	E.N. CEN.	E.S. CEN.	W.N. CEN.	W.S. CEN.	MTN.	PAC.	U.S.
COAL THOU TONS	67	8.	89.	6.	156.	18.	0.	0.	0.	0.	278.
	71	3.	37.	2.	65.	8.	0.	0.	0.	0.	116.
	74	0.	12.	0.	1.	0.	1.	0.	0.	0.	54.
DIST. OIL THOU BAR	67	131.	128.	29.	40.	0.	0.	0.	0.	0.	329.
	71	276.	270.	62.	84.	0.	0.	0.	0.	0.	692.
	74	411.	97.	0.	0.	0.	0.	0.	0.	0.	509.
RES. OIL THOU BAR	67	856.	79.	10.	96.	0.	0.	0.	0.	0.	1041.
	71	477.	44.	5.	54.	0.	0.	0.	0.	0.	580.
	74	486.	31.	0.	0.	0.	0.	0.	0.	0.	518.
NAT. GAS BILL CF	67	0.	1.	0.	3.	0.	0.	0.	0.	0.	4.
	71	1.	1.	0.	6.	0.	0.	0.	0.	0.	8.
	74	2.	0.	0.	2.	0.	0.	0.	0.	0.	5.
ELECTRI. BILL KWH	67	1.	0.	0.	0.	0.	0.	0.	0.	0.	1.
	71	1.	0.	0.	0.	0.	0.	0.	0.	0.	1.
	74	1.	0.	0.	0.	0.	0.	0.	0.	0.	2.
OTH. ENRGY TRILL BTU	67	4.	2.	0.	2.	1.	0.	0.	0.	0.	9.
	71	4.	2.	0.	2.	1.	0.	0.	0.	0.	9.
	74	1.	1.	0.	1.	0.	0.	0.	0.	0.	4.
TOT. FUEL TRILL BTU	67	11.	8.	1.	12.	2.	0.	0.	0.	0.	34.
	71	11.	8.	1.	12.	2.	0.	0.	0.	0.	33.
	74	11.	4.	0.	4.	0.	1.	0.	0.	0.	22.

Table 4.11 - (Continued) SIC 32 - Stone, Clay, Glass, Concrete Total

	YR	NO. EAST	MID. ATL.	SO. ATL.	E.N. CEN.	E.S. CEN.	W.N. CEN.	W.S. CEN.	MTN.	PAC.	U.S.
COAL THOU TONS	67	0.	3301.	1168.	4960.	891.	1396.	0.	80.	1.	11797.
	71	0.	2717.	961.	4082.	733.	1149.	0.	66.	1.	9709.
	74	0.	2767.	549.	3989.	473.	1586.	0.	0.	0.	9365.
COKE THOU TONS	67	0.	9.	7.	8.	8.	1.	9.	1.	4.	48.
	71	0.	56.	43.	53.	53.	7.	58.	9.	28.	307.
	74	0.	438.	0.	89.	5.	0.	0.	0.	0.	533.
DIST. OIL THOU BAR	67	568.	2004.	1393.	459.	209.	489.	204.	130.	332.	5788.
	71	1092.	3853.	2679.	882.	401.	941.	392.	250.	639.	11130.
	74	1216.	3733.	2096.	3411.	944.	847.	26.	507.	269.	13049.
RES. OIL THOU BAR	67	1031.	1801.	1468.	353.	102.	333.	520.	134.	501.	6242.
	71	1389.	2426.	1976.	475.	138.	449.	700.	180.	675.	8410.
	74	1011.	4691.	673.	1088.	17.	64.	0.	0.	322.	7866.
NAT. GAS BILL CF	67	4.	75.	81.	129.	48.	55.	108.	33.	91.	624.
	71	5.	84.	91.	146.	55.	61.	122.	37.	103.	704.
	74	7.	90.	68.	131.	56.	62.	131.	37.	92.	675.
ELECTRI. BILL KWH	67	1.	5.	3.	4.	2.	1.	2.	1.	2.	20.
	71	1.	6.	3.	5.	2.	2.	2.	1.	3.	25.
	74	1.	6.	5.	6.	3.	3.	3.	1.	3.	29.
OTH. ENRGY TRILL BTU	67	7.	16.	17.	27.	6.	8.	7.	4.	13.	104.
	71	7.	16.	17.	26.	6.	8.	7.	4.	13.	103.
	74	12.	17.	26.	34.	4.	11.	8.	11.	8.	131.
TOT. FUEL TRILL BTU	67	27.	212.	162.	282.	85.	106.	137.	46.	127.	1182.
	71	29.	229.	176.	305.	92.	115.	149.	49.	138.	1281.
	74	35.	264.	142.	318.	88.	129.	153.	56.	117.	1301.

Table 4.11 - (Continued) SIC 34 - Fabricated Metal Products

CONSUMPTION IN TRADITIONAL UNITS

	YR	NO. EAST	MID. ATL.	SO. ATL.	E.N. CEN.	E.S. CEN.	W.N. CEN.	W.S. CEN.	MTN.	PAC.	U.S.
COAL THOU TONS	67	12.	76.	3.	852.	74.	1.	0.	0.	0.	1018.
	71	8.	49.	2.	544.	47.	1.	0.	0.	0.	650.
	74	0.	36.	1.	373.	30.	0.	0.	0.	0.	445.
COKE THOU TONS	67	2.	27.	0.	34.	46.	5.	0.	0.	0.	113.
	71	4.	48.	0.	61.	82.	9.	0.	0.	0.	203.
	74	0.	24.	0.	6.	1.	0.	2.	0.	0.	79.
DIST. OIL THOU BAR	67	736.	938.	117.	503.	40.	88.	6.	5.	42.	2475.
	71	880.	1122.	140.	602.	48.	105.	8.	6.	50.	2961.
	74	665.	1198.	383.	1154.	60.	118.	282.	10.	0.	3870.
RES. OIL THOU BAR	67	617.	932.	38.	402.	15.	31.	0.	0.	56.	2092.
	71	558.	804.	35.	364.	14.	28.	0.	0.	51.	1894.
	74	1051.	607.	74.	593.	15.	263.	4.	0.	0.	2607.
NAT. GAS BILL CF	67	3.	16.	6.	45.	7.	7.	10.	2.	10.	104.
	71	5.	24.	9.	68.	10.	10.	15.	2.	15.	157.
	74	6.	26.	8.	98.	10.	16.	15.	2.	18.	202.
ELECTRI. BILL KWH	67	1.	3.	1.	6.	1.	1.	1.	0.	1.	15.
	71	1.	4.	1.	8.	1.	1.	1.	0.	2.	20.
	74	1.	4.	2.	10.	1.	2.	2.	1.	2.	26.
OTH. ENRGY TRILL BTU	67	5.	26.	7.	27.	4.	4.	5.	1.	9.	88.
	71	5.	21.	5.	21.	4.	3.	4.	1.	7.	70.
	74	4.	13.	5.	17.	5.	2.	5.	1.	7.	58.
TOT. FUEL TRILL BTU	67	19.	63.	17.	120.	19.	15.	20.	4.	25.	301.
	71	22.	74.	20.	140.	22.	18.	24.	4.	29.	352.
	74	26.	68.	23.	172.	21.	28.	28.	6.	34.	407.

Table 4.11 - (Continued) SIC 35 - Machinery (Except Electrical)

CONSUMPTION IN TRADITIONAL UNITS

	YR	NO. EAST	MID. ATL.	SO. ATL.	E.N. CEN.	E.S. CEN.	N.W. CEN.	W.S. CEN.	MTN.	PAC.	U.S.
COAL THOU TONS	67	1.	159.	0.	1212.	103.	188.	0.	0.	2.	1664.
	71	0.	116.	0.	884.	75.	137.	0.	0.	2.	1215.
	74	0.	42.	0.	600.	61.	95.	0.	0.	0.	806.
COKE THOU TONS	67	5.	19.	12.	46.	24.	58.	0.	0.	0.	166.
	71	9.	35.	22.	82.	43.	104.	0.	0.	0.	294.
	74	3.	10.	1.	27.	1.	101.	0.	0.	0.	143.
DIST. OIL THOU BAR	67	465.	738.	85.	685.	19.	89.	6.	11.	23.	2120.
	71	696.	1104.	127.	1025.	28.	133.	9.	17.	34.	3171.
	74	413.	707.	79.	801.	39.	205.	12.	0.	669.	2925.
RES. OIL THOU BAR	67	845.	1338.	195.	552.	10.	62.	2.	0.	83.	3086.
	71	756.	1198.	175.	495.	9.	55.	1.	0.	74.	2763.
	74	625.	1477.	145.	349.	18.	11.	2.	0.	0.	2627.
NAT. GAS BILL CF	67	2.	12.	3.	41.	3.	9.	5.	1.	3.	80.
	71	4.	22.	6.	77.	6.	16.	9.	3.	6.	149.
	74	3.	19.	11.	81.	6.	19.	13.	2.	5.	159.
ELECTRI. BILL KWH	67	1.	3.	1.	7.	1.	1.	1.	0.	1.	17.
	71	2.	4.	1.	9.	1.	2.	1.	1.	2.	22.
	74	2.	5.	2.	10.	1.	2.	2.	0.	2.	27.
OTH. ENRGY TRILL BTU	67	8.	17.	7.	37.	6.	7.	3.	1.	8.	94.
	71	5.	11.	4.	24.	4.	4.	2.	1.	5.	59.
	74	5.	7.	5.	14.	3.	4.	3.	0.	6.	48.
TOT. FUEL TRILL BTU	67	20.	56.	15.	142.	15.	29.	13.	5.	16.	311.
	71	24.	65.	16.	167.	17.	34.	16.	5.	18.	364.
	74	20.	57.	25.	155.	16.	37.	23.	3.	24.	361.

Table 4.11 - (Continued) SIC 36 - Electrical and Electronic Machinery

CONSUMPTION IN TRADITIONAL UNITS

	YR	NO. EAST	MID. ATL.	SO. ATL.	E.N. CEN.	E.S. CEN.	W.N. CEN.	W.S. CEN.	MTN.	PAC.	U.S.
COAL THOU TONS	67	1.	138.	0.	524.	109.	0.	0.	0.	0.	772.
	71	1.	123.	0.	465.	97.	0.	0.	0.	0.	686.
	74	61.	85.	0.	366.	0.	0.	0.	0.	0.	532.
COKE THOU TONS	67	0.	2.	0.	5.	1.	0.	0.	0.	0.	10.
	71	0.	9.	0.	22.	4.	0.	0.	0.	0.	35.
	74	0.	9.	0.	7.	0.	0.	0.	0.	0.	21.
DIST. OIL THOU BAR	67	194.	574.	78.	182.	34.	41.	1.	0.	4.	1108.
	71	477.	1411.	193.	446.	84.	100.	2.	1.	11.	2725.
	74	263.	816.	432.	248.	24.	111.	11.	0.	0.	1905.
RES. OIL THOU BAR	67	553.	607.	100.	165.	15.	2.	0.	0.	21.	1462.
	71	955.	1049.	173.	285.	25.	3.	0.	0.	36.	2526.
	74	611.	670.	172.	179.	10.	0.	0.	0.	0.	1643.
NAT. GAS BILL CF	67	1.	8.	4.	20.	4.	3.	2.	1.	3.	48.
	71	3.	19.	10.	46.	9.	6.	5.	2.	8.	108.
	74	3.	15.	8.	42.	9.	8.	4.	1.	5.	94.
ELECTRI. BILL KWH	67	1.	5.	2.	5.	1.	1.	1.	0.	2.	19.
	71	2.	6.	3.	6.	2.	1.	1.	1.	3.	23.
	74	2.	6.	3.	6.	2.	1.	1.	0.	3.	25.
OTH. ENRGY TRILL BTU	67	1.	27.	7.	22.	5.	6.	3.	1.	10.	88.
	71	2.	9.	2.	7.	2.	2.	1.	0.	3.	30.
	74	3.	10.	3.	7.	2.	1.	2.	0.	2.	30.
TOT. FUEL TRILL BTU	67	18.	59.	22.	81.	18.	11.	8.	4.	19.	238.
	71	20.	67.	25.	92.	21.	12.	9.	4.	21.	271.
	74	26.	57.	26.	83.	19.	13.	10.	2.	17.	247.

Table 4.11 - (Continued) SIC 37 - Transportation Equipment

CONSUMPTION IN TRADITIONAL UNITS

	YR	NO. EAST	NO. ATL.	SU. ATL.	E.N. CEN.	E.S. CEN.	W.N. CEN.	W.S. CEN.	MIN.	PAC.	U.S.
COAL	67	0.	349.	51.	2923.	29.	76.	0.	4.	0.	3432.
THOU TONS	71	0.	265.	39.	2222.	22.	58.	0.	3.	0.	2610.
	74	0.	180.	0.	1731.	0.	0.	0.	0.	0.	1911.
COKE	67	0.	0.	0.	156.	11.	11.	0.	0.	0.	178.
THOU TONS	71	0.	0.	0.	121.	9.	9.	0.	0.	0.	138.
	74	0.	0.	0.	99.	0.	0.	0.	0.	0.	99.
DIST. OIL	67	216.	705.	157.	577.	23.	41.	34.	63.	130.	1946.
THOU BAR	71	362.	1179.	263.	966.	39.	69.	56.	105.	218.	3257.
	74	319.	759.	22.	724.	27.	981.	43.	0.	0.	2875.
RES. OIL	67	1251.	997.	752.	714.	17.	123.	12.	0.	45.	3911.
THOU BAR	71	1121.	693.	674.	639.	15.	110.	11.	0.	40.	3503.
	74	1735.	423.	0.	1455.	165.	0.	6.	0.	0.	3783.
NAT. GAS	67	2.	10.	0.	56.	4.	10.	0.	0.	13.	107.
BILL CF	71	3.	13.	7.	74.	5.	13.	8.	0.	18.	142.
	74	3.	9.	4.	80.	5.	15.	6.	0.	18.	140.
ELECTRI.	67	1.	3.	2.	12.	1.	1.	1.	0.	3.	23.
BILL KWH	71	1.	3.	2.	14.	1.	2.	1.	0.	4.	28.
	74	2.	3.	2.	14.	1.	2.	1.	0.	5.	28.
OTH. ENRGY	67	3.	5.	3.	18.	2.	2.	3.	1.	6.	43.
TRILL BTU	71	2.	4.	2.	13.	2.	2.	3.	1.	5.	32.
	74	6.	4.	2.	17.	2.	4.	2.	0.	1.	38.
TOT. FUEL	67	18.	44.	21.	193.	10.	22.	14.	2.	35.	360.
TRILL BTU	71	19.	47.	23.	205.	11.	24.	15.	2.	38.	382.
	74	27.	34.	13.	205.	13.	30.	12.	2.	35.	370.

Table 4.11 - (Continued) SIC 38 - Measuring Etc. Equipment

CONSUMPTION IN TRADITIONAL UNITS

	YR	NO. EAST	MID. ATL.	SO. ATL.	E.N. CEN.	E.S. CEN.	W.N. CEN.	W.S. CEN.	MTN.	PAC.	U.S.
COAL	67	0.	-1.	-1.	-1.	0.	0.	0.	0.	0.	-1.
THOU TONS	71	0.	572.	2.	23.	0.	0.	0.	0.	0.	697.
	74	0.	0.	0.	0.	0.	0.	0.	0.	0.	-0.
DIST. OIL	67	62.	39.	19.	32.	0.	15.	0.	0.	0.	168.
THOU BAR	71	225.	141.	70.	115.	0.	56.	0.	0.	1.	608.
	74	200.	169.	16.	65.	0.	19.	0.	0.	0.	562.
RES. OIL	67	19.	50.	0.	1.	0.	1.	0.	0.	0.	71.
THOU BAR	71	307.	315.	7.	23.	1.	10.	0.	0.	0.	1163.
	74	280.	88.	2.	34.	0.	0.	0.	0.	0.	1492.
NAT. GAS	67	0.	1.	0.	1.	0.	0.	0.	0.	0.	3.
BILL CF	71	2.	5.	1.	5.	0.	2.	0.	0.	1.	16.
	74	2.	4.	1.	4.	0.	0.	0.	0.	1.	15.
ELECTRI.	67	0.	1.	0.	1.	0.	0.	0.	0.	0.	2.
BILL KWH	71	0.	1.	0.	1.	0.	0.	0.	0.	0.	4.
	74	1.	1.	0.	1.	0.	0.	0.	0.	1.	5.
OTH. ENRGY	67	6.	11.	0.	7.	3.	2.	0.	0.	1.	31.
TRILL BTU	71	2.	4.	0.	2.	1.	1.	0.	0.	0.	11.
	74	1.	3.	0.	1.	0.	0.	0.	0.	0.	6.
TOT. FUEL	67	6.	23.	2.	8.	1.	3.	0.	0.	2.	43.
TRILL BTU	71	9.	30.	3.	12.	2.	4.	0.	0.	3.	67.
	74	7.	13.	3.	9.	1.	2.	1.	0.	3.	50.

Table 4.11 - (Continued) SIC 39 - Miscellaneous Manufacturing Industries

CONSUMPTION IN TRADITIONAL UNITS

	YR	NO. EAST	MID. ATL.	SO. ATL.	E.N. CEN.	E.S. CEN.	W.N. CEN.	W.S. CEN.	MTN.	PAC.	U.S.
COAL THOU TONS	67	0.	28.	5.	45.	0.	4.	0.	0.	0.	107.
	71	0.	35.	7.	56.	1.	5.	0.	0.	0.	135.
	74	0.	0.	0.	18.	0.	0.	0.	0.	0.	34.
COKE THOU TONS	67	0.	0.	0.	-1.	0.	0.	0.	0.	0.	-1.
	71	0.	0.	0.	4.	0.	0.	0.	0.	0.	4.
	74	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
DIST. OIL THOU BAR	67	314.	463.	32.	321.	2.	206.	21.	0.	1.	1361.
	71	395.	582.	40.	404.	3.	259.	26.	0.	1.	1710.
	74	227.	407.	26.	63.	1.	27.	0.	0.	0.	751.
RES. OIL THOU BAR	67	669.	325.	2.	48.	28.	121.	0.	0.	0.	1192.
	71	841.	408.	2.	60.	35.	152.	0.	0.	0.	1498.
	74	290.	317.	0.	39.	1.	7.	0.	0.	0.	654.
NAT. GAS BILL CF	67	1.	4.	2.	8.	2.	8.	2.	0.	5.	32.
	71	2.	5.	3.	10.	3.	10.	3.	0.	6.	40.
	74	1.	3.	0.	5.	1.	0.	5.	0.	1.	18.
ELECTRI. BILL KWH	67	0.	0.	0.	1.	0.	0.	0.	0.	1.	2.
	71	1.	1.	0.	2.	0.	1.	0.	0.	2.	8.
	74	1.	1.	0.	1.	0.	0.	0.	0.	0.	4.
OTH. ENRGY TRILL BTU	67	6.	11.	3.	5.	2.	2.	2.	0.	5.	36.
	71	3.	6.	2.	3.	1.	1.	1.	0.	3.	19.
	74	3.	3.	0.	1.	1.	0.	1.	0.	0.	9.
TOT. FUEL TRILL BTU	67	13.	20.	6.	20.	4.	14.	4.	0.	13.	95.
	71	15.	23.	6.	24.	5.	16.	5.	0.	15.	109.
	74	9.	16.	2.	10.	3.	2.	6.	0.	3.	51.

Table III-4.12 Btu Consumption According to Functional Use for the Food and Kindred Products, the Textile Mill Products, and the Stone, Clay, and Glass Industries - 1974 (10^{12} Btu)

Food & Kindred Products - SIC 20														
FUEL	USE	Space Heating	Space Cooling	Space Condition- ing NSK	Lighting	Total Direct Heat	Raw Material	Process Steam	Electricity Generation	Coke Production	Machine Drive	Electrolytic Process	Other Uses NSK	TOTAL All Functional Uses
Coal		3.4	-1	0	0	0	0	67.4	3.0	0	0	0	1.5	75.3
Coke		-1	-1	-1	-1	-1	0	-1	-1	0	-1	0	1.6	1.6
Distillate		3.5	-1	0	0	9.5	0	44.8	2.7	0	0	0	6.3	66.8
Residual		3.1	-1	0	0	9.3	0	45.5	2.6	0	0	0	5.0	65.5
Natural Gas		20.5	-1	0	0	75.3	0	320.1	18.9	0	0	0	40.6	475.6
Electricity		.0	-1	3.4	31.2	0	0	0	-8.8	0	98.7	0	2.3	126.7
Other Energy		-1	-1	-1	-1	-1	-1	-1	-1	0	-1	0	123.2	123.2
TOTAL		30.6	-1	3.4	31.2	94.1	0	477.8	18.4	0	98.7	0	180.6	934.7

Table III-4.12 - (Continued)

Textile Mill
Products - SIC 22

FUNCTIONAL USE FUEL	Space Heating	Space Cooling	Space Condition- ing NSK	Lighting	Total Direct Heat	Raw Material	Process Steam	Electricity Generation	Coke Production	Machine Drive	Electrolytic Process	Other Uses NSK	TOTAL All Functional Uses
Coal	1.2	0	-1	0	0	0	20.0	.5	0	0	0	.4	22.0
Coke	-1	-1	-1	-1	-1	0	-1	-1	0	-1	0	0	0
Distillate	1.7	0	-1	0	0	0	23.3	.5	0	0	0	.5	26.0
Residual	2.3	0	-1	0	0	0	32.9	.8	0	0	0	.7	36.7
Natural Gas	4.0	0	-1	0	26.0	0	68.1	2.1	0	0	0	1.8	102.1
Electricity	1.4	30.4	-1	11.1	0	0	0	-1.3	0	44.2	0	6.1	91.8
Other Energy	-1	-1	-1	-1	-1	-1	-1	-1	0	-1	0	38.1	38.1
TOTAL	10.6	30.4	-1	11.1	26.0	0	144.3	2.7	0	44.2	0	47.5	316.7

Table III-4.12 - (Continued)

Stone, Clay, and
Glass - SIC 32

FUEL	FUNCTIONAL USE												
	Space Heating	Space Cooling	Space Condition- ing NSK	Lighting	Total Direct Heat	Raw Material	Process Steam	Electricity Generation	Coke Production	Machine Drive	Electrolytic Process	Other Uses NSK	TOTAL All Functional Uses
Coal	0	0	-1	0	231.6	0	0	1.4	-1	0	0	0	233.0
Coke	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	16.0	16.0
Distillate	1.0	0	-1	0	53.8	0	0	.5	-1	20.8	0	0	76.0
Residual	2.0	0	-1	0	46.5	0	0	.3	-1	0	0	.5	49.5
Natural Gas	6.9	0	-1	0	667.9	0	0	4.2	-1	0	0	17.3	696.3
Electricity	.7	0	-1	0	5.7	0	0	-2.0	-1	0	0	95.2	99.6
Other Energy	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	130.9	130.9
TOTAL	10.6	0	-1	0	1005.5	0	0	4.3	-1	20.8	0	260.0	1301.3

Table III-4.13 U.S Manufacturing Expenditures for Small Industries by Region and Selected Fuel Types -
1967, 1971, 1974

SIC 20 Food & Kindred		MILLIONS OF DOLLARS									
	YR	NO. EAST	MID. ATL.	SO. ATL.	E.N. CEN.	E.S. CEN.	W.N. CEN.	W.S. CEN.	MTN.	PAC.	U.S.
COAL	67	0.1	4.2	1.5	22.7	3.5	11.4	0.0	2.7	0.5	46.7
	71	0.1	4.0	1.4	21.7	3.4	10.9	0.0	2.6	0.5	44.7
	74	0.0	1.9	0.8	26.3	2.3	24.4	0.0	0.0	0.0	49.3
COKE	67	0.0	0.0	0.0	0.1	0.0	0.4	0.0	0.6	0.4	1.6
	71	0.0	0.0	0.0	0.3	0.0	1.1	0.0	1.5	1.0	3.8
	74	0.0	0.0	0.0	3.1	0.0	0.0	0.0	0.0	0.0	2.6
DIST. OIL	67	2.2	11.8	4.7	4.0	0.6	3.4	0.3	0.9	2.6	30.7
	71	3.6	19.2	7.6	6.5	1.0	5.6	0.5	1.5	4.3	50.0
	74	10.4	37.2	25.9	31.0	7.1	16.6	1.3	2.8	8.8	141.7
RES. OIL	67	3.4	8.2	6.0	3.8	0.3	2.5	0.1	0.2	2.6	27.4
	71	5.3	12.9	9.4	5.9	0.5	4.0	0.2	0.4	4.1	43.1
	74	12.0	52.9	23.5	17.5	2.9	9.5	0.1	0.0	6.8	125.0
NAT. GAS	67	2.0	14.5	12.2	36.4	6.5	22.7	11.7	9.8	26.6	142.5
	71	3.2	22.5	18.9	56.5	10.1	35.2	18.2	15.1	41.2	220.9
	74	6.0	26.8	30.4	91.3	20.5	54.1	42.3	20.9	63.2	354.8
ELECTRI.	67	15.5	52.9	40.2	75.7	16.0	45.3	27.1	11.2	34.0	316.2
	71	20.6	70.3	53.4	100.6	21.3	60.2	36.0	14.9	45.2	420.3
	74	25.7	112.6	89.8	142.2	32.9	81.0	52.2	21.6	70.4	627.7
OTH. ENRGY	67	5.2	16.9	13.9	24.1	5.0	11.2	5.7	2.5	12.1	96.5
	71	5.5	17.9	14.7	25.6	5.3	11.9	6.0	2.6	12.8	102.3
	74	6.3	26.8	19.7	27.3	6.6	17.6	7.3	5.8	30.4	147.8
TOT. FUEL	67	28.6	109.8	78.8	162.3	31.0	96.3	45.5	28.8	81.5	661.6
	71	38.3	146.8	105.4	217.1	41.5	128.8	60.9	38.5	109.0	885.1
	74	60.4	258.2	190.2	338.6	72.1	203.3	103.2	51.1	179.6	1448.9

Table 4.13 - (Continued) SIC 21 - Tobacco Manufacturers

MILLIONS OF DOLLARS

	YR	NO. EAST	MID. ATL.	SO. ATL.	E.N. CEN.	E.S. CEN.	W.N. CEN.	W.S. CEN.	MTN.	PAC.	U.S.
COAL	67	0.0	0.0	3.1	0.0	0.1	0.0	0.0	0.0	0.0	3.0
	71	0.0	0.0	3.0	0.0	0.1	0.0	0.0	0.0	0.0	2.9
	74	0.0	0.0	5.8	0.0	0.2	0.0	0.0	0.0	0.0	5.0
COKE	67	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	71	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	74	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DIST. OIL	67	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.7
	71	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.9
	74	0.0	0.9	1.2	0.0	0.0	0.0	0.0	0.0	0.0	2.5
RES. OIL	67	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.6
	71	0.0	0.0	2.0	0.0	0.1	0.0	0.0	0.0	0.0	2.1
	74	0.0	0.0	6.1	0.0	0.0	0.0	0.0	0.0	0.0	7.1
NAT. GAS	67	0.0	0.0	0.8	0.0	0.5	0.0	0.0	0.0	0.0	1.3
	71	0.0	0.0	1.4	0.0	0.8	0.0	0.0	0.0	0.0	2.3
	74	0.0	0.1	1.8	0.0	1.2	0.0	0.0	0.0	0.0	3.5
ELECTRI.	67	0.0	0.0	6.0	0.0	1.3	0.0	0.0	0.0	0.0	7.9
	71	0.0	0.0	7.7	0.0	1.6	0.0	0.0	0.0	0.0	10.1
	74	0.0	1.7	13.3	0.0	2.6	0.0	0.0	0.0	0.0	18.3
OTH. ENRGY	67	0.0	0.0	1.2	0.0	0.3	0.0	0.0	0.0	0.0	1.5
	71	0.0	0.0	1.1	0.0	0.3	0.0	0.0	0.0	0.0	1.4
	74	0.0	0.1	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.4
TOT. FUEL	67	0.0	0.0	12.1	0.0	2.2	0.0	0.0	0.0	0.0	15.0
	71	0.0	0.0	15.9	0.0	2.9	0.0	0.0	0.0	0.0	19.7
	74	0.0	2.8	26.4	0.0	4.1	0.0	0.0	0.0	0.0	36.8

Table 4.13 - (Continued) SIC 22 - Textile Mill Products

MILLIONS OF DOLLARS

	YR	NO. EAST	MID. ATL.	SO. ATL.	E.N. CEN.	E.S. CEN.	W.N. CEN.	W.S. CEN.	MTN.	PAC.	U.S.
COAL	67	0.2	0.5	16.3	0.1	0.5	0.0	0.0	0.0	0.0	17.7
	71	0.2	0.6	18.8	0.1	0.6	0.0	0.0	0.0	0.0	20.5
	74	0.0	0.6	24.5	1.1	0.6	0.0	0.0	0.0	0.0	26.8
COKE	67	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	71	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	74	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DIST. OIL	67	1.2	1.5	2.9	0.0	0.3	0.0	0.0	0.0	0.0	5.9
	71	4.3	5.1	10.0	0.1	1.1	0.1	0.0	0.0	0.0	20.7
	74	7.5	12.7	31.4	1.3	1.6	0.0	0.0	0.0	0.1	54.5
RES. OIL	67	4.5	2.9	5.9	0.1	0.1	0.0	0.0	0.0	0.0	13.7
	71	8.9	5.8	11.8	0.2	0.2	0.0	0.1	0.0	0.0	27.3
	74	20.5	10.7	36.5	0.0	0.9	0.0	0.0	0.0	0.0	68.8
NAT. GAS	67	1.1	1.7	17.2	0.7	2.8	0.1	0.4	0.0	0.5	24.8
	71	2.3	3.6	36.9	1.6	6.0	0.2	1.0	0.0	1.2	53.3
	74	4.9	5.8	55.9	4.3	8.7	0.3	2.4	0.0	0.0	83.0
ELECTRI.	67	13.5	20.9	118.9	3.1	17.4	0.8	1.7	0.0	1.9	178.6
	71	18.3	28.2	160.8	4.2	23.5	1.0	2.4	0.0	2.6	241.5
	74	27.3	39.2	282.8	6.0	39.6	1.0	5.9	0.0	4.1	404.2
OTH. ENRGY	67	7.5	11.6	17.2	2.3	3.5	0.4	0.0	0.0	1.3	43.8
	71	6.5	10.1	14.9	2.0	3.0	0.3	0.0	0.0	1.1	38.0
	74	9.6	11.6	24.7	3.0	3.9	0.0	0.0	0.0	0.2	53.0
TOT. FUEL	67	28.7	37.9	179.6	5.8	24.4	1.1	2.4	0.0	3.5	284.5
	71	40.5	53.4	253.3	8.2	34.4	1.6	3.4	0.0	4.9	401.3
	74	69.7	80.6	455.7	15.7	55.5	1.2	8.3	0.0	4.5	690.3

Table 4.13 - (Continued) SIC 23 - Apparel

MILLIONS OF DOLLARS

	YR	NO. EAST	MID. ATL.	SO. ATL.	E.N. CEN.	E.S. CEN.	W.N. CEN.	W.S. CEN.	MTN.	PAC.	U.S.
COAL	67	0.0	0.1	0.8	0.2	0.0	0.0	0.0	0.0	0.0	1.2
	71	0.0	0.1	1.2	0.3	0.0	0.0	0.0	0.0	0.0	1.8
	74	0.0	0.2	0.6	0.2	0.0	0.0	0.0	0.0	0.0	0.9
COKE	67	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	71	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	74	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DIST. OIL	67	0.1	1.6	0.5	0.1	0.0	0.1	0.0	0.0	0.5	3.0
	71	0.2	2.2	0.6	0.2	0.1	0.1	0.0	0.0	0.7	4.0
	74	0.7	5.4	1.7	0.9	0.5	0.1	0.0	0.0	0.0	9.7
RES. OIL	67	0.0	0.3	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.6
	71	0.0	0.4	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.8
	74	0.4	2.0	0.3	0.1	0.0	0.0	0.0	0.0	0.0	2.7
NAT. GAS	67	0.1	0.6	1.0	1.4	0.8	0.3	0.0	0.0	0.1	4.2
	71	0.2	1.0	1.7	2.3	1.3	0.5	0.0	0.0	0.2	6.9
	74	0.6	1.9	2.9	2.4	1.8	0.8	0.8	0.2	0.8	13.4
ELECTRI.	67	4.7	25.3	9.1	6.7	6.9	2.8	0.0	0.0	3.8	67.0
	71	6.9	37.0	13.3	9.7	10.1	4.1	0.0	0.0	5.6	97.8
	74	7.0	41.1	26.5	8.4	14.8	10.8	9.7	6.6	8.6	132.1
OTH. ENRGY	67	2.7	12.9	3.3	3.3	3.6	2.3	0.0	0.0	1.2	29.3
	71	1.8	8.7	2.2	2.2	2.4	1.6	0.0	0.0	0.8	19.8
	74	1.4	8.5	5.3	1.3	2.9	0.9	0.5	0.4	0.1	21.3
TOT. FUEL	67	7.3	39.6	15.3	12.0	11.2	5.1	0.0	0.0	5.9	105.2
	71	9.1	49.4	19.1	14.9	13.9	6.4	0.0	0.0	7.3	131.1
	74	10.1	59.1	37.3	13.3	20.0	12.7	11.0	7.2	9.4	180.1

Table 4.13 - (Continued) SIC 24 - Lumber

MILLIONS OF DOLLARS

	YR	NO. EAST	MID. ATL.	SO. ATL.	E.N. CEN.	E.S. CEN.	W.N. CEN.	W.S. CEN.	MTN.	PAC.	U.S.
COAL	67	0.0	0.0	0.0	1.8	0.0	0.2	0.0	0.0	0.0	2.4
	71	0.0	0.0	0.0	2.1	0.0	0.2	0.0	0.0	0.1	2.8
	74	0.0	0.2	0.0	0.5	0.1	0.0	0.0	0.0	0.0	3.6
COKE	67	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.0
	71	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
	74	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.0
DIST. OIL	67	1.7	0.6	3.5	1.3	0.6	0.1	0.2	0.7	4.8	14.1
	71	3.0	1.0	6.1	2.2	1.0	0.2	0.4	1.2	8.4	24.4
	74	0.7	4.8	12.1	2.6	9.8	0.4	1.9	2.8	20.0	72.0
RES. OIL	67	0.7	0.1	1.3	0.1	0.1	0.0	0.0	0.1	1.6	4.4
	71	0.6	0.1	1.0	0.1	0.1	0.0	0.0	0.1	1.2	3.3
	74	0.3	0.6	5.2	0.3	0.5	0.0	0.3	0.1	4.5	15.4
NAT. GAS	67	0.3	0.9	1.3	2.0	5.3	0.1	2.6	0.7	5.1	18.7
	71	0.6	1.5	2.2	3.5	9.1	0.3	4.4	1.3	8.8	32.4
	74	0.2	3.0	6.5	5.6	9.5	1.6	7.0	2.1	14.2	54.8
ELECTRI.	67	2.0	5.8	12.2	10.3	7.3	0.2	8.9	5.6	26.1	89.2
	71	3.0	8.7	18.2	15.4	10.9	0.3	13.3	8.3	39.1	133.4
	74	6.7	14.8	40.5	21.6	29.5	6.3	22.6	10.2	54.2	215.2
OTH. ENRGY	67	3.0	6.3	21.4	5.0	6.2	1.3	4.8	5.2	22.3	75.5
	71	3.7	7.7	25.9	6.1	7.5	1.6	5.8	6.3	27.0	91.7
	74	7.5	8.1	23.3	7.4	10.5	3.8	13.9	3.7	43.1	125.8
TOT. FUEL	67	7.7	13.5	37.9	20.9	20.2	1.8	17.0	12.2	60.0	204.3
	71	10.8	19.1	53.5	29.5	28.5	2.6	23.9	17.3	84.6	288.1
	74	15.4	31.5	87.6	38.0	59.9	12.2	45.7	18.8	136.0	486.8

Table 4.13 - (Continued) SIC 25 - Furniture
MILLIONS OF DOLLARS

	YR	NO. EAST	MID. ATL.	SO. ATL.	E.N. CEN.	E.S. CEN.	W.N. CEN.	W.S. CEN.	MTN.	PAC.	U.S.
COAL	67	0.1	0.1	1.3	0.4	0.0	0.0	0.0	0.0	0.0	1.7
	71	0.2	0.3	2.4	0.8	0.0	0.0	0.0	0.0	0.0	3.2
	74	0.0	0.6	2.5	0.5	0.0	0.0	0.0	0.0	0.0	3.6
COKE	67	0.0	0.0	-1.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.0
	71	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2
	74	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DIST. OIL	67	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.5
	71	0.3	1.0	0.6	0.4	0.2	0.0	0.0	0.0	0.0	2.7
	74	0.5	2.7	5.1	1.8	0.7	0.1	0.0	0.0	0.1	11.2
RES. OIL	67	0.1	0.2	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.6
	71	0.3	0.5	0.2	0.4	0.0	0.0	0.0	0.0	0.0	1.5
	74	0.7	0.5	2.4	0.6	0.6	0.0	0.0	0.0	0.0	4.7
NAT. GAS	67	0.0	0.2	0.1	0.5	0.1	0.0	0.1	0.0	0.1	1.1
	71	0.1	1.5	1.0	4.9	0.8	0.4	0.6	0.0	0.6	10.7
	74	0.2	2.8	4.3	7.9	3.3	0.8	0.6	0.0	1.8	21.5
ELECTRI.	67	1.7	6.9	8.8	8.1	3.0	0.6	1.8	0.0	2.5	37.2
	71	2.5	10.1	12.8	11.7	4.4	0.9	2.6	0.0	3.7	54.0
	74	3.6	10.6	23.3	17.2	6.7	1.7	4.8	0.0	9.8	76.6
OTH. ENRGY	67	1.6	3.7	4.5	3.3	1.3	0.3	1.1	0.0	1.4	17.1
	71	1.1	2.6	3.1	2.3	0.9	0.2	0.8	0.0	0.9	11.9
	74	0.6	3.8	2.1	1.9	1.2	0.4	0.7	0.1	0.9	11.7
TOT. FUEL	67	3.1	11.0	14.1	14.2	4.3	1.0	2.7	0.0	3.6	58.2
	71	4.5	16.0	20.4	20.5	6.3	1.4	4.0	0.0	5.2	84.2
	74	5.6	21.1	39.8	29.9	12.6	3.0	6.1	0.1	12.5	129.3

Table 4.13 - (Continued) SIC 27 - Printing, Publishing

MILLIONS OF DOLLARS

	YR	NO. EAST	MID. ATL.	SO. ATL.	E.N. CEN.	E.S. CEN.	W.N. CEN.	W.S. CEN.	MTN.	PAC.	U.S.
COAL	67	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.2
	71	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.2
	74	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.4
COKE	67	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.0
	71	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.0
	74	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.0
DIST. OIL	67	0.3	1.1	0.1	0.7	0.0	0.1	0.0	0.0	0.0	2.5
	71	0.5	1.7	0.2	1.1	0.0	0.2	0.0	0.0	0.0	4.0
	74	1.8	3.5	0.5	3.0	0.3	0.0	0.0	0.0	0.0	10.7
RES. OIL	67	0.6	0.6	0.2	0.3	0.0	0.0	0.0	0.0	0.0	1.7
	71	0.6	0.6	0.2	0.3	0.0	0.0	0.0	0.0	0.0	1.7
	74	0.5	1.7	0.3	0.5	0.0	0.0	0.0	0.0	0.0	3.9
NAT. GAS	67	0.4	1.3	0.5	4.2	0.4	0.3	0.0	0.0	0.5	9.8
	71	0.8	2.7	1.0	8.5	0.8	0.6	0.0	0.1	1.1	19.6
	74	1.2	3.6	1.1	10.1	1.4	2.1	2.3	0.3	2.6	24.2
ELECTRI.	67	5.4	23.3	5.5	22.4	2.6	1.8	0.0	0.0	6.6	88.1
	71	8.3	36.2	8.5	34.8	4.0	2.8	0.0	0.0	10.3	136.7
	74	12.8	50.2	24.4	40.8	6.0	12.8	9.5	2.9	15.9	192.5
OTH. ENRGY	67	2.1	5.2	1.1	4.6	0.9	0.4	0.0	0.2	0.4	17.9
	71	2.4	5.9	1.3	5.2	1.0	0.5	0.0	0.2	0.5	20.3
	74	2.0	8.0	0.9	5.4	0.2	1.5	0.7	0.1	2.1	22.1
TOT. FUEL	67	8.3	31.0	7.3	32.9	3.8	2.7	0.0	0.2	7.8	120.2
	71	12.5	47.1	11.1	50.0	5.8	4.1	0.0	0.3	11.9	182.5
	74	18.3	67.0	27.2	60.5	7.9	16.4	12.5	3.2	20.6	253.8

Table 4.13 - (Continued) SIC 30 - Rubber and Miscellaneous Plastics

MILLIONS OF DOLLARS

	YR	NO. EAST	MID. ATL.	SO. ATL.	E.N. CEN.	E.S. CEN.	W.N. CEN.	W.S. CEN.	MTN.	PAC.	U.S.
COAL	67	0.0	1.8	0.5	11.0	0.4	0.0	0.0	0.0	0.0	13.6
	71	0.0	1.6	0.4	9.9	0.4	0.0	0.0	0.0	0.0	12.3
	74	0.0	1.6	0.0	21.8	0.8	0.0	0.0	0.0	0.0	22.4
COKE	67	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	71	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	74	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DIST. OIL	67	0.8	1.7	0.9	0.6	0.5	0.1	0.0	0.0	0.0	4.8
	71	2.1	4.7	2.5	1.7	1.3	0.3	0.0	0.0	0.1	13.0
	74	6.7	13.9	4.4	9.1	2.6	0.2	0.0	0.0	0.0	37.2
RES. OIL	67	3.1	1.5	0.4	0.7	0.0	0.2	0.0	0.0	0.0	6.1
	71	5.0	2.4	0.7	1.1	0.0	0.2	0.0	0.0	0.0	9.9
	74	15.8	14.8	14.6	1.6	1.6	0.3	0.0	0.0	0.0	46.4
NAT. GAS	67	0.7	3.1	1.9	8.8	1.7	1.4	1.0	0.0	1.9	20.2
	71	1.3	6.1	3.7	17.2	3.3	2.8	1.9	0.0	3.7	39.7
	74	4.8	7.0	9.9	28.7	7.2	2.7	4.2	0.0	4.6	66.9
ELECTRI.	67	13.5	23.1	11.1	38.3	7.5	9.0	5.3	0.0	8.9	117.3
	71	20.5	35.1	16.9	58.2	11.4	13.7	8.1	0.0	13.5	178.3
	74	40.6	67.1	42.8	98.4	24.2	18.1	14.7	1.8	28.2	340.3
OTH. ENRGY	67	2.6	3.0	1.6	3.3	1.0	0.6	0.6	0.0	0.4	13.1
	71	3.0	3.4	1.9	3.8	1.1	0.7	0.7	0.0	0.4	15.0
	74	5.8	8.5	4.2	6.8	2.0	1.5	1.1	0.0	1.8	31.7
TOT. FUEL	67	20.8	34.8	17.0	60.0	11.4	11.5	7.0	0.0	11.6	175.1
	71	31.9	53.3	26.1	91.9	17.5	17.7	10.7	0.0	17.7	268.2
	74	73.8	113.0	75.8	166.3	38.5	22.8	20.0	1.8	34.6	544.9

Table 4.13 - (Continued) SIC 31 - Leather

MILLIONS OF DOLLARS

	YR	NO. EAST	MID. ATL.	SO. ATL.	E.N. CEN.	E.S. CEN.	W.N. CEN.	W.S. CEN.	MTN.	PAC.	U.S.
COAL	67	0.1	0.8	0.1	1.2	0.1	0.0	0.0	0.0	0.0	2.5
	71	0.0	0.4	0.1	0.6	0.1	0.0	0.0	0.0	0.0	1.3
	74	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7
COKE	67	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	71	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	74	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DIST. OIL	67	0.5	0.5	0.1	0.2	0.0	0.0	0.0	0.0	0.0	1.2
	71	1.2	1.2	0.2	0.4	0.0	0.0	0.0	0.0	0.0	2.9
	74	5.1	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.4
RES. OIL	67	2.1	0.2	0.0	0.3	0.0	0.0	0.0	0.0	0.0	2.7
	71	1.9	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	2.5
	74	5.8	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.2
NAT. GAS	67	0.3	0.5	0.0	1.7	0.1	0.0	0.0	0.0	0.0	2.4
	71	0.5	0.8	0.0	2.9	0.2	0.0	0.0	0.0	0.0	4.0
	74	2.1	0.4	0.0	1.9	0.0	0.3	0.1	0.0	0.0	4.8
ELECTRI.	67	7.6	5.0	0.4	17.6	1.1	0.0	0.0	0.0	0.0	20.6
	71	9.3	6.1	0.5	21.5	1.3	0.0	0.0	0.0	0.0	25.2
	74	16.1	4.1	1.5	4.3	1.7	2.5	0.7	0.0	0.7	29.8
OTH. ENRGY	67	2.0	1.2	0.1	1.2	0.2	0.0	0.0	0.0	0.0	4.7
	71	2.5	1.5	0.1	1.5	0.3	0.0	0.0	0.0	0.0	5.9
	74	2.1	1.8	0.0	0.8	0.0	0.3	0.0	0.0	0.0	5.0
TOT. FUEL	67	12.7	8.4	0.8	22.2	1.5	0.0	0.0	0.0	0.0	34.1
	71	15.5	10.2	1.0	27.2	1.9	0.0	0.0	0.0	0.0	41.8
	74	31.2	8.1	1.5	7.0	1.7	3.1	0.8	0.0	0.7	52.9

Table 4.13 - (Continued) SIC 34 - Fabricated Metal Products

MILLIONS OF DOLLARS

	YR	NO. EAST	MID. ATL.	SO. ATL.	E.N. CEN.	E.S. CEN.	W.N. CEN.	W.S. CEN.	MTN.	PAC.	U.S.
COAL	67	0.1	0.5	0.0	6.9	0.4	0.0	0.0	0.0	0.0	8.1
	71	0.1	0.5	0.0	6.6	0.4	0.0	0.0	0.0	0.0	7.7
	74	0.0	0.8	0.0	8.1	0.6	0.0	0.0	0.0	0.0	9.7
COKE	67	0.1	0.8	0.0	1.3	2.0	0.2	0.0	0.0	0.0	4.0
	71	0.1	1.0	0.0	1.5	2.4	0.2	0.0	0.0	0.0	4.7
	74	0.0	2.0	0.0	0.4	0.1	0.0	0.1	0.0	0.0	6.8
DIST. OIL	67	3.2	3.9	0.4	2.0	0.2	0.4	0.0	0.0	0.2	10.3
	71	4.4	5.4	0.6	2.7	0.2	0.5	0.0	0.0	0.2	14.2
	74	9.0	15.5	4.7	13.7	0.7	1.4	2.8	0.1	0.0	48.3
RES. OIL	67	1.9	2.9	0.1	1.2	0.0	0.1	0.0	0.0	0.2	6.4
	71	2.2	3.5	0.1	1.4	0.0	0.1	0.0	0.0	0.2	7.6
	74	13.0	7.5	0.8	7.7	0.2	2.8	0.0	0.0	0.0	32.5
NAT. GAS	67	2.3	10.6	3.4	27.8	3.5	3.2	2.6	0.6	5.1	59.8
	71	3.6	16.3	5.2	42.6	5.4	4.9	4.0	0.9	7.8	91.6
	74	9.7	27.7	7.9	88.5	8.0	11.7	9.5	1.0	15.7	179.5
ELECTRI.	67	12.6	42.6	13.3	84.7	10.0	11.2	11.4	2.7	15.9	207.3
	71	16.1	54.7	17.1	108.9	12.9	14.4	14.7	3.5	20.4	266.4
	74	38.6	89.7	37.4	181.1	18.8	27.5	29.9	11.5	42.6	470.9
OTH. ENRGY	67	3.5	16.4	4.1	17.1	3.1	2.7	3.5	0.4	5.9	56.6
	71	3.2	15.2	3.8	15.9	2.9	2.5	3.2	0.4	5.5	52.5
	74	4.6	16.0	6.4	22.8	5.6	2.6	6.2	1.1	9.0	74.3
TOT. FUEL	67	23.6	76.6	21.3	142.4	19.2	17.9	17.4	3.8	27.0	352.5
	71	29.7	96.6	26.9	179.7	24.2	22.6	21.9	4.8	34.1	444.7
	74	74.9	159.2	57.3	322.3	33.9	46.0	48.6	13.7	67.3	822.0

Table 4.13 - (Continued) SIC 32 - Stone, Clay, Glass, Concrete Total

MILLIONS OF DOLLARS

	YR	NO. EAST	MID. ATL.	SO. ATL.	E.N. CEN.	E.S. CEN.	W.N. CEN.	W.S. CEN.	MTN.	PAC.	U.S.
COAL	67	0.0	26.1	8.6	38.2	5.3	9.1	0.0	0.5	0.0	87.5
	71	0.0	31.2	10.3	45.7	6.4	10.9	0.0	0.6	0.0	104.7
	74	0.0	63.2	14.9	86.4	10.4	27.5	0.0	0.0	0.0	196.7
COKE	67	0.0	0.2	0.2	0.2	0.2	0.0	0.3	0.0	0.1	1.2
	71	0.0	1.3	0.9	1.2	1.1	0.2	1.3	0.2	0.7	6.4
	74	0.0	24.9	0.0	7.0	0.4	0.0	0.0	0.0	0.0	14.1
DIST. OIL	67	2.7	9.1	5.9	2.2	0.9	2.3	0.8	0.7	1.2	26.1
	71	5.1	17.2	11.1	4.1	1.7	4.4	1.5	1.3	2.3	49.4
	74	15.2	47.9	24.8	41.5	9.2	10.7	0.3	5.7	3.6	161.4
RES. OIL	67	3.2	5.3	3.7	1.2	0.3	0.9	1.2	0.4	1.5	18.0
	71	5.2	8.7	6.1	2.0	0.5	1.5	1.9	0.7	2.5	29.4
	74	12.5	51.5	7.4	12.5	0.2	1.0	0.0	0.0	2.8	86.1
NAT. GAS	67	2.7	39.3	36.0	57.5	18.1	18.2	23.1	10.6	33.8	237.7
	71	3.6	51.6	47.3	75.5	23.8	23.9	30.4	13.9	44.3	312.2
	74	9.8	87.1	51.8	106.7	35.2	34.2	77.8	23.7	68.3	487.9
ELECTRI.	67	6.7	51.3	28.0	46.3	14.0	15.7	14.6	7.3	20.4	200.3
	71	8.8	67.1	36.7	60.6	18.3	20.5	19.1	9.5	26.7	261.9
	74	16.6	110.7	75.1	90.5	33.2	40.4	32.9	17.4	46.8	463.6
OTH. ENRGY	67	4.3	11.1	10.3	16.6	3.6	6.9	4.2	2.1	7.9	67.0
	71	4.5	11.6	10.8	17.3	3.8	7.2	4.4	2.2	8.3	70.0
	74	11.7	17.7	27.8	39.0	5.2	13.1	10.6	12.6	8.7	146.3
TOT. FUEL	67	20.8	144.3	94.2	157.8	42.5	52.5	44.9	21.7	64.9	637.8
	71	27.2	188.7	123.1	206.4	55.6	68.6	58.7	28.3	84.9	834.0
	74	65.7	402.9	201.8	383.7	93.8	126.8	121.6	59.4	130.2	1556.1

Table 4.13 - (Continued) SIC 35 - Machinery (Except Electrical)

MILLIONS OF DOLLARS

	YR	NO. EAST	MID. ATL.	SO. ATL.	E.N. CEN.	E.S. CEN.	W.N. CEN.	W.S. CEN.	MTN.	PAC.	U.S.
COAL	67	0.0	1.4	0.0	9.6	0.7	1.1	0.0	0.0	0.0	12.9
	71	0.0	1.4	0.0	9.5	0.7	1.1	0.0	0.0	0.0	12.7
	74	0.0	0.9	0.0	12.6	1.1	1.5	0.0	0.0	0.0	16.3
COKE	67	0.2	0.6	0.5	1.8	1.2	2.1	0.0	0.0	0.0	6.0
	71	0.2	0.6	0.6	2.0	1.3	2.4	0.0	0.0	0.0	6.8
	74	0.3	0.4	0.1	2.1	0.1	7.9	0.0	0.0	0.0	11.2
DIST. OIL	67	1.9	3.0	0.3	2.8	0.1	0.4	0.0	0.0	0.1	8.7
	71	3.2	5.0	0.5	4.6	0.1	0.6	0.0	0.1	0.1	14.5
	74	5.3	9.0	0.9	9.7	0.5	2.4	0.1	0.0	7.6	35.9
RES. OIL	67	2.2	3.6	0.5	1.5	0.0	0.1	0.0	0.0	0.2	8.3
	71	3.2	5.2	0.6	2.1	0.0	0.2	0.0	0.0	0.3	11.9
	74	8.3	17.8	1.6	4.6	0.2	0.1	0.0	0.0	0.0	32.4
NAT. GAS	67	1.8	8.6	1.9	24.9	1.7	4.3	1.6	0.5	1.7	47.4
	71	3.2	15.1	3.3	43.7	3.1	7.6	2.8	0.9	3.0	83.3
	74	5.3	19.3	8.6	70.5	4.9	13.4	8.3	1.2	4.5	137.5
ELECTRI.	67	18.7	42.4	11.5	86.5	8.4	16.7	9.7	4.3	17.3	217.2
	71	25.3	57.4	15.6	117.2	11.4	22.6	13.2	5.9	23.4	294.2
	74	43.7	94.9	34.2	180.8	20.8	40.4	25.6	4.0	41.2	482.9
OTH. ENRGY	67	4.2	10.6	3.7	22.7	3.4	3.8	1.7	1.1	4.3	55.4
	71	3.3	8.3	2.9	17.8	2.7	2.9	1.3	0.8	3.3	43.4
	74	5.5	8.4	7.1	18.1	3.7	5.1	3.9	0.2	9.3	61.4
TOT. FUEL	67	29.3	70.9	17.9	150.2	14.7	28.5	13.2	5.9	23.0	355.9
	71	38.4	93.0	23.5	197.0	19.3	37.4	17.3	7.7	30.2	466.8
	74	68.4	150.8	52.6	298.5	31.3	70.8	38.0	5.4	62.5	777.6

Table 4.13 - (Continued) SIC 36 - Electrical and Electronic Machinery

MILLIONS OF DOLLARS

	YR	NO. EAST	MID. ATL.	SO. ATL.	E.N. CEN.	E.S. CEN.	W.N. CEN.	W.S. CEN.	MTN.	PAC.	U.S.
COAL	67	0.0	1.0	0.0	4.1	0.7	0.0	0.0	0.0	0.0	6.0
	71	0.0	1.2	0.0	4.8	0.8	0.0	0.0	0.0	0.0	7.1
	74	1.8	1.8	0.0	7.6	0.0	0.0	0.0	0.0	0.0	11.5
COKE	67	0.0	0.1	0.0	0.3	0.1	0.0	0.0	0.0	0.0	0.4
	71	0.0	0.2	0.0	0.5	0.2	0.0	0.0	0.0	0.0	0.8
	74	0.0	0.8	0.0	0.7	0.0	0.0	0.0	0.0	0.0	1.9
DIST. OIL	67	0.7	2.1	0.3	0.7	0.1	0.2	0.0	0.0	0.0	4.2
	71	2.1	6.1	0.8	2.0	0.4	0.5	0.0	0.0	0.0	12.2
	74	3.4	10.8	5.6	3.2	0.3	1.4	0.1	0.0	0.0	24.6
RES. OIL	67	1.4	1.7	0.2	0.4	0.0	0.0	0.0	0.0	0.0	4.0
	71	4.2	5.0	0.6	1.1	0.1	0.0	0.0	0.0	0.1	11.5
	74	7.1	8.4	2.0	2.4	0.1	0.0	0.0	0.0	0.0	19.9
NAT. GAS	67	0.9	5.4	2.3	11.3	2.0	1.3	0.5	0.3	1.7	25.9
	71	2.2	12.6	5.3	26.6	4.8	3.0	1.2	0.7	4.0	60.8
	74	3.7	16.9	6.8	36.5	7.1	5.1	2.2	0.8	4.5	85.5
ELECTRI.	67	17.2	53.0	22.6	53.0	12.4	7.7	5.8	4.1	20.9	199.9
	71	23.1	71.0	30.2	71.1	16.6	10.4	7.8	5.5	28.1	268.0
	74	52.7	106.6	56.1	105.6	25.7	17.3	15.1	1.2	47.0	424.1
OTH. ENRGY	67	3.7	16.5	3.4	12.6	3.0	3.1	1.8	0.4	4.5	49.0
	71	1.8	8.1	1.7	6.2	1.5	1.5	0.9	0.2	2.2	24.1
	74	3.1	14.4	3.3	9.2	3.6	1.9	2.1	0.0	2.7	40.3
TOT. FUEL	67	25.1	78.4	29.0	84.6	18.3	11.5	7.4	4.8	26.0	289.4
	71	33.3	104.2	38.6	112.4	24.4	15.3	9.9	6.3	34.5	384.5
	74	71.9	159.7	73.9	165.3	36.8	25.7	19.5	11.1	54.2	507.8

Table 4.13 - (Continued) SIC 38 - Measuring Etc. Equipment

MILLIONS OF DOLLARS

	YR	NO. EAST	MID. ATL.	SO. ATL.	E.N. CEN.	E.S. CEN.	W.N. CEN.	W.S. CEN.	MTN.	PAC.	U.S.
COAL	67	0.0	-1.0	-1.0	-1.0	0.0	0.0	0.0	0.0	0.0	-1.0
	71	0.0	8.3	0.0	0.2	0.0	0.0	0.0	0.0	0.0	8.5
	74	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0
COKE	67	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	71	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	74	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DIST. OIL	67	0.2	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.6
	71	1.0	0.6	0.3	0.5	0.0	0.3	0.0	0.0	0.0	2.8
	74	2.8	2.2	0.2	0.8	0.0	0.2	0.0	0.0	0.0	7.2
RES. OIL	67	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
	71	1.0	4.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	5.4
	74	3.3	1.2	0.0	0.5	0.0	0.0	0.0	0.0	0.0	19.6
NAT. GAS	67	0.2	0.6	0.1	0.5	0.0	0.1	0.0	0.0	0.1	1.7
	71	1.3	3.5	0.7	2.7	0.2	0.7	0.0	0.0	0.4	9.5
	74	2.3	4.7	1.1	3.8	0.2	0.3	0.2	0.0	1.0	15.6
ELECTRI.	67	5.1	12.4	1.8	7.5	0.9	2.8	0.0	0.0	2.6	34.1
	71	7.6	18.7	2.6	11.3	1.3	4.2	0.0	0.0	3.9	51.4
	74	18.3	31.7	6.7	15.3	1.6	4.7	2.0	1.5	9.4	95.1
OTH. ENRGY	67	3.2	8.2	0.2	3.7	1.3	1.7	0.0	0.0	0.7	19.2
	71	1.3	3.3	0.1	1.5	0.5	0.7	0.0	0.0	0.3	7.7
	74	0.9	5.3	0.2	1.7	0.0	0.1	0.1	0.0	0.0	9.4
TOT. FUEL	67	8.0	25.2	2.5	10.7	1.4	3.9	0.0	0.0	3.0	55.8
	71	12.3	38.5	3.8	16.3	2.1	5.9	0.0	0.0	4.6	85.3
	74	27.7	45.1	8.2	22.0	1.8	5.3	2.3	1.5	10.4	146.9

Table 4.13 - (Continued.) SIC 37 - Transportation Equipment

MILLIONS OF DOLLARS

	YR	NO. EAST	MID. ATL.	SO. ATL.	E.N. CEN.	E.S. CEN.	W.N. CEN.	W.S. CEN.	MTN.	PAC.	U.S.
COAL	67	0.0	2.4	1.0	24.5	0.2	0.6	0.0	0.0	0.0	28.2
	71	0.0	2.9	1.3	29.5	0.2	0.7	0.0	0.0	0.0	33.9
	74	0.0	3.3	0.0	45.3	0.0	0.0	0.0	0.0	0.0	49.9
COKE	67	0.0	0.0	0.0	5.9	0.5	0.6	0.0	0.0	0.0	6.7
	71	0.0	0.0	0.0	2.8	0.3	0.3	0.0	0.0	0.0	3.2
	74	0.0	0.0	0.0	7.9	0.0	0.0	0.0	0.0	0.0	7.7
DIST. OIL	67	0.9	3.1	0.6	2.4	0.1	0.2	0.1	0.2	0.5	8.2
	71	1.7	5.6	1.2	4.4	0.2	0.3	0.2	0.4	1.0	15.0
	74	4.1	10.1	0.3	9.0	0.3	11.8	0.6	0.0	0.0	37.3
RES. OIL	67	3.1	3.1	1.7	1.9	0.0	0.3	0.0	0.0	0.1	10.4
	71	4.2	4.2	2.3	2.6	0.1	0.4	0.0	0.0	0.1	14.3
	74	20.9	5.5	0.0	17.2	1.8	0.0	0.0	0.0	0.0	44.6
NAT. GAS	67	1.9	6.4	2.8	30.6	2.0	4.1	1.4	0.1	5.7	55.2
	71	2.8	9.3	4.0	44.5	2.9	5.9	2.0	0.1	8.3	80.3
	74	4.6	9.2	4.0	73.2	4.0	9.2	3.5	0.2	14.9	123.1
ELECTRI.	67	13.5	28.9	15.5	121.6	7.0	13.7	9.3	1.6	26.7	238.2
	71	17.8	38.2	20.5	160.9	9.2	18.1	12.3	2.1	35.3	315.1
	74	37.7	59.5	32.6	239.8	15.7	24.3	17.3	3.1	76.5	506.9
OTH. ENRGY	67	1.5	2.9	2.3	15.9	1.1	1.5	2.1	0.4	4.9	32.7
	71	1.4	2.8	2.3	15.4	1.1	1.5	2.0	0.4	4.8	31.7
	74	8.9	5.8	3.4	26.4	3.0	5.9	2.0	0.5	1.9	57.9
TOT. FUEL	67	21.5	48.5	24.3	200.1	10.7	21.0	12.8	2.4	38.1	379.6
	71	28.0	63.0	31.5	260.2	13.9	27.3	16.6	3.1	49.5	493.5
	74	76.2	93.4	40.2	418.8	24.8	51.2	23.5	3.8	93.3	827.4

Table 4.13 - (Continued) SIC 39 - Miscellaneous Manufacturing Industries

MILLIONS OF DOLLARS

	YR	NO. EAST	MID. ATL.	SO. ATL.	E.N. CEN.	E.S. CEN.	W.N. CEN.	W.S. CEN.	MTN.	PAC.	U.S.
COAL	67	0.0	0.3	0.1	0.4	0.0	0.0	0.0	0.0	0.0	1.1
	71	0.0	0.4	0.2	0.6	0.0	0.1	0.0	0.0	0.0	1.6
	74	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.6
COKE	67	0.0	0.0	0.0	-1.0	0.0	0.0	0.0	0.0	0.0	-1.0
	71	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1
	74	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DIST. OIL	67	1.4	2.0	0.1	1.4	0.0	0.9	0.1	0.0	0.0	5.9
	71	1.9	2.7	0.2	1.8	0.0	1.2	0.1	0.0	0.0	7.9
	74	3.0	4.8	0.3	0.9	0.0	0.3	0.0	0.0	0.0	9.1
RES. OIL	67	2.5	1.3	0.0	0.2	0.1	0.4	0.0	0.0	0.0	4.5
	71	3.4	1.8	0.0	0.2	0.1	0.6	0.0	0.0	0.0	6.3
	74	3.8	3.7	0.0	0.5	0.0	0.1	0.0	0.0	0.0	8.2
NAT. GAS	67	0.8	2.2	0.9	3.5	0.7	2.4	0.5	0.0	1.9	12.7
	71	1.3	3.4	1.4	5.4	1.1	3.7	0.8	0.0	3.0	19.6
	74	1.8	4.3	0.3	4.6	0.5	0.3	2.6	0.1	1.2	17.4
ELECTRI.	67	9.3	16.3	4.3	22.0	2.0	6.0	1.7	0.0	14.3	37.9
	71	12.2	21.4	5.6	28.9	2.7	7.9	2.2	0.0	18.8	49.7
	74	21.5	26.8	6.9	14.8	3.8	4.2	0.9	0.6	5.6	85.7
OTH. ENRGY	67	3.9	5.9	1.5	2.9	1.0	1.3	0.9	0.0	3.2	20.6
	71	2.6	3.9	1.0	1.9	0.7	0.9	0.6	0.0	2.1	13.6
	74	3.1	4.2	0.3	1.2	1.0	0.4	1.4	0.1	0.0	11.6
TOT. FUEL	67	17.8	28.1	6.9	32.7	3.8	12.1	3.1	0.0	20.0	82.8
	71	21.3	33.6	8.3	39.0	4.6	14.4	3.7	0.0	23.9	98.8
	74	33.2	43.7	7.9	22.3	5.3	5.3	4.8	0.8	6.8	132.6

c. Documentation

(1) Introduction

For most of the small industries, no credible data sources existed other than the Census of Manufactures. However, for SIC 20, 22, and 32 it was necessary to consider other sources as well.

(a) Stone, Clay, and Glass Products (SIC 32)

The only source that provides total SIC 32 data on a state by state basis is the Census of Manufactures. Both Portland Cement Association and the U.S. Bureau of Mines present data for the largest energy consumer, SIC 3241. However, detail is not available down to the state by state level of geographical disaggregation. A comparison of the three data sources for 1971 on a national level is given below:

	<u>Census Bureau</u>	<u>PCA</u>	<u>BOM</u>
Fuel Oil (10^3 bbl)	6,808	10,159	10,754
Distillate	2,177	910	-----
Residual	4,632	9,249	-----
Coal (10^3 tons)	6,776	6,940	7,182
Natural Gas (10^9 cf)	202	216	220
Purchased			
Electricity (10^3 kWh)	8,500	9,825	9,179
Total (10^9 Btu's)	517,897	557,334	578,536

The greatest discrepancy between the three data sources is in the fuel oil category. The reason for the discrepancy is not immediately apparent; however, there are several factors to be considered. First, Bureau of Mines data includes Puerto Rican plants which are primarily fuel oil consumers. The 16 plants which cite fuel oil as their single energy source account for over 85 percent of the fuel oil consumed. The Puerto Rico plants account for one-fifth of the total capacity of these plants. When the Bureau of Mines data is adjusted to reflect this discrepancy it falls roughly between PCA and Census.

The second factor taken into account is that both the PCA and the Bureau of Mines include a greater portion of the quarrying and inplant transportation than the Bureau of Census. Census reports gasoline and propane used for inplant transportation as "other fuels". Also, if a quarry is located at a different address than its associated cement plant, it is classified separately in the Census of

Mineral Industries. According to most sources, quarrying and transportation account for about 2 percent of the total cement industry energy,

Finally, independent grinding operations which are included in the Bureau of Mines and Portland Cement data are not classified under SIC 3241 in the Census of Manufactures. These six to seven plants comprise 3 percent of production capacity. A comparison of the adjusted Bureau of Mines data to Census of Manufactures data in 1971 is given below:

	<u>Fuel Oil</u>	<u>Coal</u>	<u>Natural Gas</u>	<u>Electricity</u>
Unadjusted BOM	10754	7182	220	9179
less Puerto Rico	1810	----	---	----
less grinding	323	215	6	275
Adjusted BOM	7621	6967	214	8704
Census Data	6808	6776	202	8500
% difference	21%	3%	6%	5%

Although the fuel oil discrepancy is not eliminated by the adjustment factors, it is sufficient to say that no two sources are completely consistent. Therefore, because there is a geographical problem with Bureau of Mines data, and because Census classification is consistent with the mining sector and provides more detail on the state level, the Bureau of Census data was used to display all SIC 32 data for each of the three years - 1967, 1971, and 1974.

(b) Food and Kindred Products (SIC 20)

Energy used in SIC 20 is evenly distributed among the various 3-digit industry groups. The percent of energy consumed by each 3-digit code as given by the Census of Manufactures is listed below:

<u>SIC Code</u>	<u>Industry Group</u>	<u>Percent of SIC 20</u>
201	Meat Products	13%
202	Dairy Products	11%
203	Canned, Cured and Frozen Food	13%

<u>SIC Code</u>	<u>Industry Group</u>	<u>Percent of SIC 20</u>
204	Grain Mill Products	14%
205	Bakery Products	6%
206	Sugar, Confectionery Products	13%
207	Fats and Oils	2%
208	Beverages	12%
209	Miscellaneous	16%

Several studies of the food industry have been undertaken; however, the most comprehensive of reliable data to date is the Census of Manufactures. It is also the only source that provides total SIC 20 data.

The other major energy studies were : Industrial Energy Study of Selected Food Industries by Development, Planning, and Research Associates; Voluntary Industry Energy Conservation, report series with reports submitted by five of the affiliated trade associations; and Energy Consumption in Manufacturing by the Conference Board.

Both the trade association data and the Conference Board data cover only a small portion of the total industry. Five trade associations report to the VIEC program and six industries are covered by the Conference Board. It is impossible to extrapolate to the total food industry based on such small coverage.

The Development, Planning and Research Association (DPRA) prepared a more thorough report covering the 14 major energy consuming industries in SIC 20. Their data was based primarily on staff knowledge of the industry and contact with offices in the industry. Although the coverage is too small to be used, it does provide a useful check of the census data.

9
ENERGY USE, COMPARISON OF ENERGY SOURCES (10 Btu's)

<u>SIC Code</u>	<u>Census</u>	<u>DPRA</u>	<u>% Difference from Census</u>
2011	117.2	110.4	- 5.8%
2013	28.2	27.9	- .9%
2026	73.8	81.2	+10.0%
2033	62.2	50.4	-19.0%
2037	46.2	54.2	+17.3%
2042	69.9	83.9	+20.0%
2046	68.6	72.2	+ 5.2%

* Electricity evaluated at 10.6 thousand Btu/kWh since DPRA used this factor.

Although Census and DPRA data were developed through completely different methodologies, the results are sufficiently close to support each other. No serious misreporting occurs in either source. Since Census is more comprehensive, it provided the base for SIC 20 physical consumption data. A subsequent report by DPRA, "Energy Efficiency Improvement Targets Food and Kindred Products Industry," was used to generate functional use coefficients.

(c) Textile Mill Products (SIC 22)

Although Textile Mills only consumed 2.4 percent of all industrial energy consumption, it has been one of the more thoroughly studied industries. In November, 1973, the American Textile Manufacturers Institute (ATMI) initiated a comprehensive energy study program aimed at reducing consumption. This study comprised 80 of the larger corporations and has produced national energy consumption figures up to the present. FEA further promoted study of the Textile Industry in 1976 by contracting a Target Setting Report from SCS Engineers. Their study also produced national energy consumption figures from contact with 131 of the larger mills.

Both of these energy studies provided a comparison for Census of Manufactures which was used as a basis for this study. ATMI used energy use per pound of production as a yardstick to measure the effectiveness of conservation efforts. Their value of 13.3 kWh/kg in 1974 is 21 percent lower than the comparable census figure, 17.0 kWh/kg for that year. This difference is explained primarily by the scope of the ATMI survey. The 80 corporations surveyed are the larger corporations in SIC 22 and therefore have better energy utilization capability. Also, some of the specialty products which require additional energy for manufacture are excluded from the ATMI reporting.

On the other hand, estimates by SCS Engineers are somewhat greater than Census. Although a direct comparison is not possible since the two sources cover different years, a similar trend has emerged in the past five years according to both sources. According to SCS Engineers energy consumption decreased 24 percent while Census data shows an 11 percent decrease.

Since SCS Engineers based energy consumption data on a survey of 131 of the larger mills, the data was somewhat biased toward greater energy intensity. The mills surveyed by SCS Engineers exhibited capacity for energy conservation and a slightly different product mix from that of the total industry.

An additional factor supporting the decision to use Census data was that it was the only source that displayed data below the national level and disaggregated by various fuel types. Other sources presented national data, but because the information gathered on a small survey is generally proprietary, low level disaggregations are not feasible.

(2) General Methodology

(a) Physical Consumption for all Industries

Consumption Data in 1974, 1971: The data listed for each two digit SIC code by state was displayed as it appeared in the Census data. The amount of fuel consumed by unlisted states and states with disclosure problems was allocated on the basis of value added shares given in the 1971 Census of Manufactures for each 2-digit industry group. The total fuels for all states without disclosures were added up to find total listed fuels. This total of listed fuels was subtracted from the actual national value for total fuel. The remainder was distributed to each state on the basis of value added shares.

The derived total fuels were distributed to fuel types on the basis of the regional distribution of the listed states in the same regions. The individual fuel types were then added up for all states and normalized to the national total by normalizing the derived Census numbers where necessary. The state by state total fuel values were recalculated by summing individual fuel types for each state. No values explicitly given by Census were changed in the procedure.

Consumption Data in 1967: The data available for 1967 is national 2-digit data. The data was disaggregated into state by state information according to each state's share of energy consumption in 1971.

(b) Expenditure Data for All Industries

Prices were developed for 1974 and 1971 by dividing expenditure by unit consumption according to 2-digit SIC code and state. Where data was unavailable for a given SIC code, the total industry price was used. Also, if the expenditure was less than half the unit value, it was assumed that round-off error would be great and the total industry price was used instead. These prices were multiplied by the physical consumption values previously developed to obtain expenditures by state.

In order to develop 1967 prices, a national 1967 to 1971 index by fuel was developed from the national fuel prices. The 1971 state fuel prices were multiplied by the index to obtain state by state fuel prices in 1967.

(c) Functional Use Breakdowns for Selected Industries

Stone, Clay, and Glass Products (SIC 32): Functional use coefficients were developed for SIC 32 from the five 4-digit industries which consume over two-thirds of the energy. Census of Manufactures data was used for consumption values by fuel type and the sources listed below were used to break out the fuel types by functional uses.

<u>Industry</u>	<u>Source</u>
SIC 3241 Hydraulic Cement	Battelle, "Energy Use Patterns in Metallurgical and Non-metallic Mineral Processing"
SIC 3221 Glass Containers	Battelle, "Development of an Energy Efficiency Improvement Target for SIC 32 Stone, Clay, and Glass"
SIC 3274 Lime	Battelle, "Energy Use Patterns in Metallurgical and Non-metallic Mineral Processing"
SIC 3273 Ready-mix Cement	The Conference Board "Energy Consumption in Manufacturing"
SIC 3251 Brick and Structural Clay	Battelle, "Development of Energy Efficiency Improvement Target for SIC 32 Stone, Clay, and Glass"

Functional uses were fairly consistent along fuel type lines. For the most part all petroleum products, coal and natural gas were used as direct heat while electricity made up machine drive.

Exceptions to this generalization were electricity used in the Glass Container Industry and the "other fuels" used in the Brick and Structural Clay and the Ready-mix Cement Industries. Glass containers consumed about 26 percent of their electricity in electric furnaces and electric boosting of traditional furnaces and 3 percent in space heating. The Brick and Structural Clay Industry consumed a considerable amount of LPG which was classified as "other fuel" in the Census of Manufactures. About sixty-five percent of this "other fuel" was used for direct heat and twenty-five percent was used for machine drive. Ready-mix Cement also showed a large amount of "other fuel" used. Seventy-four percent of this fuel, gasoline, was used for transportation and mixing in cement mixing trucks.

Taking into account these uses, the fuels were classified by functional uses for each of the five 3-digit industries. The Census of Manufactures data was used for total physical consumption of each fuel type in each industry. The five industries were added up and functional use coefficients were developed for the total. These functional use coefficients which cover 65 percent of the total SIC 32 were assumed to hold true for the overall industry.

Food and Kindred Products (SIC 20): The functional use information was taken directly from "Energy Efficiency Improvement Targets: Food and Kindred Products" done for FEA by Development Planning and Research Associates, Inc. (DPRA). Their study covered each of the 47 4-digit industries comprising SIC 20. Functional use coefficients were developed from the 31 industries making up 90 percent of the energy consumption.

Energy consumption figures for each 4-digit SIC code and fuel type were taken directly from the 1974 Survey of Manufactures and were converted to Btu's using the U.S. Bureau of Mines conversion factors.

The data provided by DPRA was broken out into purchased fuels and purchased electricity and was then further broken down by functional uses. The functional uses were process specific and had to be translated into the ECDB functional use categories (see Figure 4.15). All fuels were broken out according to the purchased fuels breakdown and all electricity was assumed to follow the breakdown outlined in DPRA. The functional use breakdowns for each industry were weighted according to fuel consumption, and percentage breakdowns were developed from these functional use breakdowns.

The functional use coefficients developed from DPRA were expressed in percentages. To apply these percentages to the total food industry it was necessary to first isolate electricity generation. The amount of electricity generated was converted at 3412 Btu's per kilowatt-hour and added to the purchased electricity to obtain total electricity used. The functional use percentages for electricity were applied to the total to get the functional uses of electricity. Generated electricity (assessed at 3412 Btu/kWh) was accounted for as a negative number in the electricity column so that the net electricity would be equal to the purchased electricity.

The amount of fuel required to generate electricity was assessed at 10,500 Btu/kWh. The resultant Btu's of fuel used to generate electricity were then distributed to the fuel types based on the relative fuel share in the industry. After accounting for electricity generation, the remaining amount of each fuel was distributed according to the DPRA fuel share. The merit of this process of accounting for electricity generation is that the 30 percent generating loss is accounted for by the two conversion factors.

Figure 4.15 Translation of DPRA Processes to ECDB Functional Uses

<u>ECDB Functional Use</u>	<u>DPRA Operations</u>	
1. Space Heating.....	1. Space Heating	3. Plant Heating
	2. Area Heating	
2. Space Cooling.....	4. Air Conditioning	5. HVAC Equipment
3. Lighting.....	6. Lighting	
4. Machine Drive.....	7. Mixing	21. Packing and Distribu- tion
	8. Fish Pump	22. Crushing, Grinding
	9. Battery Charging	23. Boilerwater Treatment, Centrifuge
	10. Poultry Dressing	24. Carbo-Cooler Com- pressors
	11. Cocking	25. Steam and Hot Water Pump
	12. Packing	26. Mechanical Power
	13. Rendering (Elec- trical)	27. Process Preparation - Cooling
	14. Compressed Air	28. Refrigeration
	15. Preparation	29. Steam and Water Use (Electrical)
	16. Processing	30. Primary Waste Treatment
	17. Warehousing	31. Waste Disposal
	18. Receiving	32. Garage and Maintenance
	19. Coffee Extraction	33. Process Equipment
	20. Solvent Distillation	34. Tempering and Milling

ECDB Functional Use

DPRA Operations

5. Process Steam.....	35. Cooking (Boiler Uses)	46. Condensing Mills and Whey
	36. Vat Pastuerization	47. Vac./Heat Flavor
	37. Proof Fermentation	48. Ovens (Boiler Uses)
	38. Solvent Recovery	49. Desolventizer, Toaster
	39. Drying (Boiler Uses)	50. Screen and Press
	40. Vacuum Pans	51. Heat Boiler Feed-water
	41. HTST Heating	52. Deodorization
	42. Hydrogen Production	53. Conditioning, Flaking, Pelletting
	43. Process Steam	54. Rendering (Boiler Uses)
	44. Evaporation	55. Hot Water Production
	45. Processing	56. Hot Water Clean-up
6. Direct Heat.....	57. Fryers	69. Spray Drying
	58. Hydrogenation	70. Figal Can Washing
	59. Coopering	71. Shortening Storage
	60. Roasting	72. Carbon Regeneration
	61. Cooking (Direct Uses)	73. After Burners
	62. Starch Dryers	74. Smoke House
	63. Pulp Dryers	75. Cook Ovens
	64. Lime Kiln	76. Hot Water Heater
	65. Feed Dryers	77. Refrigeration
	66. Hog Singers	78. Milk Drying
	67. Drying	79. Carton Spilling
	68. Whey Drying	
7. Miscellaneous.....	80. Transportation	83. Receiving, Warehousing, Misc.
	81. Warehousing, Misc.	84. Receiving and Preparations
	82. Transport, Harvest	85. Receiving and Misc.

Textile Mill Products (SIC 22): The primary source used to develop functional use coefficients was a report prepared for FEA by SCS Engineers, "Energy Efficiency Improvement Target in the Textile Mill Products Industry SIC 22". The fuel information available from SCS Engineers was a process format. Energy use in SIC 22 was classified according to the following process:

- Spinning
- Texturizing
- Weaving
- Knitting
- Greige Mills
- Finishing, Woven
- Finishing, Knit
- Yarn Dyeing
- Floor Covering

For each of these processes, fuel consumption was classified according to fuel type and appropriate subprocesses. The major effort required in developing functional uses involved classifying the subprocesses into the appropriate functional use categories according to Figure 4.16. The assumption was made that if no fuel was specified for a heating process then the Btu's of energy required for that process were distributed according to the total industry fuel mix.

The functional use percentages developed by major process groups were then weighted according to the relative share of energy each major process consumed. This percentage share was developed for data presented by SCS engineers on energy requirements of each process.

Having established the functional use breakdowns associated with each of the processes, the energy consumed per functional use and fuel type for all processes was added up to find the amount of the total that each fuel comprised.

In the case of Yarn Dyeing, which was not discussed in terms of subprocesses, the information provided on fuel type and the process flow diagram were combined to classify all electricity into machine drive and all other fuels to process steam generation. In this case it was impossible to separate plant heating and

machine drive. Lighting was assigned the average amount consumed by the other processes.

The functional use coefficients from SCS were expressed in percentages. To apply these percentages to Census data it was necessary to first isolate electricity generation. The amount of electricity generated was converted at 3412 Btu's per kilowatt-hour and added to the purchased electricity to obtain total electricity used. The functional use percentages for electricity were applied to the total to get the functional uses of electricity. The generated electricity was assessed at 3412 Btu/kWh in the electricity fuel column as a negative number. The sum of the electricity functional uses would then be equal to the total purchased energy.

The amount of fuel required to generate electricity was assessed at 10,500 Btu/kWh. The resultant Btu's of fuel used to generate electricity were then distributed to the fuel types based on the relative fuel share in the industry. After accounting for electricity generation, the remaining amount of fuel was distributed according to the SCS functional use fuel shares. As in the Food Industry, this method of accounting for electricity generation adjusts for the 30 percent loss in generating efficiency.

Figure 4.16 Translation of SCS Subprocesses to ECDB Functional Uses

<u>ECDB Functional Use</u>	<u>SCS Operation</u>
1. Space Heating.....	1. Heating
2. Space Cooling.....	2. Air Conditioning
3. Lighting.....	3. Lighting
4. Machine Drive.....	4. Bale Presses/Opening
	5. Blending
	6. Carding
	7. Drawing
	8. Roving
	9. Ring Spinning
	10. Twisting

ECDB Functional Use

SCS Operation

- | | |
|---------------------------------|---|
| 4. Machine Drive (Continued)... | 11. Winding |
| | 12. Texturizing |
| | 13. Knit-deknitting |
| | 14. Autoclaving |
| | 15. Doubling and Coning |
| | 16. Weaving |
| | 17. Knitters and Graders |
| | 18. Yarn Formation |
| | 19. Yarn Dyeing |
| 5. Process Steam..... | 20. Preparation, Including - Slushing
and Drying |
| | 21. Slashers |
| | 22. Fabric Preparation |
| | 23. Dyeing |
| | 24. Finishing* |
| 6. Direct Heat..... | 25. Finishing |
| | 26. Floor Covering |
| 7. Other Uses NSK/NEC..... | 27. Miscellaneous |

* Finishing and Curing use both process steam and direct heat. It was assumed that natural gas used in finishing was direct heat.

(3) Data Base Reference Numbers and Detailed
Methodology - All Minor Industries

REF. NO.

- 1 All data developed for the minor industrial energy users is outlined in the following 12 steps:

Summary: Step 1: Develop consumption data in Btu's for each 2-digit SIC code in 1971.

Step 1a - Multiply the physical consumption fuel value for each state and the nation [REF. Computer Files F, G, H and C, D, E], by the Btu conversion factors [REF. File 5], to obtain all available state and U.S. fuel information in Btu's.

Step 1b - For all states without any disclosure problems, sum up the individual fuel types according to each state and the nation [REF. Step 1a] (1. Distillate Fuel Oil; 2. Residual Fuel Oil; 3. Coal; 4. Coke; 5. Natural Gas; 6. Other; 7. NSK; 8. Electricity), to obtain total purchased fuels (Fuel 10) by each state and the U.S. in 1971.

Step 1c - Initialize all states according to their census region, and sum up the Btu fuel values according to fuel types for all the states (without disclosure problems) [REF. Step 1a], to obtain physical consumption according to Census region, the nation and fuel types (Fuel 1-8, 10).

Step 1d - For each Census region, divide each fuel type (Fuels 1-8) [REF. Step 1c], by the total fuel value (Fuel 10) [REF. Step 1c], to obtain fuel shares according to Census region and fuel type.

Step 1e - Subtract the Btu value for total fuels (Fuel 10) for listed states [REF. Step 1c], from the Btu value for total fuels (Fuel 10) in the nation [REF. Step 1b], to obtain the unallocated portion of the total fuels.

Step 1f - Allocate the unallocated portion of total fuels (Fuel 10) [REF. Step 1e], among the unlisted states* and states with disclosure problems based on value added shares for the 2-digit industry group [REF. File 1].

* States that do not give energy consumption data for a 2-digit SIC code, but do list production figures for that industry.

- Step 1g - Allocate the total fuels (Fuel 10) according to unlisted and disclosure states and SIC code [REF. Step 1f], to each fuel type (Fuels 1-8) with each state based on the fuel type distribution of the appropriate Census region [REF. Step 1d].
- Step 1h - Subtract the total fuel type consumption values (for Fuels 1-8) for the listed states [REF. Step 1c], from the national value for each fuel [REF. Step 1a], to obtain the unallocated portion of each fuel.
- Step 1i - For each fuel, sum up the Btu value of fuel consumption according to fuel type for the unlisted states [REF. Step 1g], to obtain the total computed consumption for each fuel in the nation.
- Step 1j - Divide the unallocated portion of each fuel [REF. Step 1h], by the total computed consumption for each fuel [REF. Step 1i] to obtain a normalization factor according to each fuel.
- Step 1k - Multiply each computed fuel value [REF. Step 1g], by the normalization factor according to fuel type [REF. Step 1j], to obtain normalized fuel values for the unlisted and disclosure states.
- Step 1l - Sum up the individual fuel values (Fuels 1-8) [REF. Step 1a, 1k], to obtain the actual total fuels (Fuel 10) according to each state.
- Step 1m - Initialize the final all states according to their Census region, and sum up the Btu fuel values according to fuel types for all the states [REF. Step 1a, 1k, 1l], to obtain regional values according to fuel type.
-

Summary: Steps 2-3: Develop physical consumption and expenditures for each state and fuel in 1971.

Step 2a - Divide the Btu fuel values according to state, fuel type and SIC code [REF. Step 1a, 1k], by the 1971 Btu conversion factors according to fuel type [REF. File 5], to obtain fuel consumption values in physical units according to state, fuel type and SIC code in 1971.

Step 2b - Divide the Btu fuel values according to region, fuel type and SIC code [REF. Step 1m], by the 1971 Btu conversion factors according to fuel type [REF. File 5], to obtain fuel consumption values in physical units according to region, fuel type and SIC code.

Step 3a - Divide the available cost values according to state, fuel type and 2-digit SIC code [REF. Computer Files F, G, H], by the available physical consumption values according to state, fuel type and 2-digit SIC code [REF. Computer Files F, G, H], to obtain all available prices by state, fuel type and 2-digit SIC codes.

Step 3b - If cost is not available on the 2-digit industry state level or is less than .5, divide the state total industry cost according to fuel type and state [REF. Computer Files F, G, H], by the physical consumption value according to fuel type and state [REF. Computer Files F, G, H], to obtain the price of fuel for the industry in question.

Step 3c - If cost is unavailable by both 2-digit SIC code and total industry within a state, then divide the national 2-digit industry cost [REF. Computer Files C, D, E], by the national 2-digit physical consumption values [REF. Computer Files C, D, E], to obtain the national 2-digit fuel price.

Step 3d - Divide the fuel consumption in physical units according to state, fuel type and 2-digit SIC code [REF. Step 2a], by the fuel prices according to state, fuel type and 2-digit industry [REF. Steps 3a, 3b, 3c], to obtain fuel expenditures by state, fuel type and 2-digit industry.

Summary: Step 4: Develop consumption data for each 2-digit SIC code in Btu's in 1974.

Step 4a - Multiply the physical consumption fuel value for each state and the nation [REF. Computer Files K, L, M and I, J], by the Btu conversion factors [REF. File 5], to obtain all available state and U.S. fuel information in Btu's.

Step 4b - For all states without any disclosure problems, sum up the individual fuel types according to each state and the nation [REF. Step 4a] (1. Distillate Fuel Oil; 2. Residual Fuel Oil; 5. Natural Gas; 6. Other; 7. NSK; 8. Electricity), to obtain total purchased fuels (Fuel 10) by each state and the U.S. in 1974.

Step 4c - Initialize all states according to their Census region, and sum up the Btu fuel values according to fuel type for all the states (without disclosure problems) [REF. Step 4a], to obtain physical consumption according to Census region, the nation and fuel types [Fuels 1-8, 10].

Step 4d - For each Census region, divide each fuel type (Fuels 1-8) [REF. Step 4c], by the total fuel value (Fuel 10) [REF. Step 4c], to obtain fuel shares according to Census region and fuel type.

Step 4e - Subtract the Btu value for total fuels (Fuel 10) for listed states [REF. Step 4c], from the Btu value for total fuels (Fuel 10) in the nation [REF. Step 4b], to obtain the unallocated portion of the total fuels.

- Step 4f - Allocate the unallocated portion of total fuels (Fuel 10) [REF. Step 4e], among the unlisted states* and states with disclosure problems based on value added shares for the 2-digit industry group [REF. File 1].
- Step 4g - Allocate the total fuels (Fuel 10) according to unlisted and disclosure states and SIC code [REF. 4f], to each fuel type (Fuels 1-8) with each state based on the fuel type distribution of the appropriate Census region [REF. Step 2].
- Step 4h - Subtract the total fuel type consumption values (Fuels 1-8) for the listed states [REF. Step 4c], from the national value for each fuel [REF. Step 4a], to obtain the unallocated portion of each fuel.
- Step 4i - For each fuel, sum up the Btu value of fuel consumption according to fuel type for the unlisted states [REF. Step 4g], to obtain the total computed consumption for each fuel in the nation.
- Step 4j - Divide the unallocated portion of each fuel [REF. Step 4h] by the total computed consumption for each fuel [REF. Step 4i] to obtain a normalization factor according to each fuel.
- Step 4k - Multiply each computed fuel value [REF. Step 4g], by the normalization factor according to fuel type [REF. Step 4j] to obtain normalized fuel values for the unlisted and disclosure states.
- Step 4l - Sum up the individual fuel values (Fuels 1-8) [REF. Step 4a, 4k], to obtain the actual total fuels according to each state.

* States that do not give energy consumption data for a 2-digit SIC code, but do list production figures for that industry.

Step 4m - Initialize all states according to their Census region, and sum up the Btu fuel values according to fuel types for all the states [REF. Steps 4a, 4k, 4l], to obtain regional values according to fuel type.

Summary: Steps 5-6: Develop physical consumption and expenditures for each state and fuel in 1974.

Step 5a - Divide the Btu fuel values according to state, fuel type and SIC code [REF. Step 4a, 4k], by the 1974 Btu conversion factors according to fuel type [REF. File 5], to obtain fuel consumption values in physical units according to state, fuel type and SIC code in 1974.

Step 5b - Divide the Btu fuel values according to region, fuel type and SIC code [REF. Step 4m], by the 1971 Btu conversion factors according to fuel type [REF. File 5], to obtain fuel consumption values in physical units according to region, fuel type and SIC code.

Step 6a - Divide the available cost values according to state, fuel type and 2-digit SIC code [REF. Computer Files K, L, M], by the available physical consumption values according to state, fuel type and 2-digit SIC code [REF. Computer Files K, L, M], to obtain all available prices by state, fuel type and 2-digit SIC code.

Step 6b - If cost is not available on the 2-digit industry state level or is less than .5, divide the state total industry cost according to fuel type and state [REF. Computer Files K, L, M], by the physical consumption value according to fuel type and state [REF. Computer Files K, L, M], to obtain the price of fuel for the industry in question.

- Step 6c - If cost is unavailable by both 2-digit SIC code and total industry within a state, then divide the national 2-digit industry cost [REF. Computer Files I, J], by the national 2-digit physical consumption values [REF. Computer Files I, J], to obtain the national 2-digit fuel price.
- Step 6d - Divide the fuel consumption in physical units according to state, fuel type and 2-digit SIC code [REF. Step 5a], by the fuel prices according to state, fuel type and 2-digit industry [REF. Steps 6a, 6b, 6c], to obtain fuel expenditures by state, fuel type and 2-digit industry.

Summary: Steps 7-9: Develop 1967 state by state fuel consumption data in Btu's, physical units, and expenditures.

- Step 7a - Divide the 1967 national fuel consumption data according to fuel type, 2-digit SIC code [REF. Computer Files A, B], by the 1971 national fuel consumption data according to fuel type, 2-digit SIC code [REF. Computer Files C, D, E], to obtain 1967 fuel ratios according to fuel type and 2-digit SIC code.
- Step 7b - Multiply the 1971 state by state physical consumption values according to state, fuel type and 2-digit SIC code [REF. Steps 1a, 1k], by the 1967 fuel ratios according to fuel type and 2-digit SIC code [REF. Step 7a], to obtain 1967 state by state physical consumption values according to state, fuel type and 2-digit SIC code.
- Step 7c - Initialize all the states to their Census region, and sum up the physical consumption values according to fuel types for all the states [REF. Step 7b], to obtain regional values according to fuel type.
-

- Step 8a - Multiply the 1967 state by state physical consumption values according to state, fuel type, and 2-digit SIC code [REF. Step 7b], by the Btu conversion factors for each fuel type [REF. File 5], to obtain state by state Btu values according to state, fuel type and 2-digit SIC codes.
- Step 8b - Multiply the 1967 regional physical consumption values according to fuel type and 2-digit industry [REF. Step 7c], by the Btu conversion factors [REF. File 5], to obtain regional Btu values according to state, fuel type and 2-digit SIC code.

-
- Step 9a - Divide the 1967 national expenditure data according to fuel type and 2-digit SIC code [REF. Computer Files A, B], by the 1971 national expenditure data according to fuel type and 2-digit SIC code [REF. Computer Files C, D, E], to obtain 1967 expenditure ratio according to fuel type and 2-digit SIC code.
- Step 9b - Multiply the 1971 state by state expenditure values according to state, fuel type and 2-digit SIC code [REF. Step 3d], by the 1967 expenditure ratio according to fuel type and 20 digit SIC code.
- Step 9c - Initialize all the states to their Census region, and sum up the expenditure values according to fuel types for all the states [REF. Step 9b], to obtain regional values according to fuel type.

Summary: Step 10: Develop national functional use values for SIC 20 for each fuel type.

- Step 10a - Multiply the electricity generated nationally (Fuel 9) [REF. Computer Files B, E, J], by the Btu conversion rate [REF. File 5], to obtain Btu's expended by all fuels in electricity generation by state, by year (1967, 1971, 1974).

- Step 10b - Allocate the Btu's expended in electricity generation [REF. Step 10a], the four major fuel types (1. Distillate Fuel Oil; 2. Residual Fuel Oil; 3. Coal; 5. Natural Gas), on the basis of the relative national distribution of the four fuels by year.
- Step 10c - Subtract the Btu's expended in electricity generation according to fuel type in the U.S. (Fuels 1-3, 5) [REF. Step 10b], from the total Btu's of each fuel type in the U.S. by year [REF. Step 1a], to obtain fuel used for all purposes other than electricity generation.
- Step 10d - Multiply the fuel used for all purposes other than electricity generation [REF. Step 10c], by the functional use coefficients according to fuel type, and region [REF. File 2], to obtain functional uses in Btu's according to fuel type (Fuels 1-3, 5), region and year.
- Step 10e - Multiply the kilowatt hour of generated electricity according to U.S., year, and 2-digit SIC code [REF. Computer Files B, E, J], by the purchased electricity conversion rate [REF. File 5].
- Step 10f - Add the Btu's of generated electricity [REF. Step 10e], to the purchased electricity [REF. Step 1a], to obtain total electricity used.
- Step 10g - Multiply the Btu's of generated electricity [REF. Step 1e], by -1 to obtain the amount of electricity (Fuel 8) used for electricity generation.
- Step 10h - Multiply the total Btu's of electricity used [REF. Step 1f], by the functional use breakdown shares for electricity according to year, and 2-digit SIC code [REF. File 2], to obtain the amount of electricity used for every functional use (other than electricity generation).

4) Data Quality Description

<u>REF. NO.</u>	<u>QUALITY CODE</u> ^{a/}	<u>DESCRIPTION</u>
1	2	All state data in 1971 and 1974 except disclosed Census data ^{b/} , All national data in 1967, 1971, and 1974.
	4	All functional use data. All state data in 1967. All state data in 1971 that was disclosed in Census of Manufactures.
	0	All unavailable data and zeros.

The following data was unavailable: (1) all functional uses except SIC 20, 22, and 32.

a/ Code 2 = probable error greater than 10%, but less than or equal to 25%.

Code 4 = probable error unknown.

Code 0 = data either not available or equal to zero.

b/ Refer to Census of Manufactures for disclosed states [BIB. 2, 3, 4, 20].

(5) Computer Program

1. G1 RELEASE 2.0

MAIN

DATE = 76357

16/44/04

```

C *****
C
C  CREAT AND INITIALIZE FILE 1 FOR SMALL INDUSTRIES OF MANU. SECTOR
C
C
C  IREC=IFUEL+13*(ISTATE-1)+13*61*(IYR-1)
C  ----- 2379 RECORDS IN THE FILE
C
C  IFIELD=IND+16*(IFUNC-1)
C  ----- 288 FIELDS PER RECORD
C
C *****
C
C
C
C  DIMENSION VAR(288),BVAR(522),IN(16)
C  DATA VAR/288*-1./
C  DATA IN/1,2,3,4,5,6,10,13,14,22,23,24,25,26,27,15/
C  DEFINE FILE 1(2379,288,0,11)
C  DEFINE FILE 2(2379,288,0,12)
C  DEFINE FILE 3(2379,288,0,13)
C  DEFINE FILE 91(2379,522,0,191)
C  DEFINE FILE 92(2379,522,0,192)
C  DEFINE FILE 93(2379,522,0,193)
C  DO 1 I=1,2379
C    WRITE(3'I)VAR
C    WRITE(2'I)VAR
1  WRITE(1'I)VAR
C    DO 2 IYR=1,3
C      DO 2 ISTATE=1,61
C        DO 2 IFUEL=1,13
C          IREC=IFUEL+13*(ISTATE-1)+13*61*(IYR-1)
C          DO 2 IRY=91,93
C            READ(IRY,IREC)BVAR
C          DO 3 INN=1,16
C            IND=IN(INN)
C          DO 3 IFUNC=1,18
3  BVAR(IND+29*(IFUNC-1))=-1.
C          WRITE(IRY,IREC)BVAR
2  CONTINUE
C  CALL EXIT
C  END

```

```

C *****
C
C           S T E P S   1 - 3
C
C           COMPUTATIONS FOR 1971
C
C           MAIN PROGRAM FOR SMALL INDUSTRIES OF MANUFACTURING SECTOR
C
C *****
C
C           DIMENSION ID(95),BTU(9),VALUE(52,10),SUM(10,10),VADD(52),
C *ITT(52),FU(9),AN(10),PR(52,10),FUC(10),VAR(288)
C           DATA BTU/5.825,6.287,24.88,30.12,1031.,580.04,3380.212,3.412,10.5,
C           DATA ITT/51,91,81,71,92,82,11,31,32,33,34,93,83,41,42,61,62,52,72
C 112,35,13,43,63,53,64,84,65,85,14,21,86,22,36,66,44,73,94,23,15,37
C 267,54,74,87,16,38,95,39,45,88,100/
C           DATA ID/10*0,7,20,22,30,40,46,4*0,31,33,39,7*0,6,9,10,
C *11,21,34,41,47,49,0,14,15,23,36,50,5*0,1,18,25,43,6*0,
C *16,17,24,26,28,35,42,3*0,4,19,37,44,6*0,3,6,13,27,29,32,
C *45,51,2*0,2,5,12,38,48/
C           DATA VAR/288*-1./
C
C
C *** FILE 1 FOR CONS
C *** FILE 2 FOR 10**9 BTUS
C *** FILE 3 FOR MILLIONS OF $
C
C           DEFINE FILE 1(2379,288,U,I1)
C           DEFINE FILE 2(2379,288,U,I2)
C           DEFINE FILE 3(2379,288,U,I3)
C
C *** INITIALIZE FILES TO -1.
C
C           DD 91 I=794,1586
C           WRITE(1'I)VAR
C           WRITE(2'I)VAR
C           91 WRITE(3'I)VAR
C
C *** INPUT DESIRED SIC CODE
C 98   READ(5,111,END=99)NSIC,PRICE
C           IF(NSIC.LE.0) GO TO 99
C           111 FORMAT(I4,F15.0)
C *** INPUT VALUE ADDED SHARES FOR EVERY STATE
C           DO 112 J=1,51
C           112 READ(5,*)I,VADD(I)

```

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      SU=0.
      DO 113 I=1,51
113  SU=SU+VADD(I)
      DO 114 I=1,51
114  VADD(I)=VADD(I)/SU
      DO 115 I=1,52
      DO 115 J=1,10
          AN(J)=0.
          FUC(J)=0.
          PR(I,J)=-1.
          VALUE(I,J)=-1.
          IF(I.GT.10) GO TO 115
          SUM(I,J)=0.0
115  CONTINUE
      REWIND 25
      DO 400 IK=1,16
          READ(25,401)KKK,FNSK
401  FORMAT(I4,16X,F10.0)
          IF(KKK.EQ.NSIC)BTU(7)=FNSK
400  CONTINUE
      REWIND 20
      READ(20,156)((I,(PR(I,J),J=1,8)),K=1,52)
156  FORMAT(I2,4F15.0/2X,4F15.0)
      IST=52
      REWIND 13
      REWIND 14
      REWIND 15
      REWIND 16
      REWIND 17
      REWIND 18
C ***** INPUT FROM FILES C D & E FOR NATIONAL VALUES
      DO 10 IN=13,15
          KN=IN-12
          2 GO TO(5,6,7),KN
C ***** INPUT FILE C
      5 READ(IN,1,END=10)ISIC,FU(1),FUC(1),FU(2),FUC(2)
      1 FORMAT(4X,I4,25X,F8.0,F5.0,F8.0,F5.0)
      IF(ISIC.NE.NSIC) GO TO 5
      NL=1
      NU=2
      GO TO 8
C ***** INPUT FILE D
      6 READ(IN,11,END=10)ISIC,FU(3),FUC(3),FU(4),DUM,FU(5),FUC(5),FU(6),
        *FU(7)
      11 FORMAT(4X,I4,F7.0,F5.0,F7.0,F5.0,F6.0,F6.0,2F5.0)
      IF(ISIC.NE.NSIC) GO TO 6
      FUC(4)=DUM
      FUC(6)=FU(6)

```

```

      FUC(7)=FU(7)
      IF(FU(4).EQ.-1.)FU(4)=DUM*PRICE
      IF(FU(4).EQ.-2.)FU(4)=DUM*PRICE
      IF(FU(4).EQ.-3.)FU(4)=DUM*PRICE
      IF(FU(4).LT.0.)FU(4)=-1.
      NL=3
      NU=7
      GO TO 8
C ***** INPUT FILE E
      7 READ(IN,12,END=10)ISIC,FU(8),FUC(8),FU(9)
      12 FORMAT(4X,I4,13X,F7.0,F8.0,F6.0)
      IF(ISIC.NE.NSIC) GO TO 7
      NL=8
      NU=9
      8 CONTINUE
      DO 124 I=NL,NU
      IF(FU(I).GT.0..AND.FUC(I).GT.0.5)PR(IST,I)=FUC(I)/FU(I)
      124 VALUE(IST,I)=FU(I)
      10 CONTINUE
C ***** INPUT FROM FILES F G & H FOR STATE VALUES
      DO 20 IN=16,18
      KN=IN-15
      32 GO TO (15,16,17),KN
C ***** INPUT FILE F
      15 READ(IN,41,END=20)IT,ISIC,FU(1),FUC(1),FU(2),FUC(2)
      41 FORMAT(2X,I2,I4,22X,F7.0,F4.0,F7.0,F4.0)
      IF(ISIC.NE.NSIC) GO TO 15
      NL=1
      NU=2
      GO TO 28
C ***** INPUT FILE G
      16 READ(IN,42,END=20)IT,ISIC,FU(3),FUC(3),FU(4),DUM,FU(5),FUC(5),
      *FU(6),FU(7)
      42 FORMAT(2X,I2,I4,F7.0,F5.0,F6.0,F5.0,F6.0,F5.0,2F4.0)
      IF(ISIC.NE.NSIC) GO TO 16
      IF(FU(4).EQ.-1.)FU(4)=DUM*PRICE
      IF(FU(4).EQ.-2.)FU(4)=DUM*PRICE
      IF(FU(4).EQ.-3.)FU(4)=DUM*PRICE
      FUC(4)=DUM
      FUC(6)=FU(6)
      FUC(7)=FU(7)
      IF(FU(4).LT.0.)FU(4)=-1.
      NL=3
      NU=7
      GO TO 28
C ***** INPUT FILE H
      17 READ(IN,43,END=20)IT,ISIC,FU(8),FUC(8),FU(9)
      43 FORMAT(2X,I2,I4,10X,F7.0,F5.0,F7.0)

```

```

      IF (ISIC.NE.NSIC) GO TO 17
      NL=8
      NU=9
26  CONTINUE
      IST=10(I1)
      DO 23 I=NL,NU
      IF (FU(I).GT.0..AND.FUC(I).GT.0.5) PR(IST,I)=FUC(I)/FU(I)
23  VALUE(IST,I)=FU(I)
      GO TO 32
20  CONTINUE
      WRITE(6,171) NSIC
155  FORMAT(13,8F13.3,5X,I2 ,1X,F13.0)
      WRITE(6,80)
171  FORMAT('1  PRICES FOR SIC',I5,' IN MILLION $/UNIT'/)
      WRITE(6,155)((I,(PR(I,J),J=1,10)),I=1,52)
C *** PRINTOUT INPUT VALUES IN THE PHYSICAL UNITS
      WRITE(6,71) NSIC
      WRITE(6,80)
71  FORMAT('1  AMOUNT CONSUMED FOR SIC',I5,' IN PHYS. UNITS'/)
      WRITE(6,55)((I,(VALUE(I,J),J=1,10)),I=1,52)
C *** COMPUTE TOTAL FUEL CONSUMPTION AND REGIONAL CONSUMPTION
      BIGSUM=0.
C
C *** STEP 1          DEVELOP 1971 CONSUMPTION VALUES IN BTU
C
      DO 44 I=1,52
      KY=0
      SU=0.
      IF (VALUE(I,9).GT.0.) VALUE(I,9)=VALUE(I,9)*BTU(9)
      DO 45 J=1,8
      IF (VALUE(I,J).LT.0.) GO TO 45
      KY=KY+1
      VALUE(I,J)=VALUE(I,J)*BTU(J)
      IF (I.NE.52) AN(J)=AN(J)+VALUE(I,J)
      IF (I.EQ.52) AN(10)=AN(10)+AN(J)
      SU=SU+VALUE(I,J)
45  CONTINUE
      VALUE(I,10)=-SU
      IF (KY.LT.8) GO TO 44
      IF (I.NE.52) BIGSUM=BIGSUM+SU
      VALUE(I,10)=SU
      IREG=INT(I)/10
      DO 46 J=1,10
      IF (J.EQ.9) GO TO 46
      IF (SUM(IREG,J).EQ.-1.) SUM(IREG,J)=0.
      SUM(IREG,J)=SUM(IREG,J)+VALUE(I,J)
46  CONTINUE
44  CONTINUE

```

```

WRITE(6,72)NSIC
WRITE(6,80)
72 FORMAT('1 REPORTED 10**9 BTUS FOR SIC',15/)
WRITE(6,55)((I,(VALUE(I,J),J=1,10)),I=1,52)
WRITE(6,55)I,AN
DO 61 J=1,8
IF(AN(J).LE.0.) GO TO 61
IF(VALUE(52,J).LT.AN(J))WRITE(6,82)J
IF(VALUE(52,J).LT.AN(J))VALUE(52,J)=AN(J)
61 CONTINUE
82 FORMAT('/' '***ERROR FOR FUEL',12,' STATE SUM GREATER THAN U.S. VAL
*UE'/)
C *** COMPUTE REGIONAL SHARES
DO 47 I=1,9
DO 47 J=1,8
IF(SUM(I,J).EQ.-1.)SUM(I,J)=0.
IF(SUM(I,10).LE.0.) GO TO 47
SUM(I,J)=SUM(I,J)/SUM(I,10)
47 CONTINUE
DIF=VALUE(52,10)-BIGSUM
DIF=-DIF
SV=0.
DO 48 I=1,51
IF(VALUE(I,10).GT.0.) GO TO 48
SV=SV+VADD(I)
48 CONTINUE
C *** ALLOCATE TOTAL FUEL BY VALUE ADDED SHARE
C AND INDIVIDUAL FUEL BY REGIONAL SHARE
DO 49 I=1,51
IF(VALUE(I,10).GT.0.) GO TO 49
QUA=0.
TEMP=VALUE(I,10)
IF(SV.NE.0.)QUA=DIF*VADD(I)/SV
IF(TEMP.EQ.-1.)TEMP=0.
IF(TEMP.EQ.-2.)TEMP=0.
IF(TEMP.EQ.-3.)TEMP=0.
VALUE(I,10)=TEMP
IF(QUA.LI.TEMP)VALUE(I,10)=QUA
IREG=IIT(I)/10
SU=0.
BIGSUM=0.
DO 50 J=1,8
IF(VALUE(I,J).GE.0.)SU=SU+VALUE(I,J)
IF(VALUE(I,J).LT.0.)BIGSUM=BIGSUM+SUM(IREG,J)
50 CONTINUE
DIFF=VALUE(I,10)+SU
DO 51 J=1,8
IF(VALUE(I,J).GE.0.) GO TO 51

```

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        VALUE(I,J)=0.
        IF(BIGSUM.NE.0.)VALUE(I,J)=DIFF*SUM(I,REG,J)/BIGSUM
51      CONTINUE
49      CONTINUE
C *** NORMALIZE EACH FUEL BY AVAILABLE VALUE FOR U.S.
        DO 53 J=1,8
        SU=0.
        BIGSUM=0.
        DO 52 I=1,51
        IF(VALUE(I,J).GE.0.)SU=SU+VALUE(I,J)
        IF(VALUE(I,J).LT.0.)BIGSUM=BIGSUM+VALUE(I,J)
52      CONTINUE
        DIF=VALUE(52,J)-SU
        IF(DIF.LT.0.)DIF=0.
        IF(VALUE(52,J).EQ.-1.)DIF=-1.
        IF(BIGSUM.EQ.0.) GO TO 53
        DO 54 I=1,51
        IF(DIF.EQ.-1..AND.VALUE(I,J).NE.0.)VALUE(I,J)=-1.
        IF(VALUE(I,J).GE.0.) GO TO 54
        VALUE(I,J)=VALUE(I,J)*DIF/BIGSUM
        IF(DIF.EQ.-1..AND.VALUE(I,J).NE.0.)VALUE(I,J)=-1.
54      CONTINUE
53      CONTINUE
        DO 56 I=1,52
        SU=0.
        DO 57 J=1,8
        IF(VALUE(I,J).GE.0.)SU=SU+VALUE(I,J)
57      CONTINUE
56      VALUE(I,10)=SU
        WRITE(6,73)NSIC
        WRITE(6,80)
73      FORMAT('1 AFTER ALLOCATION & NORMALIZATION 10**9 BTUS FOR SIC',15/)
        WRITE(6,55)((I,(VALUE(I,J),J=1,10)),I=1,52)
55      FORMAT(13,6F13.1,5X,12,1X,F13.0)
C
        CALL OUT(VALUE,NSIC,2)
C
        CALL REGION (VALUE,SUM,NSIC,2)
C
C *** STEP 2          DEVELOP 1971 DATA IN PHYSICAL UNITS
C
        DO 200 I=1,52
        DO 201 J=1,8
        IF(J.EQ.6) GO TO 201
        IF(J.EQ.7) GO TO 201
        IF(VALUE(I,J).NE.-1.)VALUE(I,J)=VALUE(I,J)/BTU(J)
201      CONTINUE
200      CONTINUE

```

```
      CALL OUT(VALUE,NSIC,1)
      CALL REGION(VALUE,SUM,NSIC,1)
C
C *** STEP 3    DEVELOP 1971 EXPENDITURE DATA
CC
      DO 300 I=1,52
      SU=-1.
      DO 301 J=1,8
      IF(J.EQ.6.AND.VALUE(I,J).NE.-1.)VALUE(I,J)=VALUE(I,J)/BTU(J)
      IF(J.EQ.7.AND.VALUE(I,J).NE.-1.)VALUE(I,J)=VALUE(I,J)/BTU(J)
      IF(VALUE(I,J).NE.-1.)VALUE(I,J)=VALUE(I,J)*PR(I,J)
      IF(VALUE(I,J).NE.-1..AND.SU.EQ.-1.)SU=0.
      IF(VALUE(I,J).NE.-1.)SU=SU+VALUE(I,J)
301 CONTINUE
300 VALUE(I,10)=SU
      CALL OUT(VALUE,NSIC,3)
      CALL REGION(VALUE,SUM,NSIC,3)
C
      GO TO 98
99 CONTINUE
80 FORMAT(' STATE      DIST OIL      RES OIL      COAL      COKE',
*6X,' NAT GAS      OTHER      NSK      ELECTRICITY',
* 5X,' TOTAL FUEL')
      STOP
      END
```

C *****

C

C SUBROUTINE REGION (VALUE,SUM,NSIC,IFILE)

C

C *****

C

C

```

SUBROUTINE REGION(VALUE,SUM,NSIC,IFILE)
  DIMENSION VALUE(52,10),SUM(10,10),ITT(52),IS(10),ISIC(16),VAR(288)
  *,IF(10)
  DATA ITT/51,91,81,71,92,82,11,31,32,33,34,93,83,41,42,61,62,52,72,
  112,35,13,43,63,53,64,84,65,85,14,21,86,22,36,66,44,73,94,23,15,37,
  267,54,74,87,16,38,95,39,45,88,100/
  DATA ISIC/20,21,22,23,24,25,27,30,31,34,35,36,37,38,39,32/
  DATA IS/1,8,12,22,28,33,41,46,55,61/
  DATA IF/3,4,1,2,8,12,12,11,11,13/
80 FORMAT('OREGION      DIST OIL      RES OIL      COAL      COKE',
  *6X,'NAT GAS      OTHER      NSK      ELECTRICITY',
  *5X,'TOTAL FUEL')
55 FORMAT(I3,6F13.3,5X,I2  ,1X,F13.3)
  DO 11 I=1,10
  DO 11 J=1,10
11 SUM(I,J)=-1.
  DO 12 I=1,52
  IREG=ITT(I)/10
  DO 12 J=1,10
  IF(VALUE(I,J).NE.-1..AND.SUM(IREG,J).EQ.-1.)SUM(IREG,J)=0.
  IF(VALUE(I,J).NE.-1.)SUM(IREG,J)=SUM(IREG,J)+VALUE(I,J)
12 CONTINUE
  WRITE(6,80)
  WRITE(6,55)((I,(SUM(I,J),J=1,10)),I=1,10)
  IYR=2
  DO 1 I=1,16
  IF(ISIC(I).EQ.NSIC/100) GO TO 2
1 CONTINUE
  RETURN
2 CONTINUE
  IND=1
  DO 3 IST=1,10
  ISTATE=IS(IST)
  DO 3 IFL=1,10
  IF(IFL.EQ.9)GO TO 3
  IFUEL=IF(IFL)
  IREC=IFUEL+13*(ISTATE-1)+13*61*(IYR-1)
  READ(IFILE'IREC)VAR
  DO 4 IFUNC=17,18
  IFIELD=IND+16*(IFUNC-1)
  IF(VAR(IFIELD).EQ.-1..AND.SUM(IST,IFL).NE.-1.)VAR(IFIELD)=0.

```

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```
IF(SUM(IST,IFL).NE.-1.)VAR(IFIELD)=VAR(IFIELD)+SUM(IST,IFL)
4 CONTINUE
WRITE(IFILE,IREC)VAR
3 CONTINUE
RETURN
END
```

```

C *****
C
C   SUBROUTINE OUT(VALUE,NSIC,IFILE)
C
C *****
C
C   SUBROUTINE OUT(VALUE,NSIC,IFILE)
C     DIMENSION VALUE(52,10),IS(51),VAR(288),ISIC(16),IF(10)
C     DATA ISIC/20,21,22,23,24,25,27,30,31,34,35,36,37,38,39,32/
C     DATA IS/29,56,47,42,57,48,2,13,14,15,16,58,49,23,24,34,35,30,43,
C     13,17,4,25,36,31,37,50,38,51,5,9,52,10,18,39,26,44,59,11,6,19,40,
C     232,45,53,7,20,60,21,27,54/
C     DATA IF/5,4,1,2,8,12,12,11,11,13/
C     IYR=2
C     DO 1 I=1,10
C       IF(ISIC(I).EQ.NSIC/100) GO TO 2
C 1    CONTINUE
C     RETURN
C 2    CONTINUE
C     IND=1
C     DO 3 IST=1,51
C       ISTATE=IS(IST)
C       DO 3 IFL=1,10
C         IF(IFL.EQ.9)GO TO 3
C         IFUEL=IF(IFL)
C         IREC=IFUEL+13*(ISTATE-1)+13*61*(IYR-1)
C         READ(IFILE'IREC)VAR
C         DO 4 IFUNC=17,18
C           IFIELD=IND+16*(IFUNC-1)
C           IF(VAR(IFIELD).EQ.-1..AND.VALUE(IST,IFL).NE.-1.)VAR(IFIELD)=0.
C           IF(VALUE(IST,IFL).NE.-1.)VAR(IFIELD)=VAR(IFIELD)+VALUE(IST,IFL)
C 4    CONTINUE
C     WRITE(IFILE'IREC)VAR
C 3    CONTINUE
C     RETURN
C     END

```

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```
C *****
C
C           S T E P S   4 - 6
C
C           COMPUTATIONS FOR 1974
C
C           MAIN PROGRAM FOR SMALL INDUSTRIES OF MANUFACTURING SECTOR
C
C *****
C
C
C
```

```
      DIMENSION ID(95),BTU(9),VALUE(52,10),SUM(10,10),VADD(52),
*ITT(52),FU(9),AN(10),PR(52,10),FUC(10),VAR(288)
      DATA BTU/5.025,6.287,24.88,30.12,1031.,580.04,3380.212,3.412,10.5/
      DATA ITT/51,91,81,71,92,82,11,31,32,33,34,93,83,41,42,61,62,52,72,
112,35,13,43,63,53,64,84,65,85,14,21,86,22,36,66,44,73,94,23,15,37,
267,54,74,87,16,38,95,39,45,88,100/
      DATA ID/10*0,7,20,22,30,40,46,4*0,31,33,39,7*0,8,9,10,
*11,21,34,41,47,49,0,14,15,23,36,50,5*0,1,18,25,43,6*0,
*16,17,24,26,28,35,42,3*0,4,19,37,44,6*0,3,6,13,27,29,32,
*45,51,2*0,2,5,12,38,48/
      DATA VAR/288*-1./
```

```
C
C
C *** FILE 1 FOR CUMS
C *** FILE 2 FOR 10**9 BTUS
C *** FILE 3 FOR BILLIONS OF $
C
C
```

```
      DEFINE FILE 1(2379,288,U,I1)
      DEFINE FILE 2(2379,288,U,I2)
      DEFINE FILE 3(2379,288,U,I3)
```

```
C
C *** INITIALIZE FILES TO -1.
C
```

```
      DO 91 I=1587,2379
      WRITE(1'I)VAR
      WRITE(2'I)VAR
      91 WRITE(3'I)VAR
```

```
C
C *** INPUT DESIRED SIC CODE
98      READ(5,111,END=99)NSIC,PRICE
      IF(NSIC.LE.0) GO TO 99
      111 FORMAT(I4,F15.0)
C *** INPUT VALUE ADDED SHARES FOR EVERY STATE
      DO 112 J=1,51
      112 READ(5,*)I,VADD(I)
```

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```

      SU=0.
      DO 113 I=1,51
113  SU=SU+VADD(I)
      DO 114 I=1,51
114  VADD(I)=VADD(I)/SU
      DO 115 I=1,52
      DO 115 J=1,10
        AN(J)=0.
        FUC(J)=0.
        PR(I,J)=-1.
        VALUE(I,J)=-1.
        IF(I.GT.10) GO TO 115
        SUM(I,J)=0.0
115  CONTINUE
      REWIND 25
      DO 400 IK=1,16
      READ(25,401)KKK,FNSK
401  FORMAT(I4,26X,F10.0)
      IF(KKK.EQ.NSIC)BTU(7)=FNSK
400  CONTINUE
      REWIND 20
      READ(20,156)((I,(PR(I,J),J=1,8)),K=1,52)
156  FORMAT(I2,4F15.0/2X,4F15.0)
      IST=52
      REWIND 13
      REWIND 14
      REWIND 16
      REWIND 17
      REWIND 18
C ***** INPUT FROM FILES I AND J FOR NATIONAL VALUES
      DO 10 IN=13,14
      KN=IN-12
      2 GO TO(5,6),KN
C ***** INPUT FILE I
      5 READ(IN,1,END=10)ISIC,FU(1),FUC(1),FU(2),FUC(2),FU(3),FUC(3),
      *FU(4),DUM
      1 FORMAT(4X,I4,13X,F8.0,F6.0,F8.0,F6.0,F7.0,F6.0,F7.0,F5.0)
      IF(ISIC.NE.NSIC) GO TO 5
      FUC(4)=DUM
      IF(FU(4).EQ.-1.)FU(4)=DUM*PRICE
      IF(FU(4).EQ.-2.)FU(4)=DUM*PRICE
      IF(FU(4).EQ.-3.)FU(4)=DUM*PRICE
      IF(FU(4).LT.0.)FU(4)=-1.
      NL=1
      NU=4
      GO TO 8
C ***** INPUT FILE J
      6 READ(IN,11,END=10)ISIC,FU(5),FUC(5),FU(6),FU(7),FU(8),FUC(8),FU(9)

```

```

11 FORMAT(4X,I4,2F6.0,2F5.0,F8.0,F6.0,F7.0)
   IF(ISIC.NE.NSIC) GO TO 6
   FUC(6)=FU(6)
   FUC(7)=FU(7)
   NL=5
   NU=9
8  CONTINUE
   DO 124 I=NL,NU
   IF(FU(I).GT.0..AND.FUC(I).GT.0.5)PR(IST,I)=FUC(I)/FU(I)
124 VALUE(IST,I)=FU(I)
10 CONTINUE
C ***** INPUT FROM FILES K L & M FOR STATE VALUES
   DO 20 IN=16,18
   KN=IN-15
   32 GO TO (15,16,17),KN
C ***** INPUT FILE K
15 READ(IN,41,END=20)IT,ISIC,FU(1),FUC(1),FU(2),FUC(2)
41 FORMAT(2X,I2,I4,22X,F7.0,F4.0,F7.0,F4.0)
   IF(ISIC.NE.NSIC) GO TO 15
   NL=1
   NU=2
   GO TO 28
C ***** INPUT FILE L
16 READ(IN,42,END=20)IT,ISIC,FU(3),FUC(3),FU(4),DUM,FU(5),FUC(5),
   *FU(6),FU(7)
42 FORMAT(2X,I2,I4,F7.0,F5.0,F6.0,F5.0,F6.0,F5.0,2F4.0)
   IF(ISIC.NE.NSIC) GO TO 16
   IF(FU(4).EQ.-1.)FU(4)=DUM*PRICE
   IF(FU(4).EQ.-2.)FU(4)=DUM*PRICE
   IF(FU(4).EQ.-3.)FU(4)=DUM*PRICE
   FUC(4)=DUM
   FUC(6)=FU(6)
   FUC(7)=FU(7)
   IF(FU(4).LT.0.)FU(4)=-1.
   NL=3
   NU=7
   GO TO 28
C ***** INPUT FILE M
17 READ(IN,43,END=20)IT,ISIC,FU(8),FUC(8),FU(9)
43 FORMAT(2X,I2,I4,10X,F7.0,F5.0,F7.0)
   IF(ISIC.NE.NSIC) GO TO 17
   NL=8
   NU=9
28 CONTINUE
   IST=ID(IT)
   DO 23 I=NL,NU
   IF(FU(I).GT.0..AND.FUC(I).GT.0.5)PR(IST,I)=FUC(I)/FU(I)
23 VALUE(IST,I)=FU(I)

```

```

      GO TO 32
20    CONTINUE
      WRITE(6,171)NSIC
155   FORMAT(I3,8F13.3,5X,I2 ,1X,F13.0)
      WRITE(6,80)
171   FORMAT('1  PRICES FOR SIC',I5,' IN MILLION $/UNIT'/)
      WRITE(6,155)((I,(PR(I,J),J=1,10)),I=1,52)
C *** PRINTOUT INPUT VALUES IN THE PHYSICAL UNITS
      WRITE(6,71)NSIC
      WRITE(6,80)
71    FORMAT('1  AMOUNT CONSUMED FOR SIC',I5,' IN PHYS.UNITS'/)
      WRITE(6,55)((I,(VALUE(I,J),J=1,10)),I=1,52)
C *** COMPUTE TOTAL FUEL CONSUMPTION AND REGIONAL CONSUMPTION
      BIGSUM=0.
C
C *** STEP 4          DEVELOP 1974 BTU VALUES
C
      DO 44 I=1,52
      KY=0
      SU=0.
      IF(VALUE(I,9).GT.0.)VALUE(I,9)=VALUE(I,9)*BTU(9)
      DO 45 J=1,8
      IF(VALUE(I,J).LT.0.) GO TO 45
      KY=KY+1
      VALUE(I,J)=VALUE(I,J)*BTU(J)
      IF(I.NE.52)AN(J)=AN(J)+VALUE(I,J)
      IF(I.EQ.52)AN(10)=AN(10)+AN(J)
      SU=SU+VALUE(I,J)
45    CONTINUE
      VALUE(I,10)=-SU
      IF(KY.LT.8) GO TO 44
      IF(I.NE.52)BIGSUM=BIGSUM+SU
      VALUE(I,10)=SU
      IREG=ITT(I)/10
      DO 46 J=1,10
      IF(J.EQ.9) GO TO 46
      IF(SUM(IREG,J).EQ.-1.)SUM(IREG,J)=0.
      SUM(IREG,J)=SUM(IREG,J)+VALUE(I,J)
46    CONTINUE
44    CONTINUE
      WRITE(6,72)NSIC
      WRITE(6,80)
72    FORMAT('1  REPORTED 10**9 BTUS FOR SIC',I5/)
      WRITE(6,55)((I,(VALUE(I,J),J=1,10)),I=1,52)
      WRITE(6,55)I,AN
      DO 61 J=1,8
      IF(AN(J).LE.0.) GO TO 61
      IF(VALUE(52,J).LT.AN(J))WRITE(6,62)J

```

```

        IF(VALUE(52,J).LT.AN(J))VALUE(52,J)=AN(J)
61 CONTINUE
62 FORMAT(/' ***ERROR FOR FUEL',I2,' STATE SUM GREATER THAN U.S. VAL
    *UE'/)
C *** COMPUTE REGIONAL SHARES
    DO 47 I=1,9
    DO 47 J=1,8
    IF(SUM(I,J).EQ.-1.)SUM(I,J)=0.
    IF(SUM(I,10).LE.0.) GO TO 47
    SUM(I,J)=SUM(I,J)/SUM(I,10)
47 CONTINUE
    DIF=VALUE(52,10)-BIGSUM
    DIF=-DIF
    SV=0.
    DO 48 I=1,51
    IF(VALUE(I,10).GT.0.) GO TO 48
    SV=SV+VADD(I)
48 CONTINUE
C *** ALLOCATE TOTAL FUEL BY VALUE ADDED SHARE
C AND INDIVIDUAL FUEL BY REGIONAL SHARE
    DO 49 I=1,51
    IF(VALUE(I,10).GT.0.) GO TO 49
    GUA=0.
    TEMP=VALUE(I,10)
    IF(SV.NE.0.)QUA=DIF*VADD(I)/SV
    IF(TEMP.EQ.-1.)TEMP=0.
    IF(TEMP.EQ.-2.)TEMP=0.
    IF(TEMP.EQ.-3.)TEMP=0.
    VALUE(I,10)=TEMP
    IF(QUA.LT.TEMP)VALUE(I,10)=QUA
    IREG=ITT(I)/10
    SU=0.
    BIGSUM=0.
    DO 50 J=1,8
    IF(VALUE(I,J).GE.0.)SU=SU+VALUE(I,J)
    IF(VALUE(I,J).LT.0.)BIGSUM=BIGSUM+SUM(IREG,J)
50 CONTINUE
    DIFF=VALUE(I,10)+SU
    DO 51 J=1,8
    IF(VALUE(I,J).GE.0.) GO TO 51
    VALUE(I,J)=0.
    IF(BIGSUM.NE.0.)VALUE(I,J)=DIFF*SUM(IREG,J)/BIGSUM
51 CONTINUE
49 CONTINUE
C *** NORMALIZE EACH FUEL BY AVAILABLE VALUE FOR U.S.
    DO 53 J=1,8
    SU=0.
    BIGSUM=0.

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      DO 52 I=1,51
      IF(VALUE(I,J).GE.0.)SU=SU+VALUE(I,J)
      IF(VALUE(I,J).LT.0.)BIGSUM=BIGSUM+VALUE(I,J)
52  CONTINUE
      DIF=VALUE(52,J)-SU
      IF(DIF.LT.0.)DIF=0.
      IF(VALUE(52,J).EQ.-1.)DIF=-1.
      IF(BIGSUM.EQ.0.) GO TO 53
      DO 54 I=1,51
      IF(DIF.EQ.-1..AND.VALUE(I,J).NE.0.)VALUE(I,J)=-1.
      IF(VALUE(I,J).GE.0.) GO TO 54
      VALUE(I,J)=VALUE(I,J)*DIF/BIGSUM
      IF(DIF.EQ.-1..AND.VALUE(I,J).NE.0.)VALUE(I,J)=-1.
54  CONTINUE
53  CONTINUE
      DO 56 I=1,52
      SU=0.
      DO 57 J=1,8
      IF(VALUE(I,J).GE.0.)SU=SU+VALUE(I,J)
57  CONTINUE
56  VALUE(I,10)=SU
      WRITE(6,73)NSIC
      WRITE(6,80)
73  FORMAT('1 AFTER ALLOCATION &NORMALIZATION 10**9 BTUS FOR SIC',I5/)
      WRITE(6,55)((I,(VALUE(I,J),J=1,10)),I=1,52)
55  FORMAT(I3,8F13.1,5X,I2 ,1X,F13.0)

C
      CALL OUT(VALUE,NSIC,2)
C
      CALL REGION (VALUE,SUM,NSIC,2)
C
C *** STEP 5      DEVELOP 1974 PHYSICAL UNITS
C
      DO 200 I=1,52
      DO 201 J=1,8
      IF(J.EQ.6) GO TO 201
      IF(J.EQ.7) GO TO 201
      IF(VALUE(I,J).NE.-1.)VALUE(I,J)=VALUE(I,J)/BTU(J)
201  CONTINUE
200  CONTINUE
      CALL OUT(VALUE,NSIC,1)
      CALL REGION(VALUE,SUM,NSIC,1)
C
C *** STEP 6      DEVELOP 1974 EXPENDITURE VALUES
C
      DO 300 I=1,52
      SU=-1.
      DO 301 J=1,8

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IF(J.EQ.6.AND.VALUE(I,J).NE.-1.)VALUE(I,J)=VALUE(I,J)/BTU(J)
IF(J.EQ.7.AND.VALUE(I,J).NE.-1.)VALUE(I,J)=VALUE(I,J)/BTU(J)
IF(VALUE(I,J).NE.-1.)VALUE(I,J)=VALUE(I,J)*PR(I,J)
IF(VALUE(I,J).NE.-1..AND.SU.EQ.-1.)SU=0.
IF(VALUE(I,J).NE.-1.)SU=SU+VALUE(I,J)
301 CONTINUE
300 VALUE(I,10)=SU
CALL OUT(VALUE,NSIC,3)
CALL REGION(VALUE,SUM,NSIC,3)
C
GO TO 98
99 CONTINUE
80 FORMAT(' STATE      DIST OIL      RES OIL      COAL      COKE',
*6X,'NAT GAS      OTHER      NSK      ELECTRICITY',
* 5X,'TOTAL FUEL')
STOP
END
```

```

C *****
C
C   SUBROUTINE REGION (VALUE,SUM,NSIC,IFILE)
C
C *****
C
C
C   SUBROUTINE REGION(VALUE,SUM,NSIC,IFILE)
C   DIMENSION VALUE(52,10),SUM(10,10),ITT(52),IS(10),ISIC(16),VAR(288)
C   *,IF(10)
C   DATA ITT/51,91,81,71,92,82,11,31,32,33,34,93,83,41,42,61,62,52,72,
C   112,35,13,43,63,53,64,84,65,85,14,21,86,22,36,66,44,73,94,23,15,37,
C   267,54,74,87,16,38,95,39,45,88,100/
C   DATA ISIC/20,21,22,23,24,25,27,30,31,34,35,36,37,38,39,32/
C   DATA IS/1,8,12,22,28,33,41,46,55,61/
C   DATA IF/3,4,1,2,8,12,12,11,11,13/
80  FORMAT('OREGION      DIST OIL      RES OIL      COAL      COKE',
C   *6X,'NAT GAS      OTHER      NSK      ELECTRICITY',
C   * 5X,'TOTAL FUEL')
55  FORMAT(I3,8F13.3,5X,I2  ,1X,F13.3)
C   DO 11 I=1,10
C   DO 11 J=1,10
11  SUM(I,J)=-1.
C   DO 12 I=1,52
C   IREG=ITT(I)/10
C   DO 12 J=1,10
C   IF(VALUE(I,J).NE.-1..AND.SUM(IREG,J).EQ.-1.)SUM(IREG,J)=0.
C   IF(VALUE(I,J).NE.-1.)SUM(IREG,J)=SUM(IREG,J)+VALUE(I,J)
12  CONTINUE
C   WRITE(6,80)
C   WRITE(6,55)((I,(SUM(I,J),J=1,10)),I=1,10)
C   IYR=3
C   DO 1 I=1,16
C   IF(ISIC(I).EQ.NSIC/100) GO TO 2
1  CONTINUE
C   RETURN
2  CONTINUE
C   IND=I
C   DO 3 IST=1,10
C   ISTATE=IS(IST)
C   DO 3 IFL=1,10
C   IF(IFL.EQ.9)GO TO 3
C   IFUEL=IF(IFL)
C   IREC=IFUEL+13*(ISTATE-1)+13*61*(IYR-1)
C   READ(IFILE'IREC)VAR
C   DO 4 IFUNC=17,18
C   IFIELD=IND+16*(IFUNC-1)
C   IF(VAR(IFIELD).EQ.-1..AND.SUM(IST,IFL).NE.-1.)VAR(IFIELD)=0.

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```
      IF(SUM(IST,IFL).NE.-1.)VAR(IFIELD)=VAR(IFIELD)+SUM(IST,IFL)
4  CONTINUE
      WRITE(IFILE'REC)VAR
3  CONTINUE
      RETURN
      END
```

```

C *****
C
C   SUBROUTINE OUT(VALUE,NSIC,IFILE)
C
C *****
C
C   SUBROUTINE OUT(VALUE,NSIC,IFILE)
C     DIMENSION VALUE(52,10),IS(51),VAR(288),ISIC(16),IF(10)
C     DATA ISIC/20,21,22,23,24,25,27,30,31,34,35,36,37,38,39,32/
C     DATA IS/29,56,47,42,57,48,2,13,14,15,16,58,49,23,24,34,35,30,43,
C     13,17,4,25,36,31,37,50,38,51,5,9,52,10,18,39,26,44,59,11,6,19,40,
C     232,45,53,7,20,60,21,27,54/
C     DATA IF/3,4,1,2,8,12,12,11,11,13/
C     IYR=3
C     DO 1 I=1,16
C       IF(ISIC(I).EQ.NSIC/100) GO TO 2
C 1 CONTINUE
C     RETURN
C 2 CONTINUE
C     IND=1
C     DO 3 IST=1,51
C       ISTATE=IS(IST)
C       DO 3 IFL=1,10
C         IF(IFL.EQ.9)GO TO 3
C         IFUEL=IF(IFL)
C         IREC=IFUEL+13*(ISTATE-1)+13*61*(IYR-1)
C         READ(IFILE'IREC)VAR
C         DO 4 IFUNC=17,18
C           IFIELD=IND+16*(IFUNC-1)
C           IF(VAR(IFIELD).EQ.-1..AND.VALUE(IST,IFL).NE.-1.)VAR(IFIELD)=0.
C           IF(VALUE(IST,IFL).NE.-1.)VAR(IFIELD)=VAR(IFIELD)+VALUE(IST,IFL)
C 4 CONTINUE
C         WRITE(IFILE'IREC)VAR
C 3 CONTINUE
C     RETURN
C     END

```

```

C *****
C
C           S T E P S       7   -   9
C
C           COMPUTATIONS FOR 1967
C
C           MAIN PROGRAM FOR SMALL INDUSTRIES OF MANUFACTURING SECTOR
C
C *****
C
C
C           DIMENSION BTU(9),VALUE(10),FU(10),PR(10),FUC(10),VAR(288)
C           DATA BTU/5.825,6.287,24.88,30.12,1031.,580.04,3380.212,3.412,10.5/
C           DATA VAR/288*-1./
C
C
C *** FILE 1 FOR CONS
C *** FILE 2 FOR 10**9 BTUS
C *** FILE 3 FOR MILLIONS OF $
C
C           DEFINE FILE 1(2379,288,U,I1)
C           DEFINE FILE 2(2379,288,U,I2)
C           DEFINE FILE 3(2379,288,U,I3)
C
C *** INITIALIZE FILES TO -1.
C
C           DO 91 I=1,793
C           WRITE(1'I)VAR
C           WRITE(2'I)VAR
C           91 WRITE(3'I)VAR
C
C *** INPUT DESIRED SIC CODE
98 READ(5,111,END=99)NSIC
   IF(NSIC.LE.0) GO TO 99
111 FORMAT(I4)
   DO 115 J=1,10
   FUC(J)=0.
   FU(J)=0.
   PR(J)=-1.
   VALUE(J)=-1.
115 CONTINUE
   REWIND 25
   DO 400 IK=1,16
   READ(25,401)KKK,FNSK
401 FORMAT(I4,6X,F10.0)
   IF(KKK.EQ.NSIC)BTU(7)=FNSK

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400 CONTINUE
  REWIND 13
  REWIND 14
C ***** INPUT FROM FILES A AND B FOR NATIONAL VALUES
  DO 10 IN=13,14
    KN=IN-12
    2 GO TO(5,6),KN
C ***** INPUT FILE A
  5 READ(IN,1,END=10)ISIC,FU(1),FUC(1),FU(2),FUC(2),FU(5),FUC(5),FU(6)
  *,FU(7),FU(8),FUC(8),FU(9)
  1 FORMAT(4X,I4,F7.0,F5.0,F8.0,F5.0,F9.0,F6.0,2F5.0,F8.0,F6.0,F7.0)
  IF(ISIC.NE.NSIC) GO TO 5
  IF(FU(5).GT.0.)FU(5)=FU(5)/1000.
  FUC(6)=FU(6)
  FUC(7)=FU(7)
  GO TO 8
C ***** INPUT FILE B
  6 READ(IN,11,END=10)ISIC,FU(3),FUC(3),FU(4),FUC(4)
  11 FORMAT(4X,I4,21X,2(F7.0,F5.0))
  IF(ISIC.NE.NSIC) GO TO 6
  8 CONTINUE
  NL=3
  NU=4
  IF(IN.EQ.13)NL=1
  IF(IN.EQ.13)NU=9
  DO 124 I=NL,NU
    IF(FU(I).GT.0..AND.FUC(I).GT.0.)PR(I)=FUC(I)/FU(I)
  124 VALUE(1)=FU(1)
  10 CONTINUE
  WRITE(6,21) NSIC
  21 FORMAT(///' FOR 1967 NATIONAL VALUES FOR SIC',I5/)
  WRITE(6,80)
  WRITE(6,22)PR
  WRITE(6,22)VALUE
  22 FORMAT(3X,8F13.3,5X,I2,1X,F13.3)
  IF(VALUE(9).NE.-1.)VALUE(9)=VALUE(9)*BTU(9)
C
CC ***** STEP 7          DEVELOP 1967 BTU VALUES
C
  SU=0.
  DO 23 J=1,8
    IF(VALUE(J).NE.-1.)VALUE(J)=VALUE(J)*BTU(J)
    IF(VALUE(J).NE.-1.)SU=SU+VALUE(J)
  23 CONTINUE
  VALUE(10)=SU
  WRITE(6,22)VALUE
C
  CALL OUT(VALUE,NSIC,2)

```

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```

C
C
C *** STEP 8          DEVELOP 1967 CONSUMPTION IN PHYS. UNITS
CC

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```

      DO 201 J=1,8
      IF(J.EQ.6) GO TO 201
      IF(J.EQ.7) GO TO 201
      IF(VALUE(J).NE.-1.)VALUE(J)=VALUE(J)/BTU(J)
201 CONTINUE
      WRITE(6,22)VALUE
      CALL OUT(VALUE,NSIC,1)

```

```

C
C *** STEP 9          DEVELOP 1967 EXPENDITURES
C

```

```

      SU=-1.
      DO 301 J=1,8
      IF(J.EQ.6.AND.VALUE(J).NE.-1.)VALUE(J)=VALUE(J)/BTU(J)
      IF(J.EQ.7.AND.VALUE(J).NE.-1.)VALUE(J)=VALUE(J)/BTU(J)
      IF(VALUE(J).NE.-1.)VALUE(J)=VALUE(J)*PR(J)
      IF(VALUE(J).NE.-1..AND.SU.EQ.-1.)SU=0.
      IF(VALUE(J).NE.-1.)SU=SU+VALUE(J)
301 CONTINUE
      VALUE(10)=SU
      WRITE(6,22)VALUE
      CALL OUT(VALUE,NSIC,3)

```

```

C
      GO TO 98
99 CONTINUE
80 FORMAT(' STATE          DIST OIL          RES OIL          COAL          COKE ',
          *6X,' NAT GAS          OTHER          NSK          ELECTRICITY ',
          * 5X,' TOTAL FUEL ')
      STOP
      END

```

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```

C *****
C
C   SUBROUTINE OUT(VALUE,NSIC,IFILE)
C
C *****
C

```

```

      SUBROUTINE OUT(VALUE,NSIC,IFILE)
      DIMENSION VALUE(10),VAR(288),ISIC(16),IF(10),V71(61,10),RAT(10)
      DATA ISIC/20,21,22,23,24,25,27,30,31,34,35,36,37,38,39,32/
      DATA IF/3,4,1,2,8,12,12,11,11,13/
      DO 1 I=1,16
      IF(ISIC(I).EQ.NSIC/100) GO TO 2
1  CONTINUE
      RETURN
2  CONTINUE
      IND=I
      IFUNC=18
      IYR=2
      IFIELD=IND+16*(IFUNC-1)
      DO 5 I=1,61
      DO 5 J=1,10
      RAT(J)=-1.
5  V71(I,J)=-1.
      DO 6 ISTATE=1,61
      DO 6 IFL=1,10
      IF(IFL.EQ.7) GO TO 6
      IF(IFL.EQ.9) GO TO 6
      IFUEL=IF(IFL)
      IREC=IFUEL+13*(ISTATE-1)+13*61*(IYR-1)
      READ(IFILE,IREC)VAR
      IF(VAR(IFIELD).NE.-1..AND.V71(ISTATE,IFL).EQ.-1.)V71(ISTATE,IFL)=0
      *
      IF(VAR(IFIELD).NE.-1.)V71(ISTATE,IFL)=V71(ISTATE,IFL)+VAR(IFIELD)
6  CONTINUE
      DO 7 J=1,10
      IF(J.EQ.7) GO TO 7
      IF(J.EQ.9) GO TO 7
      SU=VALUE(J)
      IF(J.NE.6) GO TO 8
      IF(SU.EQ.-1..AND.VALUE(J+1).NE.-1.)SU=0.
      IF(VALUE(J+1).NE.-1.)SU=SU+VALUE(J+1)
8  CONTINUE
      IF(SU.LE.0.) GO TO 7
      IF(V71(61,J).LE.0.)V71(61,J)=1.
      IF(V71(61,J).LE.0.) GO TO 7
      RAT(J)=SU/V71(61,J)
7  CONTINUE
      DO 9 I=1,61

```

```

      DO 9 J=1,10
      IF(J.EQ.7) GO TO 9
      IF(J.EQ.9) GO TO 9
      IF(V71(I,J).NE.-1.)V71(I,J)=V71(I,J)*RAT(J)
      IF(RAT(J).EQ.-1..AND.V71(I,J).NE.0.)V71(I,J)=-1.
9  CONTINUE
      IF(IFILE.NE.1)GO TO 10
      WRITE(6,11)((I,(V71(I,J),J=1,10)),I=1,61)
11  FORMAT(13,8F13.2,5X,I2,1X,F13.1)
10  CONTINUE
      IYR=1
      DO 3 ISTATE=1,61
      DO 3 IFL=1,10
      IF(IFL.EQ.7) GO TO 3
      IF(IFL.EQ.9)GO TO 3
      IFUEL=IF(IFL)
      IREC=IFUEL+13*(ISTATE-1)+13*61*(IYR-1)
      READ(IFILE'IREC)VAR
      DO 4 IFUNC=17,18
      IFIELD=IND+16*(IFUNC-1)
      IF(VAR(IFIELD).EQ.-1..AND.V71(ISTATE,IFL).NE.-1.)VAR(IFIELD)=0.
      IF(V71(ISTATE,IFL).NE.-1.)VAR(IFIELD)=VAR(IFIELD)+V71(ISTATE,IFL)
4  CONTINUE
      WRITE(IFILE'IREC)VAR
3  CONTINUE
      RETURN
      END

```

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C *****

C

C

S T E P 10

C

C

C

SMALL INDUSTRIES OF MANUFACTURING SECTOR

C

C

*** FUNCTIONAL USE BREAKDOWN FOR SIC 20 ***

C

C

C

C

DIMENSION VAR(288),GEN(3),IF(5),FUEL(5),BTU(5,10),FUNC(5,10),IFU(10
*0),BT(5),PR(5)

C

C

DATA GEN/2386.6,2660.1,2591.7/

DATA BT/24.88,5.825,6.287,1031.,3.412/

DATA IFU/1,3,4,5,11,12,13,15,17,18/

DATA IF/1,3,4,8,11/

DATA FUNC/4.7,5.5,5.,4.5,5*0.,2.5,4*0.,23.,0.,2*14.8,16,5,6*0.,93.
*2,69.9,72.5,70.1,10*0.,72.8,2.1,9.8,8.,8,9,1.7,5*100./

C

C

DEFINE FILE 1(2379,288,0,I1)

DEFINE FILE 2(2379,288,0,I2)

DEFINE FILE 3(2379,288,0,I3)

C

C

IND=1

DO 1 IYR=1,3

ELEC=GEN(IYR)*10.5

ISTATE=61

IFUNC=18

IFIELD=IND+16*(IFUNC-1)

SU=0.

DO 2 IFL=1,5

IFUEL=IF(IFL)

IREC=IFUEL+13*(ISTATE-1)+13*61*(IYR-1)

READ(2,IREC)VAR

FUEL(IFL)=VAR(IFIELD)

IF(IFL.EQ.5) GO TO 2

IF(FUEL(IFL).NE.-1.)SU=SU+FUEL(IFL)

2 CONTINUE

DO 3 IFL=1,5

BTU(IFL,10)=FUEL(IFL)

IF(IFL.EQ.5) GO TO 3

IF(FUEL(IFL).NE.-1.)FUEL(IFL)=ELEC*FUEL(IFL)/SU

```

      IF(FUEL(IFL).NE.-1.)BTU(IFL,7)=FUEL(IFL)
      IF(FUEL(IFL).NE.-1.)BTU(IFL,10)=BTU(IFL,10)-FUEL(IFL)
3    CONTINUE
      BTU(5,10)=BTU(5,10)+ELEC*3.412/10.5
      DO 4 IFL=1,5
      DO 14 J=1,10
      IF(J.EQ.7) GO TO 14
      BTU(IFL,J)=BTU(IFL,10)*FUNC(IFL,J)/100.
      IF(BTU(IFL,10).EQ.-1..AND.FUNC(IFL,J).NE.0.)BTU(IFL,J)=-1.
14   CONTINUE
      IF(IFL.EQ.5) GO TO 4
      BTU(IFL,10)=BTU(IFL,10)+FUEL(IFL)
4    CONTINUE
      BTU(5,10)=BTU(5,10)-ELEC*3.412/10.5
      BTU(5,7)=-ELEC *3.412/10.5
      WRITE(6,5)BTU
5    FORMAT(5F13.3)
      ISTATE=61
      DO 6 IFL=1,5
      IFUEL=IF(IFL)
      IREC=IFUEL+13*(ISTATE-1)+13*61*(IYR-1)
      READ(2'IREC)VAR
      DO 7 IFUN=1,10
      IFUNC=IFU(IFUN)
      IFIELD=IND+16*(IFUNC-1)
      VAR(IFIELD)=BTU(IFL,IFUN)
      IF(IFUNC.EQ.5)VAR(IND+16*(10-1))=VAR(IFIELD)
7    CONTINUE
      WRITE(2'IREC)VAR
6    CONTINUE
      DO 8 IFL=1,5
      IFUEL=IF(IFL)
      IREC=IFUEL+13*(ISTATE-1)+13*61*(IYR-1)
      READ(1'IREC)VAR
      IFIELD=IND+16*(10-1)
      PR(IFL)=1./VAR(IFIELD)
      DO 9 IFUN=1,10
      BTU(IFL,IFUN)=BTU(IFL,IFUN)/BT(IFL)
      IFUNC=IFU(IFUN)
      IFIELD=IND+16*(IFUNC-1)
      VAR(IFIELD)=BTU(IFL,IFUN)
      IF(IFUNC.EQ.5)VAR(IND+16*(10-1))=VAR(IFIELD)
9    CONTINUE
      WRITE(1'IREC)VAR
8    CONTINUE
      WRITE(6,5)BTU
      DO 10 IFL=1,5
      IFUEL=IF(IFL)

```

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```
IREC=IFUEL+13*(ISTATE-1)+13*61*(IYR-1)
READ(3,IREC)VAR
IFIELD=IND+16*(18-1)
PR(IFL)=PR(IFL)*VAR(IFIELD)
DO 11 IFUN=1,10
  BTU(IFL,IFUN)=BTU(IFL,IFUN)*PR(IFL)
  IFUNC=IFU(IFUN)
  IFIELD=IND+16*(1FUNC-1)
  VAR(IFIELD)=BTU(IFL,IFUN)
  IF(IFUNC.EQ.5)VAR(IND+16*(10-1))=VAR(IFIELD)
11 CONTINUE
  WRITE(3,IREC)VAR
10 CONTINUE
  WRITE(6,5)BTU
1 CONTINUE
  CALL SUMUP
  STOP
  END
```

```

C *****
C  SUBROUTINE SUMUP
C  *****
C

```

```

    SUBROUTINE SUMUP
    DIMENSION VAR(288),SUM(18)
    ISTATE=61
    IND=1
    DO 1 IYR=1,3
    DO 2 KY=2,3
    DO 4 I=1,18
4  SUM(I)=-1.
    DO 3 IFUEL=1,13
    IREC=IFUEL+13*(ISTATE-1)+13*61*(IYR-1)
    READ(KY'IREC)VAR
    IF(IFUEL.EQ.13) GO TO 6
    DO 5 IFUNC=1,18
    IFIELD=IND+16*(IFUNC-1)
    IF(VAR(IFIELD).NE.-1..AND.SUM(IFUNC).EQ.-1.)SUM(IFUNC)=0.
    IF(VAR(IFIELD).NE.-1.)SUM(IFUNC)=SUM(IFUNC)+VAR(IFIELD)
5  CONTINUE
3  CONTINUE
6  CONTINUE
    WRITE(6,8)(VAR(J),J=1,288,16)
6  FORMAT(9F13.5)
    DO 7 IFUNC=1,18
    IFIELD=IND+16*(IFUNC-1)
    VAR(IFIELD)=SUM(IFUNC)
7  CONTINUE
    WRITE(6,8)(VAR(J),J=1,288,16)
    WRITE(KY'IREC)VAR
    IF(KY.EQ.2)WRITE(1'IREC)VAR
2  CONTINUE
1  CONTINUE
    RETURN
    END

```

C *****

C

CC S T E P 11

C

C

C SMALL INDUSTRIES OF MANUFACTURING SECTOR

C

C *** FUNCTIONAL USE BREAKDOWN FOR SIC 22 ***

C

C *****

C

C

C DIMENSION VAR(288),GEN(3),IF(5),FUEL(5),BTU(5,10),FUNC(5,10),IFU(1
C *0),BT(5),PR(5)

C

C

C DATA GEN/531.4,470.,374.7/

C DATA BT/24.88,5.825,6.287,1031.,3.412/

C DATA IFU/1,2,4,5,11,12,13,15,17,18/

C DATA IF/1,3,4,8,11/

C DATA FUNC/5.5,2*6.5,4.,1.5,4*0.,32.6,4*0.,11.9,3*0.,26.,6*0.,92.7,
C *2*91.5,68.2,10*0.,47.5,1.8,2.,2.,1.8,6.5,5*100./

C

C

C DEFINE FILE 1(2379,288,U,I1)

C DEFINE FILE 2(2379,288,U,I2)

C DEFINE FILE 3(2379,288,U,I3)

C

C

C IND=3

C DO 1 IYR=1,3

C ELEC=GEN(IYR)*10.5

C ISTATE=61

C IFUNC=18

C IFIELD=IND+16*(IFUNC-1)

C SU=0.

C DO 2 IFL=1,5

C IFUEL=IF(IFL)

C IREC=IFUEL+13*(ISTATE-1)+13*61*(IYR-1)

C READ(2,IREC)VAR

C FUEL(IFL)=VAR(IFIELD)

C IF(IFL.EQ.5) GO TO 2

C IF(FUEL(IFL).NE.-1.)SU=SU+FUEL(IFL)

2 CONTINUE

C DO 3 IFL=1,5

C BTU(IFL,10)=FUEL(IFL)

C IF(IFL.EQ.5) GO TO 3

C IF(FUEL(IFL).NE.-1.)FUEL(IFL)=ELEC*FUEL(IFL)/SU

```

      IF(FUEL(IFL).NE.-1.)BTU(IFL,7)=FUEL(IFL)
      IF(FUEL(IFL).NE.-1.)BTU(IFL,10)=BTU(IFL,10)-FUEL(IFL)
3  CONTINUE
      BTU(5,10)=BTU(5,10)+ELEC*3.412/10.5
      DO 4 IFL=1,5
      DO 14 J=1,10
      IF(J.EQ.7) GO TO 14
      BTU(IFL,J)=BTU(IFL,10)*FUNC(IFL,J)/100.
      IF(BTU(IFL,10).EQ.-1..AND.FUNC(IFL,J).NE.0.)BTU(IFL,J)=-1.
14  CONTINUE
      IF(IFL.EQ.5) GO TO 4
      BTU(IFL,10)=BTU(IFL,10)+FUEL(IFL)
4  CONTINUE
      BTU(5,10)=BTU(5,10)-ELEC*3.412/10.5
      BTU(5,7)=-ELEC *3.412/10.5
      WRITE(6,5)BTU
5  FORMAT(SF13.3)
      ISTATE=61
      DO 6 IFL=1,5
      IFUEL=IF(IFL)
      IREC=IFUEL+13*(ISTATE-1)+13*61*(1YR-1)
      READ(2'REC)VAR
      DO 7 IFUN=1,10
      IFUNC=IFU(IFUN)
      IFIELD=IND+16*(IFUNC-1)
      VAR(IFIELD)=BTU(IFL,IFUN)
      IF(IFUNC.EQ.5)VAR(IND+16*(10-1))=VAR(IFIELD)
7  CONTINUE
      WRITE(2'REC)VAR
6  CONTINUE
      DO 8 IFL=1,5
      IFUEL=IF(IFL)
      IREC=IFUEL+13*(ISTATE-1)+13*61*(1YR-1)
      READ(1'REC)VAR
      IFIELD=IND+16*(18-1)
      PR(IFL)=1./VAR(IFIELD)
      DO 9 IFUN=1,10
      BTU(IFL,IFUN)=BTU(IFL,IFUN)/BT(IFL)
      IFUNC=IFU(IFUN)
      IFIELD=IND+16*(IFUNC-1)
      VAR(IFIELD)=BTU(IFL,IFUN)
      IF(IFUNC.EQ.5)VAR(IND+16*(10-1))=VAR(IFIELD)
9  CONTINUE
      WRITE(1'REC)VAR
8  CONTINUE
      WRITE(6,5)BTU
      DO 10 IFL=1,5
      IFUEL=IF(IFL)

```

```
IREC=IFUEL+13*(ISTATE-1)+13*61*(IYR-1)
READ(3,IREC)VAR
IFIELD=IND+16*(18-1)
PR(IFL)=PR(IFL)*VAR(IFIELD)
DO 11 IFUN=1,10
  BTU(IFL,IFUN)=BTU(IFL,IFUN)*PR(IFL)
  IFUNC=IFU(IFUN)
  IFIELD=IND+16*(IFUNC-1)
  VAR(IFIELD)=BTU(IFL,IFUN)
  IF (IFUNC.EQ.5) VAR(IND+16*(10-1))=VAR(IFIELD)
11 CONTINUE
  WRITE(3,IREC)VAR
10 CONTINUE
  WRITE(6,5)BTU
1 CONTINUE
  CALL SUMUP
  STOP
  END
```

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```
C *****
C  SUBROUTINE SUMUP
C  *****
C
```

```
    SUBROUTINE SUMUP
    DIMENSION VAR(288),SUM(18)
    ISTATE=61
    IND=3
    DO 1 IYR=1,3
    DO 2 KY=2,3
    DO 4 I=1,18
4    SUM(I)=-1.
    DO 3 IFUEL=1,13
    IREC=IFUEL+13*(ISTATE-1)+13*61*(IYR-1)
    READ(KY,IREC)VAR
    IF(IFUEL.EQ.13) GO TO 6
    DO 5 IFUNC=1,18
    IFIELD=IND+16*(IFUNC-1)
    IF(VAR(IFIELD).NE.-1..AND.SUM(IFUNC).EQ.-1.)SUM(IFUNC)=0.
    IF(VAR(IFIELD).NE.-1.)SUM(IFUNC)=SUM(IFUNC)+VAR(IFIELD)
5    CONTINUE
3    CONTINUE
6    CONTINUE
    WRITE(6,8)(VAR(J),J=3,288,16)
8    FORMAT(9F13.3)
    DO 7 IFUNC=1,18
    IFIELD=IND+16*(IFUNC-1)
    VAR(IFIELD)=SUM(IFUNC)
7    CONTINUE
    WRITE(6,8)(VAR(J),J=3,288,16)
    WRITE(KY,IREC)VAR
    IF(KY.EQ.2)WRITE(1,IREC)VAR
2    CONTINUE
1    CONTINUE
    RETURN
    END
```

C *****

C

C

S T E P 12

C

C

SMALL INDUSTRIES OF MANUFACTURING SECTOR

C

C

*** FUNCTIONAL USE BREAKDOWN FOR SIC 32 ***

C

C

C

DIMENSION VAR(288), GEN(3), IF(5), FUEL(5), BTU(5,10), FUNC(5,10), IFU(10
*0), BT(5), PR(5)

C

C

DATA GEN/1240.7,882.9,600.8/

DATA BT/24.88,5.825,6.287,1031.,3.412/

DATA IFU/1,2,4,5,11,12,13,15,17,18/

DATA IF/1,3,4,8,11/

DATA FUNC/0.,1.3,4.,1.,.7,10*0.,100.,71.2,94.6,96.5,5.6,
*16*0.,27.5,5*0.,1.1,2.5,93.7,5*100./

C

C

DEFINE FILE 1(2379,288,0,I1)

DEFINE FILE 2(2379,288,0,I2)

DEFINE FILE 3(2379,288,0,I3)

C

C

IND=16

DO 1 IYR=1,3

ELEC=GEN(IYR)*10.5

ISTATE=61

IFUNC=18

IFIELD=IND+16*(IFUNC-1)

SU=0.

DO 2 IFL=1,5

IFUEL=IF(IFL)

IREC=IFUEL+13*(ISTATE-1)+13*61*(IYR-1)

READ(2,IREC)VAR

FUEL(IFL)=VAR(IFIELD)

IF(IFL.EQ.5) GO TO 2

IF(FUEL(IFL).NE.-1.)SU=SU+FUEL(IFL)

2 CONTINUE

DO 3 IFL=1,5

BTU(IFL,10)=FUEL(IFL)

IF(IFL.EQ.5) GO TO 3

IF(FUEL(IFL).NE.-1.)FUEL(IFL)=ELEC*FUEL(IFL)/SU

```

      IF(FUEL(IFL).NE.-1.)BTU(IFL,7)=FUEL(IFL)
      IF(FUEL(IFL).NE.-1.)BTU(IFL,10)=BTU(IFL,10)+FUEL(IFL)
3     CONTINUE
      BTU(5,10)=BTU(5,10)+ELEC*3.412/10.5
      DO 4 IFL=1,5
      DO 14 J=1,10
      IF(J.EQ.7) GO TO 14
      BTU(IFL,J)=BTU(IFL,10)*FUNC(IFL,J)/100.
      IF(BTU(IFL,10).EQ.-1..AND.FUNC(IFL,J).NE.0.)BTU(IFL,J)=-1.
14    CONTINUE
      IF(IFL.EQ.5) GO TO 4
      BTU(IFL,10)=BTU(IFL,10)+FUEL(IFL)
4     CONTINUE
      BTU(5,10)=BTU(5,10)-ELEC*3.412/10.5
      BTU(5,7)=-ELEC *3.412/10.5
      WRITE(6,5)BTU
5     FORMAT(5F13.3)
      ISTATE=61
      DO 6 IFL=1,5
      IFUEL=IF(IFL)
      IREC=IFUEL+13*(ISTATE-1)+13*61*(IYR-1)
      READ(2,'IREC')VAR
      DO 7 IFUN=1,10
      IFUNC=IFU(IFUN)
      IFIELD=IND+16*(IFUNC-1)
      VAR(IFIELD)=BTU(IFL,IFUN)
      IF(IFUNC.EQ.5)VAR(IND+16*(10-1))=VAR(IFIELD)
7     CONTINUE
      WRITE(2,'IREC')VAR
6     CONTINUE
      DO 8 IFL=1,5
      IFUEL=IF(IFL)
      IREC=IFUEL+13*(ISTATE-1)+13*61*(IYR-1)
      READ(1,'IREC')VAR
      IFIELD=IND+16*(18-1)
      PR(IFL)=1./VAR(IFIELD)
      DO 9 IFUN=1,10
      BTU(IFL,IFUN)=BTU(IFL,IFUN)/BT(IFL)
      IFUNC=IFU(IFUN)
      IFIELD=IND+16*(IFUNC-1)
      VAR(IFIELD)=BTU(IFL,IFUN)
      IF(IFUNC.EQ.5)VAR(IND+16*(10-1))=VAR(IFIELD)
9     CONTINUE
      WRITE(1,'IREC')VAR
8     CONTINUE
      WRITE(6,5)BTU
      DO 10 IFL=1,5
      IFUEL=IF(IFL)

```

```
  IREC=IFUEL+13*(ISTATE-1)+13*61*(IYR-1)
  READ(3,IREC)VAR
  IFIELD=IND+16*(18-1)
  PR(IFL)=PR(IFL)*VAR(IFIELD)
  DO 11 IFUN=1,10
    BTU(IFL,IFUN)=BTU(IFL,IFUN)*PR(IFL)
    IFUNC=IFU(IFUN)
    IFIELD=IND+16*(IFUNC-1)
    VAR(IFIELD)=BTU(IFL,IFUN)
    IF(IFUNC.EQ.5)VAR(IND+16*(10-1))=VAR(IFIELD)
11  CONTINUE
    WRITE(3,IREC)VAR
10  CONTINUE
    WRITE(6,5)BTU
1   CONTINUE
    CALL SUMUP
    STOP
    END
```

```

C *****
C  SUBROUTINE SUMUP
C  *****
C

```

```

    SUBROUTINE SUMUP
    DIMENSION VAR(288),SUM(18)
    ISTATE=61
    IND=16
    DO 1 IYR=1,3
    DO 2 KY=2,3
    DO 4 I=1,18
4  SUM(I)=-1.
    DO 3 IFUEL=1,13
    IREC=IFUEL+13*(ISTATE-1)+13*61*(IYR-1)
    READ(KY,IREC)VAR
    IF(IFUEL.EQ.13) GO TO 6
    DO 5 IFUNC=1,18
    IFIELD=IND+16*(IFUNC-1)
    IF(VAR(IFIELD).NE.-1..AND.SUM(IFUNC).EQ.-1.)SUM(IFUNC)=0.
    IF(VAR(IFIELD).NE.-1.)SUM(IFUNC)=SUM(IFUNC)+VAR(IFIELD)
5  CONTINUE
3  CONTINUE
6  CONTINUE
    WRITE(6,8)(VAR(J),J=1,288,16)
8  FORMAT(9F13.3)
    DO 7 IFUNC=1,18
    IFIELD=IND+16*(IFUNC-1)
    VAR(IFIELD)=SUM(IFUNC)
7  CONTINUE
    WRITE(6,8)(VAR(J),J=1,288,16)
    WRITE(KY,IREC)VAR
    IF(KY.EQ.2)WRITE(1,IREC)VAR
2  CONTINUE
1  CONTINUE
    RETURN
    END

```

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```

C *****
C PRINT FILES 91 92 AND 93 OF MANUFACTURING SECTOR
C *****
  DIMENSION VAR(522),Q(13,18)
  DEFINE FILE 91(2379,522,U,I91)
  DEFINE FILE 92(2379,522,U,I92)
  DEFINE FILE 93(2379,522,U,I93)
12 READ(5,13,END=14)IND
13 FORMAT(I2)
  ISTATE=61
  DO 1 IYR=1,3
  6 FORMAT('1 YEAR ',I2,' INDUSTRY ',I3/)
  DO 1 KY=91,93
  WRITE(6,6)IYR,IND
  IF(KY.EQ.91)WRITE(6,7)
  IF(KY.EQ.92)WRITE(6,8)
  IF(KY.EQ.93)WRITE(6,9)
  7 FORMAT(' CONSUMPTION IN TRADITIONAL UNITS')
  8 FORMAT(' 10**9 BTUS')
  9 FORMAT(' MILLIONS OF $$$$')
  DO 3 IFUEL=1,13
  IREC=IFUEL+13*(ISTATE-1)+13*61*(IYR-1)
  READ(KY,IREC)VAR
  DO 2 IFUNC=1,18
  IFIELD=IND+29*(IFUNC-1)
  Q(IFUEL,IFUNC)=VAR(IFIELD)
  2 CONTINUE
  3 CONTINUE
  WRITE(6,10)
  WRITE(6,4)((Q(I,J),I=1,6),J=1,18)
  4 FORMAT(6F15,1)
  WRITE(6,11)
  WRITE(6,5)((Q(I,J),I=7,13),J=1,18)
  5 FORMAT(7F15,1)
  1 CONTINUE
10 FORMAT(/'          COAL          COKE          DIST OIL          ',
*' RES OIL          ASPHALT          MISC. PETRO. PROD')
11 FORMAT(/'          LPG          NAT GAS          OTHER GAS          ',
*' HYDRO          ELECTRICITY          OTHER ENERGY          TOTAL')
  GO TO 12
14 CONTINUE
  STOP
  END

```

(6) Reference Files

<u>File No.</u>	<u>Title</u>
1	Value Added by Manufacture for Small Industries
2	Functional Uses by Fuel Type for Food and Kindred Products - SIC 20(%)
2.1	Thirty-one 4-Digit Industries Comprising 90% of the Total Energy in SIC 20
2.2	Methodology for SIC 20 Functional Use Breakdown
2.3	Sample 4-Digit Industry from DPRA
2.4	Sample Worksheet from DPRA Information
3	Functional Uses by Fuel Type for Textile Mill Products - SIC 22 (%)
3.1	Spinning
3.2	Texturizing
3.3	Weaving
3.4	Knitting
3.5	Greige Mills
3.6	Finishing (Woven)
3.7	Finishing (Knit)
3.8	Yarn Dyeing
3.9	Floor Coverings (Foam)
3.10	Floor Coverings (Woven backed)
3.11	Percentage Energy Use by Each Component of SIC 22
4	Functional Use Breakdown for the Five Major Industries in SIC 32
4.1	Functional Use Breakdown of Glass Containers - SIC 3221
4.2	Functional Use Breakdown of Brick and Structural Clay Tile - SIC 3251
4.3	Functional Use Breakdown for Portland Cement - SIC 3241
4.4	Functional Use Breakdown of Lime - SIC 3274
4.5	Functional Use Breakdown of Ready Mix Cement - SIC 3273
5	Btu Conversion Factors
5.1	Btu Conversion Factors for Fuels NSK

<u>Computer File</u>	<u>Title</u>
A, B	Fuels and Electric Energy Consumed Nationally in 1967
C, D, E	Fuels and Electric Energy Consumed Nationally in 1971
F, G, H	Fuels and Electric Energy Consumed by State in 1971
I, J	Fuels and Electric Energy Consumed Nationally in 1974
K, L, M	Fuels and Electric Energy Consumed by State in 1974

File 1 - VALUE ADDED BY MANUFACTURES FOR SMALL INDUSTRIES - SIC 20:
FOOD AND KINDRED PRODUCTS

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Maine	165.
New Hampshire	86.2
Vermont	40.4
Massachusetts	642.1
Rhode Island	104.6
Connecticut	252.6
New York	2,328.1
New Jersey	1,513.
Pennsylvania	2,077.4
Ohio	1,737.7
Indiana	973.
Illinois	2,128.3
Michigan	1,306.3
Wisconsin	1,326.2
Minnesota	923.3
Iowa	1,112.
Missouri	1,011.7
North Dakota	66.9
South Dakota	127.
Nebraska	581.
Kansas	437.9
Delaware	209.9
Maryland	687.9
District of Columbia	48.4
Virginia	610.7
West Virginia	95.6
North Carolina	639.8
South Carolina	171.6
Georgia	832.
Florida	968.7

SOURCE: Census of Manufactures [BIB. 16].

File 1 - (CONTINUED) SIC-20

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Kentucky	703.3
Tennessee	690.2
Alabama	368.8
Mississippi	223.7
Arkansas	367.9
Louisiana	579.4
Oklahoma	239.7
Texas	1,716.6
Montana	65.7
Idaho	257.3
Wyoming	19.4
Colorado	511.9
New Mexico	68.3
Arizona	134.7
Utah	142.9
Nevada	30.
Washington	590.5
Oregon	417.9
California	4,019.9
Alaska	57.9
Hawaii	205.4

File 1 - (CONTINUED) SIC-21: TOBACCO MANUFACTURES

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Maine	0
New Hampshire	0
Vermont	0
Massachusetts	0
Rhode Island	0
Connecticut	0
New York	23.
New Jersey	2.
Pennsylvania	117.
Ohio	68.
Indiana	29.
Illinois	39.
Michigan	0
Wisconsin	0
Minnesota	0
Iowa	0
Missouri	0
North Dakota	0
South Dakota	0
Nebraska	0
Kansas	0
Delaware	0
Maryland	0
District of Columbia	0
Virginia	580.5
West Virginia	45.8
North Carolina	1,263.8
South Carolina	4.4
Georgia	30.5
Florida	52.6

File 1 - (CONTINUED) SIC-21

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Kentucky	356.7
Tennessee	27.7
Alabama	41.2
Mississippi	0
Arkansas	0
Louisiana	0
Oklahoma	0
Texas	0
Montana	0
Idaho	0
Wyoming	0
Colorado	0
New Mexico	0
Arizona	0
Utah	0
Nevada	0
Washington	0
Oregon	0
California	0
Alaska	0
Hawaii	0

File 1 - (CONTINUED) SIC-22: TEXTILE MILL PRODUCTS

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Maine	89.8
New Hampshire	93.
Vermont	5.9
Massachusetts	417.5
Rhode Island	188.7
Connecticut	195.3
New York	777.3
New Jersey	453.6
Pennsylvania	706.4
Ohio	148.7
Indiana	13.9
Illinois	67.3
Michigan	60.
Wisconsin	103.2
Minnesota	30.9
Iowa	2.8
Missouri	27.4
North Dakota	0
South Dakota	0
Nebraska	4.
Kansas	0
Delaware	13.7
Maryland	19.2
District of Columbia	0
Virginia	522.8
West Virginia	8.4
North Carolina	3,013.4
South Carolina	1,723.9
Georgia	1,562.4
Florida	56.7

File 1 - (CONTINUED) SIC-22

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Kentucky	101.3
Tennessee	340.
Alabama	457.4
Mississippi	82.6
Arkansas	63.8
Louisiana	14.1
Oklahoma	23.6
Texas	62.6
Montana	0
Idaho	2.1
Wyoming	0
Colorado	11.8
New Mexico	3.2
Arizona	0
Utah	7.5
Nevada	0
Washington	9.9
Oregon	13.6
California	231.6
Alaska	0
Hawaii	0

File 1 - (CONTINUED) SIC-23: APPAREL AND OTHER FINISHED PRODUCTS

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Maine	41.9
New Hampshire	17.4
Vermont	7.9
Massachusetts	488.4
Rhode Island	35.3
Connecticut	137.3
New York	3,160.3
New Jersey	696.7
Pennsylvania	1,288.7
Ohio	294.7
Indiana	119.2
Illinois	334.4
Michigan	411.2
Wisconsin	74.6
Minnesota	65.6
Iowa	34.3
Missouri	289.2
North Dakota	0
South Dakota	6.3
Nebraska	18.1
Kansas	75.3
Delaware	15.2
Maryland	216.5
District of Columbia	1.9
Virginia	280.6
West Virginia	33.4
North Carolina	636.1
South Carolina	395.6
Georgia	639.6
Florida	232.4

File 1 - (CONTINUED) SIC-23

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Kentucky	224.
Tennessee	589.3
Alabama	370.5
Mississippi	276.9
Arkansas	128.4
Louisiana	67.3
Oklahoma	76.7
Texas	557.4
Montana	0
Idaho	4.9
Wyoming	0
Colorado	27.
New Mexico	16.2
Arizona	44.8
Utah	33.2
Nevada	0
Washington	66.9
Oregon	21.
California	893.8
Alaska	0
Hawaii	29.6

File 1 - (CONTINUED) SIC-24: LUMBER AND WOOD PRODUCTS

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Maine	148.9
New Hampshire	50.
Vermont	28.7
Massachusetts	80.8
Rhode Island	5.1
Connecticut	21.7
New York	242.4
New Jersey	82.8
Pennsylvania	321.5
Ohio	197.5
Indiana	349.7
Illinois	176.4
Michigan	233.8
Wisconsin	245.7
Minnesota	143.5
Iowa	72.1
Missouri	112.7
North Dakota	5.2
South Dakota	23.8
Nebraska	30.8
Kansas	58.1
Delaware	4.7
Maryland	74.5
District of Columbia	0
Virginia	275.
West Virginia	59.8
North Carolina	366.8
South Carolina	170.8
Georgia	367.6
Florida	264.1

File 1 - (CONTINUED) SIC-24

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Kentucky	113.1
Tennessee	196.3
Alabama	342.4
Mississippi	292.8
Arkansas	270.3
Louisiana	208.9
Oklahoma	70.6
Texas	369.9
Montana	149.5
Idaho	268.9
Wyoming	14.5
Colorado	55.8
New Mexico	31.6
Arizona	67.4
Utah	25.6
Nevada	4.4
Washington	941.7
Oregon	1,491.8
California	1,137.3
Alaska	29.4
Hawaii	13.1

File 1 - (CONTINUED) SIC-25: FURNITURE AND FIXTURES

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Maine	9.5
New Hampshire	23.7
Vermont	25.6
Massachusetts	119.
Rhode Island	10.7
Connecticut	77.2
New York	395.7
New Jersey	151.8
Pennsylvania	313.6
Ohio	272.1
Indiana	275.8
Illinois	374.4
Michigan	363.3
Wisconsin	126.8
Minnesota	57.3
Iowa	65.8
Missouri	110.7
North Dakota	0
South Dakota	0
Nebraska	31.2
Kansas	31.2
Delaware	3.3
Maryland	40.4
District of Columbia	0
Virginia	341.7
West Virginia	10.9
North Carolina	823.7
South Carolina	55.8
Georgia	125.1
Florida	121.6

File 1 - (CONTINUED) SIC-25

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Kentucky	54.6
Tennessee	286.4
Alabama	77.7
Mississippi	176.5
Arkansas	132.2
Louisiana	15.5
Oklahoma	22.1
Texas	198.3
Montana	0
Idaho	0
Wyoming	0
Colorado	27.6
New Mexico	5.8
Arizona	16.6
Utah	11.8
Nevada	2.6
Washington	33.5
Oregon	35.3
California	623.8
Alaska	0
Hawaii	7.9

File 1 - (CONTINUED) SIC-27: PRINTING, PUBLISHING AND ALLIED PRODUCTS

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Maine	40.9
New Hampshire	68.5
Vermont	58.2
Massachusetts	750.
Rhode Island	101.7
Connecticut	352.5
New York	4,222.7
New Jersey	754.8
Pennsylvania	1,180.1
Ohio	1,200.9
Indiana	447.5
Illinois	2,217.7
Michigan	696.2
Wisconsin	421.
Minnesota	402.2
Iowa	227.6
Missouri	646.5
North Dakota	20.
South Dakota	22.9
Nebraska	92.8
Kansas	153.6
Delaware	26.
Maryland	345.2
District of Columbia	280.
Virginia	228.3
West Virginia	71.8
North Carolina	205.4
South Carolina	79.3
Georgia	248.6
Florida	466.4

File 1 - (CONTINUED) SIC-27

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Kentucky	175.4
Tennessee	274.4
Alabama	128.9
Mississippi	41.2
Arkansas	117.4
Louisiana	121.2
Oklahoma	131.
Texas	655.3
Montana	25.1
Idaho	23.2
Wyoming	10.8
Colorado	181.9
New Mexico	31.6
Arizona	115.6
Utah	48.
Nevada	28.1
Washington	176.
Oregon	120.2
California	1,706.9
Alaska	9.6
Hawaii	46.2

File 1 - (CONTINUED) SIC-30: RUBBER AND MISCELLANEOUS PLASTIC PRODUCTS

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Maine	47.
New Hampshire	79.3
Vermont	21.9
Massachusetts	560.3
Rhode Island	122.3
Connecticut	233.7
New York	572.
New Jersey	616.2
Pennsylvania	651.5
Ohio	1,995.8
Indiana	497.5
Illinois	677.1
Michigan	226.2
Wisconsin	128.2
Minnesota	498.9
Iowa	251.4
Missouri	153.2
North Dakota	0
South Dakota	5.7
Nebraska	66.1
Kansas	170.4
Delaware	118.4
Maryland	140.
District of Columbia	0
Virginia	255.6
West Virginia	35.6
North Carolina	280.2
South Carolina	33.1
Georgia	206.7
Florida	122.7

File 1 - (CONTINUED) SIC-30

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Kentucky	138.9
Tennessee	414.2
Alabama	371.4
Mississippi	95.3
Arkansas	124.4
Louisiana	11.3
Oklahoma	139.
Texas	347.1
Montana	0
Idaho	10.7
Wyoming	0
Colorado	146.2
New Mexico	3.2
Arizona	23.7
Utah	14.1
Nevada	0
Washington	30.5
Oregon	19.7
California	943.7
Alaska	0
Hawaii	2.7

File 1 - (CONTINUED) SIC-31: LEATHER AND LEATHER PRODUCTS

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Maine	182.4
New Hampshire	123.1
Vermont	3.6
Massachusetts	299.6
Rhode Island	28.2
Connecticut	17.5
New York	359.8
New Jersey	105.3
Pennsylvania	226.5
Ohio	58.3
Indiana	26.4
Illinois	110.3
Michigan	27.3
Wisconsin	101.2
Minnesota	20.
Iowa	8.6
Missouri	120.3
North Dakota	0
South Dakota	0
Nebraska	0
Kansas	10.
Delaware	2.6
Maryland	25.
District of Columbia	0
Virginia	27.8
West Virginia	11.1
North Carolina	35.4
South Carolina	0
Georgia	34.4
Florida	26.8

File 1 - (CONTINUED) SIC-31

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Kentucky	56.7
Tennessee	217.3
Alabama	11.8
Mississippi	25.
Arkansas	82.5
Louisiana	6.8
Oklahoma	13.6
Texas	95.
Montana	0
Idaho	0
Wyoming	0
Colorado	19.1
New Mexico	6.4
Arizona	15.4
Utah	0
Nevada	0
Washington	4.4
Oregon	21.9
California	188.6
Alaska	0
Hawaii	0

File 1 - (CONTINUED) SIC-32: STONE, CLAY, GLASS, AND CONCRETE PRODUCTS

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Maine	22.
New Hampshire	41.5
Vermont	37.4
Massachusetts	258.4
Rhode Island	43.7
Connecticut	140.8
New York	738.4
New Jersey	698.4
Pennsylvania	1,114.2
Ohio	1,254.4
Indiana	469.7
Illinois	773.5
Michigan	553.2
Wisconsin	167.9
Minnesota	131.6
Iowa	131.5
Missouri	267.8
North Dakota	20.4
South Dakota	12.2
Nebraska	53.7
Kansas	159.2
Delaware	5.2
Maryland	74.7
District of Columbia	1.
Virginia	54.
West Virginia	135.
North Carolina	78.9
South Carolina	61.4
Georgia	88.4
Florida	102.4

File 1 - (CONTINUED) SIC-32

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Kentucky	53.7
Tennessee	105.3
Alabama	47.5
Mississippi	35.9
Arkansas	24.4
Louisiana	39.4
Oklahoma	54.8
Texas	172.5
Montana	24.9
Idaho	20.8
Wyoming	21.7
Colorado	139.6
New Mexico	31.7
Arizona	105.8
Utah	59.
Nevada	35.8
Washington	113.9
Oregon	71.8
California	1,126.7
Alaska	6.2
Hawaii	31.5

File 1 - (CONTINUED) SIC-34: FABRICATED METAL PRODUCTS

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Maine	37.4
New Hampshire	48.1
Vermont	42.4
Massachusetts	839.3
Rhode Island	115.2
Connecticut	922.3
New York	1,613.9
New Jersey	1,138.9
Pennsylvania	1,836.2
Ohio	3,142.5
Indiana	1,117.2
Illinois	2,852.4
Michigan	2,786.4
Wisconsin	984.8
Minnesota	578.5
Iowa	301.7
Missouri	608.2
North Dakota	6.3
South Dakota	13.1
Nebraska	115.1
Kansas	145.2
Delaware	23.
Maryland	253.9
District of Columbia	7.9
Virginia	235.6
West Virginia	127.9
North Carolina	292.7
South Carolina	114.7
Georgia	294.9
Florida	425.4

File 1 - (CONTINUED) SIC-34

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Kentucky	299.2
Tennessee	448.
Alabama	339.5
Mississippi	193.1
Arkansas	173.8
Louisiana	210.9
Oklahoma	224.1
Texas	1,080.9
Montana	5.2
Idaho	22.7
Wyoming	0
Colorado	206.3
New Mexico	10.9
Arizona	67.8
Utah	69.3
Nevada	11.3
Washington	145.9
Oregon	155.
California	2,237.5
Alaska	0
Hawaii	21.8

File 1 - (CONTINUED) SIC-35: MACHINERY, EXCEPT ELECTRICAL

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Maine	46.1
New Hampshire	176.4
Vermont	94.3
Massachusetts	1,727.1
Rhode Island	138.1
Connecticut	925.8
New York	2,983.3
New Jersey	1,298.6
Pennsylvania	2,377.
Ohio	3,943.1
Indiana	1,305.
Illinois	4,206.2
Michigan	2,967.8
Wisconsin	1,992.9
Minnesota	1,140.4
Iowa	1,204.2
Missouri	561.8
North Dakota	39.6
South Dakota	39.8
Nebraska	192.2
Kansas	328.7
Delaware	42.2
Maryland	396.2
District of Columbia	3.
Virginia	191.6
West Virginia	79.9
North Carolina	729.1
South Carolina	406.4
Georgia	213.3
Florida	287.6

File 1 - (CONTINUED) SIC-35

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Kentucky	685.4
Tennessee	518.1
Alabama	139.2
Mississippi	153.8
Arkansas	134.2
Louisiana	123.9
Oklahoma	476.4
Texas	1,449.9
Montana	31.8
Idaho	11.
Wyoming	26.5
Colorado	302.8
New Mexico	28.8
Arizona	309.1
Utah	115.9
Nevada	9.1
Washington	169.7
Oregon	185.3
California	2,688.
Alaska	0
Hawaii	4.8

File 1 - (CONTINUED) SIC-36: ELECTRICAL AND ELECTRONIC MACHINERY

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Maine	53.8
New Hampshire	169.3
Vermont	32.3
Massachusetts	1,333.3
Rhode Island	121.
Connecticut	715.
New York	2,917.6
New Jersey	1,590.2
Pennsylvania	2,202.9
Ohio	2,277.9
Indiana	2,324.5
Illinois	3,090.1
Michigan	769.4
Wisconsin	828.8
Minnesota	354.9
Iowa	405.3
Missouri	568.1
North Dakota	0
South Dakota	5.5
Nebraska	171.6
Kansas	70.
Delaware	11.2
Maryland	508.2
District of Columbia	9.1
Virginia	557.5
West Virginia	111.1
North Carolina	687.6
South Carolina	185.3
Georgia	226.6
Florida	580.9

File 1 - (CONTINUED) SIC-36

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Kentucky	826.1
Tennessee	692.2
Alabama	245.7
Mississippi	244.5
Arkansas	343.6
Louisiana	145.
Oklahoma	202.4
Texas	938.9
Montana	0
Idaho	6.6
Wyoming	0
Colorado	85.6
New Mexico	42.
Arizona	331.8
Utah	52.8
Nevada	12.5
Washington	61.6
Oregon	54.3
California	3,311.1
Alaska	0
Hawaii	0

File 1 - (CONTINUED) SIC-37: TRANSPORTATION EQUIPMENT

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Maine	261.3
New Hampshire	25.5
Vermont	30.3
Massachusetts	477.1
Rhode Island	23.9
Connecticut	1,162.1
New York	1,366.
New Jersey	917.7
Pennsylvania	1,354.6
Ohio	3,812.9
Indiana	1,947.8
Illinois	1,243.4
Michigan	8,545.
Wisconsin	786.
Minnesota	221.7
Iowa	157.4
Missouri	2,020.1
North Dakota	52.3
South Dakota	104.6
Nebraska	68.5
Kansas	684.
Delaware	316.2
Maryland	440.8
District of Columbia	0
Virginia	496.7
West Virginia	57.8
North Carolina	188.7
South Carolina	46.2
Georgia	901.6
Florida	700.2

File 1 - (CONTINUED) SIC-37

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Kentucky	416.4
Tennessee	379.8
Alabama	269.9
Mississippi	267.8
Arkansas	93.6
Louisiana	288.1
Oklahoma	150.
Texas	1,260.6
Montana	3.3
Idaho	19.1
Wyoming	0
Colorado	259.1
New Mexico	18.9
Arizona	170.5
Utah	151.
Nevada	0
Washington	1,138.2
Oregon	161.5
California	6,697.2
Alaska	0
Hawaii	2.7

File 1 - (CONTINUED) SIC-38: MEASURING, ANALYZING, AND CONTROLLING INSTRUMENTS;
PHOTOGRAPHIC, MEDICAL, AND OPTICAL GOODS; WATCHES
AND CLOCKS

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Maine	3.6
New Hampshire	82.7
Vermont	19.1
Massachusetts	877.5
Rhode Island	70.8
Connecticut	369.4
New York	3,535.8
New Jersey	505.
Pennsylvania	601.5
Ohio	307.2
Indiana	196.1
Illinois	848.9
Michigan	165.2
Wisconsin	120.9
Minnesota	225.9
Iowa	49.3
Missouri	133.6
North Dakota	0
South Dakota	5.8
Nebraska	82.4
Kansas	60.9
Delaware	15.3
Maryland	48.6
District of Columbia	0
Virginia	58.2
West Virginia	49.3
North Carolina	149.8
South Carolina	78.3
Georgia	52.
Florida	68.4

File 1 - (CONTINUED) SIC-38

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Kentucky	77.8
Tennessee	49.
Alabama	24.
Mississippi	28.
Arkansas	11.6
Louisiana	8.1
Oklahoma	48.3
Texas	177.
Montana	0
Idaho	0
Wyoming	0
Colorado	198.2
New Mexico	7.
Arizona	69.9
Utah	4.5
Nevada	8.4
Washington	56.4
Oregon	180.6
California	927.3
Alaska	0
Hawaii	0

File 1 - (CONTINUED) SIC-39: MISCELLANEOUS MANUFACTURE INDUSTRIES

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Maine	8.1
New Hampshire	19.8
Vermont	11.1
Massachusetts	452.8
Rhode Island	392.8
Connecticut	233.4
New York	1,183.2
New Jersey	418.6
Pennsylvania	544.2
Ohio	286.2
Indiana	169.2
Illinois	554.2
Michigan	159.
Wisconsin	204.
Minnesota	96.9
Iowa	107.9
Missouri	100.6
North Dakota	2.8
South Dakota	1.7
Nebraska	18.8
Kansas	37.2
Delaware	0
Maryland	47.4
District of Columbia	3.2
Virginia	39.3
West Virginia	25.9
North Carolina	101.9
South Carolina	79.3
Georgia	103.5
Florida	67.8

File 1 - (CONTINUED) SIC-39

<u>State</u>	<u>Value Added by Manufacture</u> <u>(million dollars)</u>
Kentucky	66.9
Tennessee	135.2
Alabama	45.6
Mississippi	82.8
Arkansas	23.9
Louisiana	18.6
Oklahoma	34.4
Texas	132.9
Montana	2.9
Idaho	4.3
Wyoming	0
Colorado	39.8
New Mexico	10.2
Arizona	20.2
Utah	18.9
Nevada	7.2
Washington	43.9
Oregon	27.5
California	549.3
Alaska	0
Hawaii	6.9

File 2 - FUNCTIONAL USES BY FUEL TYPE FOR FOOD AND KINDRED PRODUCTS - SIC 20 (%)

Functional Use	Fuel					
	Coal	Fuel Oil		Natural Gas	LPG	Electricity
		Distillate	Residual			
Space Heating	4.7	5.5	5	4.5	0	0
Space Cooling	0	0	0	0	0	2.5
Lighting	0	0	0	0	0	23
Total Direct Heat	0	14.8	14.8	16.5	0	0
Raw Material	0	0	0	0	0	0
Process Steam	93.2	69.9	72.3	70.1	0	0
Electricity Generation	0	0	0	0	0	0
Machine Drive	0	0	0	0	0	72.8
Other Uses, NSK/NEC	2.1	9.8	8	8.9	0	1.7

SOURCE: BIB. 15. Percentages derived from energy figures of the 31 4-digit industries which comprise 90% of the energy in SIC 20 [REF. Files 2.1, 2.2, 2.3, 2.4].

File 2.1 - THIRTY-ONE 4-DIGIT INDUSTRIES COMPRISING 90% OF TOTAL ENERGY
IN SIC 20

<u>1972 SIC Codes</u>	<u>Industry</u>
2063	Beet Sugar
2046	Wet Corn Milling
2011	Meatpacking Plants
2082	Malt Beverages
2033	Canned Fruits and Vegetables
2026	Fluid Mix
2051	Bread, Cake, Related Products
2075	Soybean Oil Mills
2062	Cane Sugar Refining
2037	Frozen Fruits and Vegetables
2048A	Prepared Feeds, NEC
2048B	Prepared Feeds - Alfalfa
2079	Shortening and Cooking Oils
2099	Food Preparations, NEC
2077A	Animal and Marine Fats and Oils - Animal
2077B	Animal and Marine Fats and Oils - Marine
2022	Cheese, Natural and Processed
2023	Condensed and Evaporated Milk
2032	Canned Specialties
2086	Bottled and Canned Soft Drinks
2016	Poultry Dressing Plants
2085	Distilled Liquor
2013	Sausages and Prepared Meats
2047A	Pet Food - Canned
2047B	Pet Food - Dry
2061	Raw Cane Sugar
2065	Confectionery Products

File 2.1 - (CONTINUED)

<u>1972 SIC Codes</u>	<u>Industry</u>
2038	Frozen Specialties
2041	Flour and Other Grain Mill Products
2034	Dehydrated Food Products
2052	Cookies and Crackers

File 2.2 - METHODOLOGY FOR SIC 20 FUNCTIONAL USE BREAKDOWN

Energy consumption figures for coal, coke and breeze, natural gas, distillate fuel oil, and residual fuel oil were taken from the 1974 Annual Survey of Manufactures and converted to Btu's using the Bureau of Mines conversion factors. The disclosures existing for a specific fuel type on the 4-digit level were calculated by: summing the non-disclosed 4-digit values for that fuel type; subtracting this sum from the 3-digit value; and apportioning the difference on the basis of total fuel shares for the disclosed 4-digit industries. Percentages of each fuel for each 4-digit industry were developed from these figures.

Generated electricity was also taken from the 1974 Annual Survey of Manufactures and was converted to Btu's using 10,500 Btu/kWh. In cases where no figure was given in the 1974 Survey, the percentages given by Development Planning and Research Associates, Inc. (DPRA) were used and were applied to the energy figure used for boilers.

The percentage breakdown for each functional use within each 4-digit industry came from DPRA [REF. File 2.3]. Applying these percentages to the energy figure for each 4-digit industry, the amount of energy used for each functional use was derived. And these numbers were further broken down into the amount of energy used for each functional use by each fuel type, using percentages derived from the 1974 Survey figures [REF. File 2.4].

Exceptions:

- 2022, 2063 - Space heating and miscellaneous combined under boiler uses;
2077A assumed all energy to go to space heating.
2077B
- 2026 - Direct heat and miscellaneous combined under direct uses;
assumed miscellaneous to be negligible; direct heat given all the energy.
- 2051 - Air conditioning and refrigeration combined under electricity;
assumed all energy to go to air conditioning.
- 2099 - not able to be done by DPRA - 5-digit information unavailable.

File 2.3 - SAMPLE 4-DIGIT INDUSTRY FROM DPRA

ANALYTICAL FRAMEWORK AND CRITICAL ASSUMPTIONS

EXHIBIT 8-1. SIC: 2063 INDUSTRY: BEET SUGAR

SUMMARY OF 1980 ENERGY EFFICIENCY IMPROVEMENT DATA*

INDUSTRY COMPOSITE USE PROFILE (1980)			INDUSTRY COMPOSITE ENERGY CONSERVATION PROFILE (1980)		INTERMEDIATE ENERGY EFFICIENCY IMPROVEMENT COEFFICIENTS		
INTERMEDIATE USE DISTRIBUTION	END USE	ENERGY END USE ACTIVITY	END USE EFFICIENCY IMPROVEMENT	TECHNIQUE FOR IMPROVEMENT	TECH. FEASIBILITY 1980	ECONOMIC VIABILITY 1980	SPECIAL CHARACTERISTICS
A(1)	B(1)		C(1)=C(1)*F(1)		D(1)	E(1)	F(1)
30 ↓ 100	97 PULP DRYER 13 LINE KILN		12 5	PULP PRESS, HEAT RECOVERY INSULATION, AIR LOCKS	26 5	24 5	0.50 1.00
55 ↓ 100	24 BOILER LOSSES 56 EVAPORATORS, PROCESS STEAM 3 SPACE HEATING, MISCELLANEOUS 10 OTHER LOSSES		30 28 50	ECONOMIZER, MINIMIZE BLOWDOWN HEAT RECOVERY, STEAM USE MODIFICATION HEAT RECOVERY STEAM TRAPS, GLAND SEALS, HEAT RECOVERY	30 28 10 50	30 28 50	1.00 1.00 1.00
1 ↓ 100	93 MECHANICAL POWER 7 LIGHTING		1 8	SIZE EQUIPMENT TO MATCH LOAD BETTER MANAGEMENT, CONVERT TO FLUORESCENT	5 15	2 8	0.45 1.00
GROSS GOAL 23 <20>			INTERMEDIATE VALUES 27 <2A> 23 				

<A> TECHNOLOGICALLY FEASIBLE GOAL = SUM(A(1)*B(1)*C(1)) = 27
 ECONOMICALLY PRACTICABLE GOAL = SUM(A(1)*B(1)*E(1)*F(1)) = 23

OTHER CONSIDERATIONS:
EPA AND OSHA
TOTAL ADJUSTMENT

-2.05
-2.05 <D>

<C> GROSS GOAL = SUM(A(1)*B(1)*C(1)) = 27
<D> ADJUSTMENT = -2.05
NET GOAL = 25

* ENERGY IMPROVEMENT GOALS ARE APPLICABLE TO THE COMPOSITE INDUSTRY ONLY. PLANTS WILL VARY WIDELY FROM THE COMPOSITE.
ESTIMATES PREPARED BY DEVELOPMENT PLANNING & RESEARCH ASSOCIATES, INC.

File 2.4 - SAMPLE WORKSHEET FROM DPRA INFORMATION

<u>SIC CODE</u>	<u>Distillate</u>	<u>Residual</u>	<u>Coal</u>	<u>Coke & Breeze</u>	<u>Natural Gas</u>	<u>TOTAL</u>
2063						
10 ¹² Btu	2.4	2.1	31.4	-----	33	68.9
%	3.5	3.0	45.6	-----	47.9	

Direct Use	30.3%	20.9	(10 ¹² Btu)	
Direct Heat		Distillate	.73	
		Residual	.63	
		Coal	9.5	
		Natural Gas	10.0	
Boiler	69.7%	43.3	(10 ¹² Btu)	(48 - 4.7)
Steam	94.9%	41.1	(10 ¹² Btu)	
		Distillate	1.4	
		Residual	1.2	
		Coal	18.7	
		Natural Gas	19.7	
Space Heat	5.1%	2.2	(10 ¹² Btu)	
		Distillate	.07	
		Residual	.07	
		Coal	1	
		Natural Gas	1.1	
Electricity Generation		4.7	(10 ¹² Btu)	
		Distillate	.17	
		Residual	.15	
		Coal	2.2	
		Natural Gas	2.3	
Electricity		5.37	10 ¹² Btu	(.67 + 4.7)
Machine Drive	93%	4.99	(10 ¹² Btu)	
Lighting	7%	.38	(10 ¹² Btu)	

File 3 - FUNCTIONAL USES BY FUEL TYPE FOR TEXTILE MILL PRODUCTS - SIC 22 (%)

Fuel Functional Use	Coal	Fuel Oil	Natural Gas	LPG	Electricity
Space Heating	5.5	6.5	4.0		1.5
Space Cooling					32.6
Lighting					11.9
Total Direct Heat			26.0		
Raw Material					
Process Steam	92.7	91.5	68.2		
Electricity Generation					
Machine Drive					47.5
Other Uses, NSK/NEC	1.8	2.0	1.8		6.5
Transportation				100.0	

File 3.1 - SPINNING - SIC 22 (10⁹kWh)

Fuel Functional Use	Coal	Fuel Oil	Natural Gas	LPG	Electricity
Space Heating	.043	.123	.195		
Space Cooling					1.141
Lighting					.240
Total Direct Heat					
Raw Material					
Process Steam					
Electricity Generation					
Machine Drive					3.905
Other Uses, NSK/NEC					.300
Transportation				.006	

File 3.1 - (CONTINUED)

The total amount of energy used for Spinning was found by taking the total amount of purchased fuels and electric energy (in kilowatt hour equivalents) for SIC 22 as given in the 1974 Annual Survey of Manufactures and multiplying it by the percent energy this process consumes of the whole Textile Mill Industry, SIC 22 [REF. File 3.11].

To find the amount of each fuel used for each functional use, the percentages given by SCS Engineers for each functional use were multiplied by the total amount of energy used for Spinning.

In space heating and steam raising, where fuel types are not specified, the fuel mix was assumed to be fuel oil, 34%; natural gas, 54%; and coal, 12%. This was based on the fuel mix for SIC 22 as given in the 1974 Annual Survey of Manufactures.

File 3.1 displays the amount of energy used for Spinning by fuel type and functional use in kilowatt hours.

File 3.2 - TEXTURIZING - SIC 22 (10⁹ kWh)

Functional Use	Fuel		Fuel Oil		Natural Gas	LPG	Electricity
	Coal	Distillate	Residual				
Space Heating							
Space Cooling							2.448
Lighting							.4896
Total Direct Heat							
Raw Material							
Process Steam							
Electricity Generation							
Machine Drive							2.176
Other Uses, NSK/NEC							.272
Transportation						.0544	

File 3.2 - (CONTINUED)

The total amount of energy used for Texturizing was found by taking the total amount of purchased fuels and electric energy (in kilowatt hour equivalents) for SIC 22 as given in the 1974 Annual Survey of Manufactures and multiplying it by the percent energy this process consumes of the whole Textile Mill Industry, SIC 22 [REF. File 3.11].

To find the amount of each fuel used for each functional use, the percentages given by SCS Engineers for each functional use were multiplied by the total amount of energy used for Texturizing.

In space heating and steam raising, where fuel types are not specified, the fuel mix was assumed to be fuel oil, 34%; natural gas, 54%; and coal, 12%. This was based on the fuel mix for SIC 22 as given in the 1974 Annual Survey of Manufactures.

File 3.2 displays the amount of energy used for Texturizing by fuel type and functional use in kilowatt hours.

File 3.3 - WEAVING - SIC 22 (10⁹ kWh)

Fuel Functional Use	Coal	Fuel Oil	Natural Gas	LPG	Electricity
Space Heating	.208				
Space Cooling					1.561
Lighting					.364
Total Direct Heat					
Raw Material					
Process Steam	1.821				
Electricity Generation					
Machine Drive					.989
Other Uses, NSK/NEC					.208
Transportation				.052	

File 3.3 - (CONTINUED)

The total amount of energy used for Weaving was found by taking the total amount of purchased fuels and electric energy (in kilowatt hour equivalents) for SIC 22 as given in the 1974 Annual Survey of Manufactures and multiplying it by the percent energy this process consumes of the whole Textile Mill Industry, SIC 22 [REF. File 3.11].

To find the amount of each fuel used for each functional use, the percentages given by SCS Engineers for each functional use were multiplied by the total amount of energy used for Weaving.

In space heating and steam raising, where fuel types are not specified, the fuel mix was assumed to be fuel oil, 34%; natural gas, 54%; and coal, 12%. This was based on the fuel mix for SIC 22 as given in the 1974 Annual Survey of Manufactures.

Both electricity and propane were used as fuels for transportation. Electricity was assumed to be negligible, and the full amount was given to propane.

File 3.3 displays the amount of energy used for Weaving by fuel type and functional use in kilowatt hours.

File 3.4 - KNITTING - SIC 22 (10⁹ kWh)

Functional Use	Fuel				
	Coal	Fuel Oil	Natural Gas	LPG	Electricity
Space Heating					.278
Space Cooling					.378
Lighting					.119
Total Direct Heat					
Raw Material					
Process Steam					
Electricity Generation					
Machine Drive					.934
Other Uses, NSK/NEC		.258			
Transportation				.002	

File 3.4 - (CONTINUED)

The total amount of energy used for Knitting was found by taking the total amount of purchased fuels and electric energy (in kilowatt hour equivalents) for SIC 22 as given in the 1974 Annual Survey of Manufactures and multiplying it by the percent energy this process consumes of the whole Textile Mill Industry, SIC 22 [REF. File 3.11].

To find the amount of each fuel used for each functional use, the percentages given by SCS Engineers for each functional use were multiplied by the total amount of energy used for Knitting.

In space heating and steam raising, where fuel types were not specified, the fuel mix was assumed to be fuel oil, 34%; natural gas, 54%; and coal, 12%. This was based on the fuel mix for SIC 22 as given in the 1974 Annual Survey of Manufactures.

Electricity and fuel oil were both given as energy for machine drive. Based on the flow diagram given for Knitting [BIB. 18 Appendix, Figure 4], all machine drive was allocated to electricity.

File 3.4 displays the amount of energy used for Knitting by fuel type and functional use in kilowatt hours.

File 3.5 - GREIGE MILLS - SIC 22 (10⁹kWh)

Functional Use	Fuel				
	Coal	Fuel Oil	Natural Gas	LPG	Electricity
Space Heating	.131	.370	.587		
Space Cooling					4.025
Lighting					.762
Total Direct Heat					
Raw Material					
Process Steam	.109	.294	.468		
Electricity Generation					
Machine Drive					3.916
Other Uses, NSK/NEC					.218
Transportation					

File 3.5 - (CONTINUED)

The total amount of energy used for Greige Mills was found by taking the total amount of purchased fuels and electric energy (in kilowatt hour equivalents) for SIC 22 as given in the 1974 Annual Survey of Manufactures and multiplying it by the percent energy this process consumes of the whole Textile Mill Industry, SIC 22 [REF. File 3.11].

To find the amount of each fuel used for each functional use, the percentages given by SCS Engineers for each functional use were multiplied by the total amount of energy used for Greige Mills.

In space heating and steam raising, where fuel types are not specified, the fuel mix was assumed to be fuel oil, 34%; natural gas, 54%; and coal, 12%. This was based on the fuel mix for SIC 22 as given in the 1974 Annual Survey of Manufactures.

Two estimates of fuel use were given, and estimate #1 was used.

File 3.5 displays the amount of energy used for Greige Mills by fuel type and functional use in kilowatt hours.

File 3.6 - FINISHING (WOVEN) - SIC 22 (10⁹ kWh)

Fuel Functional Use	Coal	Fuel Oil	Natural Gas	LPG	Electricity
Space Heating	.108	.307	.488		.181
Space Cooling					
Lighting					.181
Total Direct Heat			2.891		
Raw Material					
Process Steam	1.409	4.246	6.740		
Electricity Generation					
Machine Drive					.903
Other Uses, NSK/NEC			.181		.361
Transportation					

File 3.6 - (CONTINUED)

The total amount of energy used for Finishing (Woven) was found by taking the total amount of purchased fuels and electric energy (in kilowatt hour equivalents) for SIC 22 as given in the 1974 Annual Survey of Manufactures and multiplying it by the percent energy this process consumes of the whole Textile Mill Industry, SIC 22 [REF. File 3.11].

To find the amount of each fuel used for each functional use, the percentages given by SCS Engineers for each functional use were multiplied by the total amount of energy used for Finishing (Woven).

In space heating and steam raising, where fuel types were not specified, the fuel mix was assumed to be fuel oil, 34%; natural gas, 54%; and coal, 12%. This was based on the fuel mix for SIC 22 as given in the 1974 Annual Survey of Manufactures.

File 3.6 displays the amount of energy used for Finishing (Woven) by fuel type and functional use in kilowatt hours.

File 3.7 - FINISHING (KNIT) - SIC 22 (10⁹ kWh)

Functional Use	Fuel				
	Coal	Fuel Oil	Natural Gas	LPG	Electricity
Space Heating		.683			
Space Cooling					.683
Lighting					.910
Total Direct Heat					
Raw Material					
Process Steam		13.423	6.143		
Electricity Generation					
Machine Drive					
Other Uses, NSK/NEC					.683
Transportation					

File 3.7 - (CONTINUED)

The total amount of energy used for Finishing (Knit) was found by taking the total amount of purchased fuels and electric energy (in kilowatt hour equivalents) for SIC 22 as given in the 1974 Annual Survey of Manufactures and multiplying it by the percent energy this process consumes of the whole Textile Mill Industry, SIC 22 [REF. File 3.11].

To find the amount of each fuel used for each functional use, the percentages given by SCS Engineers for each functional use were multiplied by the total amount of energy used for Finishing (Knit).

In space heating and steam raising, where fuel types are not specified, the fuel mix was assumed to be fuel oil, 34%; natural gas, 54%; and coal, 12%. This was based on the fuel mix for SIC 22 as given in the 1974 Annual Survey of Manufactures.

Both electricity and propane were used as fuels for transportation. Electricity was assumed to be negligible, and the full amount was given to propane.

File 3.7 displays the amount of energy used for Finishing (Knit) by fuel type and functional use in kilowatt hours.

File 3.8 - YARN DYEING - SIC 22 (10⁹kWh)

Fuel Functional Use	Coal	Fuel Oil	Natural Gas	LPG	Electricity
Space Heating					
Space Cooling					
Lighting					.657
Total Direct Heat					
Raw Material					
Steam	2.630	2.360	5.917		
Electricity Generation					
Machine Drive					1.315
Other Uses, NSK/NEC					
Transportation					

File 3.8 - (CONTINUED)

The total amount of energy used for Yarn Dyeing was found by taking the total amount of purchased fuels and electric energy (in kilowatt hour equivalents) for SIC 22 as given in the 1974 Annual Survey of Manufactures and multiplying it by the percent energy this process consumes of the whole Textile Mill Industry, SIC 22 [REF. File 3.11].

To find the amount of each fuel used for each functional use, the percentages given by SCS Engineers for each functional use were multiplied by the total amount of energy used for Yarn Dyeing.

Functional use breakdowns were not given in as much detail for Yarn Dyeing as for all the other processes. Lighting, as a result, is the average of lighting for all other processes. The remaining electricity was given to machine drive, and space conditioning NSK was assumed to be negligible.

Percentages of fuels were given for coal, fuel oil, and natural gas for steam generation. These were used instead of the fuel mix percentages derived from the 1974 Annual Survey of Manufactures.

File 3.8 displays the amount of energy used for Yarn Dyeing by fuel type and functional use in kilowatt hours.

File 3.9 - FLOOR COVERINGS (FOAM) - SIC 22 (10⁹ kWh)

Fuel Functional Use	Coal	Fuel Oil	Natural Gas	LPG	Electricity
Space Heating					
Space Cooling					
Lighting					
Total Direct Heat			2.291		
Raw Material					
Steam	.2	.564	.903		
Electricity Generation					
Machine Drive					.280
Other Uses, NSK/NEC					
Transportation					

File 3.9 - (CONTINUED)

The total amount of energy used for Floor Coverings (Foam) was found by taking the total amount of purchased fuels and electric energy (in kilowatt hour equivalents) for SIC 22 as given in the 1974 Annual Survey of Manufactures and multiplying it by the percent energy this process consumes of the whole Textile Mill Industry, SIC 22 [REF. File 3.11].

To find the amount of each fuel used for each functional use, the percentages given by SCS Engineers for each functional use were multiplied by the total amount of energy used for Floor Coverings (Foam).

In space heating and steam raising, where fuel types are not specified, the fuel mix was assumed to be fuel oil, 34%; natural gas, 54%; and coal, 12%. This was based on the fuel mix for SIC 22 as given in the 1974 Annual Survey of Manufactures.

File 3.9 displays the amount of energy used for Floor Coverings (Foam) by fuel type and functional use in kilowatt hours.

File 3.10 - FLOOR COVERINGS (WOVEN BACKED) - SIC 22 (10⁹ kWh)

Functional Use	Fuel				
	Coal	Fuel Oil	Natural Gas	LPG	Electricity
Space Heating					
Space Cooling					
Lighting					
Total Direct Heat			3.059		
Raw Material					
Steam	.409	1.155	1.841		
Electricity Generation					
Machine Drive					.457
Other Uses, NSK/NEC					
Transportation					

File 3.10 - (CONTINUED)

The total amount of energy used for Floor Coverings (woven backed) was found by taking the total amount of purchased fuels and electric energy (in kilowatt hour equivalents) for SIC 22 as given in the 1974 Annual Survey of Manufactures and multiplying it by the percent energy this process consumes of the whole Textile Mill Industry, SIC 22 [REF. File 3.11].

To find the amount of each fuel used for each functional use, the percentages given by SCS Engineers for each functional use were multiplied by the total amount of energy used for Floor Coverings (woven backed).

In space heating and steam raising, where fuel types were not specified, the fuel mix was assumed to be fuel oil, 34%; natural gas, 54%; and coal, 12%. This was based on the fuel mix for SIC 22 as given in the 1974 Annual Survey of Manufactures.

File 3.10 displays the amount of energy used for Floor Coverings (woven backed) by fuel type and functional use in kilowatt hours.

File 3.11 - PERCENTAGE ENERGY USE BY EACH COMPONENT OF SIC 22

<u>Process</u>	<u>Percent of Energy Use</u>
Spinning	6.35
Texturizing	5.75
Weaving	5.5
Knitting	2.1
Greige Mills	11.5
Finishing (Woven)	19.1
Finishing (Knit)	24.0
Yarn Dyeing	13.9
Floor Coverings	11.8
TOTAL	100

SOURCE: [BIB. 18, Table 43, page 301].

File 4 - FUNCTIONAL USE BREAKDOWN FOR THE FIVE MAJOR INDUSTRIES IN SIC 32

(Percent)

	<u>Bituminous Coal</u>	<u>Distillate Fuel Oil</u>	<u>Residual Fuel Oil</u>	<u>Natural Gas</u>	<u>Purchased Electricity</u>	<u>Other Energy</u>
Space Heat		1.3	4.0	1	.7	
Machine Drive		27.5	---	-	----	----
Direct Heat	100%	71.2	94.6	96.5	5.6	
Other Uses		----	1.1	2.5	93.7 ^{1/}	100 ^{2/}

SOURCE: File 4.1 through 4.5.

These values which represent over two-thirds of the energy consumed in SIC 32 were developed by adding up the energy uses in the 5 most energy intensive industries by functional use and dividing by the total of each fuel.

1/ Most of the electricity in other uses is machine drive with a small percent for air conditioning and ventilation.

2/ Other energy is 40 percent machine drive and 60 percent other uses.

File 4.1 - FUNCTIONAL USE BREAKDOWN OF GLASS CONTAINERS - SIC 3221

	Bituminous Coal (10 ³ tons)	Distillate Fuel Oil (10 ³ tons)	Residual Fuel Oil (10 ³ tons)	Natural Gas (10 ⁹ cf)	Purchased Electricity (10 ⁶ kWh)	Other Energy (10 ⁶ \$)
Space Heating	-----	96.2	232.4	4.0	113.9	-----
Machine Drive	-----	----	-----	---	2,694.5	-----
Direct Heat	-----	1,506.7	1,427.3	95.5	834.9	-----
Other Uses, NSK	-----	----	-----	---	-----	5.1

SOURCES: Battelle Columbus Laboratory [REF. BIB. 11, page 14-21].
Census of Manufactures [BIB. 4].

The processes in the Battelle study were classified according to functional use breakdowns:

Electricity

Batch & Cullet Handling	—————→	machine drive	
Melting	—————→	direct heat	
Conditioning	}		
Forming			
Post Forming		—————→	machine drive
Product Handling			
Space Conditioning	—————→	space heat	

LPG (other fuels)

Melting	}		
Forming		—————→	direct heat
Post Forming			
Product Handling		—————→	machine drive
Space Conditioning	—————→	space heat	

Natural Gas, Fuel Oil, Coal

Melting	}		
Conditioning			
Forming		—————→	direct heat
Product Handling			
Space Conditioning	—————→	space heat	

File 4.1 - (CONTINUED)

After categorizing the processes according to functional uses, percentages were developed for each functional use according to fuel type. These percentages were multiplied by the Census value for that fuel in SIC 3221 to obtain the values shown in File 4.1.

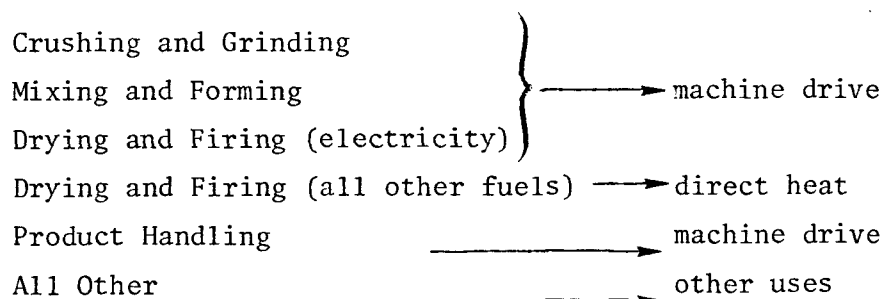
File 4.2 - FUNCTIONAL USE BREAKDOWN OF BRICK AND STRUCTURAL CLAY TILE - SIC 3251

	Bituminous Coal (10 ³ bb1)	Distillate Fuel Oil (10 ³ bb1)	Residual Fuel Oil (10 ³ bb1)	Natural Gas (10 ⁹ cf)	Purchased Electricity (10 ⁶ kWh)	Other Energy (10 ⁶ \$)
Space Heating	----	----	----	----	-----	-----
Machine Drive	----	----	----	----	957.2	-----
Direct Heat	----	651.3	65.5	48.2	-----	-----
Other Uses, NSK	----	----	----	2.5	-----	9.6

SOURCES: Battelle Columbus Laboratory [BIB. 11, page 51-8].

Census of Manufactures [BIB. 4].

The process in the Battelle study were classified according to the functional use breakdowns:



Percentages were developed from the Battelle study for each fuel. These percentages were applied to the Census final values for SIC 3251 to obtain the values given in File 4.2.

* Imputed for the 1971 ratio of distillate to residual fuel oil.

File 4.3 - FUNCTIONAL USE BREAKDOWN FOR PORTLAND CEMENT - SIC 3241

	Bituminous Coal (10 ³ tons)	Distillate Fuel Oil (10 ³ bbl)	Residual Fuel Oil (10 ³ bbl)	Natural Gas (10 ⁹ cf)	Purchased Electricity (10 ⁶ kWh)	Other Energy (10 ⁶ \$)
Space Heating	----	----	----	----	----	----
Machine Drive	----	----	----	----	9,904.7	----
Direct Heat	6,957.8	2,980.9	4,010.9	198.9	----	----
Other Uses, NSK	----	----	----	----	----	1.4

SOURCES: Battelle Columbus Laboratory [BIB. 9, pages 23-27].
Census of Manufactures [BIB. 4].

All fuels were assumed to be used for direct heat. All electricity was used for machine drive.

File 4.4 - FUNCTIONAL USE BREAKDOWN OF LIME - SIC 3274

	<u>Bituminous Coal (10³tons)</u>	<u>Distillate Fuel Oil (10³bb1)</u>	<u>Residual Fuel Oil (10³bb1)</u>	<u>Natural Gas (10⁹cf)</u>	<u>Purchased Electricity (10⁶kWh)</u>	<u>Other Energy (10⁶\$)</u>
Space Heating	----	----	----	----	----	----
Machine Drive	----	----	----	----	711.1	----
Direct Heat	1,945.3	152.6	7.1	27.1	----	----
Other Uses, NSK	----	----	----	----	----	.4

SOURCES: Battelle Columbus Laboratory [BIB. 9, pages 16-22].
Census of Manufactures [BIB. 4].

Lime manufacturing broken down with all electricity making up machine drive and all fuels making up direct heat.

File 4.5 - FUNCTIONAL USE BREAKDOWN OF READY MIX CEMENT - SIC 3273

	Bituminous Coal (10 ³ tons)	Distillate Fuel Oil (10 ³ bb1)	Residual Fuel Oil (10 ³ bb1)	Natural Gas (10 ⁹ cf)	Purchased Electricity (10 ⁶ kWh)	Other Energy (10 ⁶ \$)
Space Heating	----	----	----	----	----	----
Machine Drive	----	2,059.4	----	----	943.3	23.5
Direct Heat	----	----	----	----	----	----
Other Uses, NSK	----	----	64.3	7.2	----	18.4

SOURCES: The Conference Board [BIB. 12].

Census of Manufactures [BIB. 4].

Distillate oil was assumed to be diesel which was used for delivery and mixing. Fuels, NSK were assumed to be gasoline which was also used for delivery and mixing. Both were classified as machine drive along with total electricity.

Natural gas, residual fuel oil and "other fuels" were classified as other uses NSK which consisted of space heat and direct heat.

File 5 - BTU CONVERSION FACTORS

<u>Fuel</u>	<u>Units</u>	<u>1967</u>	<u>1971</u>	<u>1974</u>
Distillate	$\frac{10^6 \text{ Btu}}{10^3 \text{ bbl}}$	5825	5825	5825
Fuel Oil				
Residual	$\frac{10^6 \text{ Btu}}{10^3 \text{ bbl}}$	6287	6287	6287
Fuel Oil				
Coal	$\frac{10^6 \text{ Btu}}{10^3 \text{ tons}}$	24.88	24.88	24.88
Coke	$\frac{10^6 \text{ Btu}}{10^3 \text{ tons}}$	30.12	30.12	30.12
Natural	$\frac{10^6 \text{ Btu}}{10^6 \text{ cf}}$	1032	1031	1031
Gas				
Other	$\frac{10^6 \text{ Btu}}{10^6 \$}$	614,160 ^{1/}	580,040 ^{2/}	575,263 ^{3/}
Fuels				
Fuels	$\frac{10^6 \text{ Btu}}{10^6 \$}$	(Fuels NSK vary by 2-digit SIC code. See File 5.1 for Btu conversion factor.)		
NSK				
Purchased	$\frac{10^6 \text{ Btu}}{10^6 \text{ kWh}}$	3412	3412	3412
Electricity				
Generated	$\frac{10^6 \text{ Btu}}{10^6 \text{ kWh}}$	10,500	10,500	10,500
Electricity				

SOURCE: Bureau of Mines [BIB. 19].

File 5.1 - BTU CONVERSION FACTORS FOR FUELS NSK

<u>SIC Code</u>	<u>1967</u> ^{1/} 10 ⁶ Btu 10 ⁶ \$	<u>1971</u> ^{2/} 10 ⁹ Btu 10 ⁶ \$	<u>1974</u> ^{3/} 10 ⁶ Btu 10 ⁶ \$
20	2,363,444	1,958,945	1,013,319
21	2,371,388	1,652,126	821,667
22	2,325,044	1,743,489	808,913
23	1,386,826	1,424,228	901,031
24	1,413,902	1,263,785	794,211
27	1,441,086	1,557,652	973,095
30	2,560,983	1,949,171	915,452
31	2,142,483	1,706,000	755,357
34	1,702,813	1,585,374	917,302
35	1,833,999	1,687,209	938,013
36	1,904,304	1,659,099	908,147
37	2,028,347	1,653,375	867,635
38	2,028,347	1,660,708	797,224
39	1,732,206	1,638,658	853,080

SOURCES: 1. BIB. 1.
2. BIB. 2.
3. BIB. 3.

Value for Fuels NSK derived by dividing total fuel consumption for each 2-digit SIC code by total expenditure and converting to Btu's at 3412 Btu/kWh.

1/ BIB. 1.
2/ BIB. 2.
3/ BIB. 3.

Computer File A, B - FUELS AND ELECTRIC ENERGY CONSUMED NATIONALLY IN 1967

<u>Field No.</u>	<u>Description</u>	<u>Unit</u>
1	'67'	Year
2	Geographic code	Nation
3	SIC code	2-digit
6	Distillate Fuel Oil	10^3 bbl
7	Distillate Fuel Oil	10^6 \$
8	Residual Fuel Oil	10^3 bbl
9	Residual Fuel Oil	10^6 \$
10	Natural Gas	10^6 cf
11	Natural Gas	10^6 \$
12	Other Fuels	10^6 \$
13	Fuels NSK	10^6 \$
14	Purchased Electric Energy	10^6 kWh
15	Purchased Electric Energy	10^6 \$
16	Generated Electricity	10^6 kWh
17	Total Purchased Fuels & Electric Energy	10^6 kWh
18	Total Purchased Fuels & Electric Energy	10^6 \$
19	Total Purchased Fuels	10^6 \$
20	Bituminous Coal	10^3 tons
21	Bituminous Coal	10^6 \$
22	Coke & Breeze	10^3 tons
23	Coke & Breeze	10^6 \$

SOURCE: Census of Manufactures [BIB. 1, Table 3].

Computer File C, D, E - FUELS AND ELECTRIC ENERGY CONSUMED NATIONALLY IN 1971

<u>Field No.</u>	<u>Description</u>	<u>Unit</u>
1	'71'	Year
2	Geographic code	National
3	SIC code	4-digit
4	Total Purchased Fuels	10^9 kWh
5	Total Purchased Fuels	10^6 \$
6	Total Fuel Oil	10^3 bbl
7	Total Fuel Oil	10^6 \$
8	Distillate Fuel Oil	10^3 bbl
9	Distillate Fuel Oil	10^6 \$
10	Residual Fuel Oil	10^3 bbl
11	Residual Fuel Oil	10^6 \$
14	Bituminous Coal	10^3 bbl
15	Bituminous Coal	10^6 \$
16	Coke & Breeze	10^3 bbl
17	Coke & Breeze	10^6 \$
18	Natural Gas	10^9 cf
19	Natural Gas	10^6 \$
20	Other Fuels	10^6 \$
21	Fuels NSK	10^6 \$
24	Purchased Fuels & Electric Energy	10^9 kWh
25	Purchased Fuels & Electric Energy	10^6 \$
26	Purchased Electricity	10^9 kWh
27	Purchased Electricity	10^9 \$
28	Generated Electricity	10^9 kWh

SOURCE: 1972 Census of Manufactures [BIB. 2 and 3, Table 3].

Computer File F, G, H - FUELS AND ELECTRIC ENERGY CONSUMED BY STATE IN 1971

<u>Field No.</u>	<u>Description</u>	<u>Unit</u>
1	'71'	Year
2	Geographic code	State
3	SIC code	2-digit
4	Total Purchased Fuels	10^9 kWh
5	Total Purchased Fuels	10^6 \$
6	Total Fuel Oil	10^3 bbl
7	Total Fuel Oil	10^6 \$
8	Distillate Fuel Oil	10^3 bbl
9	Distillate Fuel Oil	10^6 \$
10	Residual Fuel Oil	10^3 bbl
11	Residual Fuel Oil	10^6 \$
14	Bituminous Coal	10^3 bbl
15	Bituminous Coal	10^6 \$
16	Coke & Breeze	10^3 bbl
17	Coke & Breeze	10^6 \$
18	Natural Gas	10^9 cf
19	Natural Gas	10^6 \$
20	Other Fuels	10^6 \$
21	Fuels NSK	10^6 \$
24	Purchased Fuels & Electric Energy	10^9 kWh
25	Purchased Fuels & Electric Energy	10^6 \$
26	Purchased Electricity	10^9 kWh
27	Purchased Electricity	10^9 \$
28	Generated Electricity	10^9 kWh

SOURCE: 1972 Census of Manufactures [BIB. 2 and 3, Table 4].

Computer File I, J - FUELS AND ELECTRICAL ENERGY CONSUMED NATIONALLY IN 1974

<u>Field No.</u>	<u>Description</u>	<u>Unit</u>
1	'74'	Year
2	Geographic code	National
3	SIC code	4-digit
4	Purchased Fuels & Electric Energy	10^9 kWh
5	Purchased Fuels & Electric Energy	10^6 \$
6	Distillate Fuel Oil	10^3 bbl
7	Distillate Fuel Oil	10^6 \$
8	Residual Fuel Oil	10^3 bbl
9	Residual Fuel Oil	10^6 \$
10	Bituminous Coal	10^3 tons
11	Bituminous Coal	10^6 \$
12	Coke & Breeze	10^3 tons
13	Coke & Breeze	10^6 \$
14	Natural Gas	10^9 cf
15	Natural Gas	10^6 \$
16	Other Fuels	10^6 \$
17	Fuels NSK	10^6 \$
18	Purchased Electricity	10^6 kWh
19	Purchased Electricity	10^6 \$
20	Generated Electricity	10^6 kWh

SOURCE: 1974 Annual Survey of Manufactures [BIB. 5].

Computer File K, L, M - FUELS AND ELECTRIC ENERGY CONSUMED BY STATE IN 1974

<u>Field No.</u>	<u>Description</u>	<u>Unit</u>
1	'74'	Year
2	Geographic code	State
3	SIC code	2-digit
4	Total Purchased Fuels	10^9 kWh
5	Total Purchased Fuels	10^6 \$
6	Total Fuel Oil	10^3 bbl
7	Total Fuel Oil	10^6 \$
8	Distillate Fuel Oil	10^3 bbl
9	Distillate Fuel Oil	10^6 \$
10	Residual Fuel Oil	10^3 bbl
11	Residual Fuel Oil	10^6 \$
12	Bituminous Coal	10^3 tons
13	Bituminous Coal	10^6 \$
14	Coke & Breeze	10^3 tons
15	Coke & Breeze	10^6 \$
16	Natural Gas	10^9 cf
17	Natural Gas	10^6 \$
18	Other Fuels	10^6 \$
19	Fuels NSK	10^6 \$
20	Purchased Fuels & Electric Energy	10^9 kWh
21	Purchased Fuels & Electric Energy	10^6 \$
22	Purchased Electricity	10^6 kWh
23	Purchased Electricity	10^6 \$
24	Generated Electricity	10^6 kWh

SOURCE: 1974 Annual Survey of Manufactures [BIB. 20].

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d. Further Work

(1) Annual or Monthly Updating of the Data Input Files

The physical consumption data can be maintained on an annual basis by using information available from the Annual Survey of Manufactures. Since this data is identical in format each year, it should require no additional programming to update the data. The one major problem is that there is presently a two-year time lag associated with gathering and publishing the survey data. An optimistic projection is that this will be reduced to one year in the near future.

The functional use data will require extended effort to update annually. The present files [REF. Files 2, 3, 4] are derived from 1974 studies which were applied to each year's data.

The conversion factors [REF. File 5] are relatively constant with any annual changes available from the Bureau of Mines annual publications.

(2) Data Gaps

The major areas which require upgrading are functional use data and Census disclosure information.

Functional Uses: The only industries for which functional use data is shown are SIC 32, 22, and 20. The sources for this information are good; however, some precision is lost in translating the process requirements into the standard functional uses specified by FEA. The other industries would require considerable effort to derive functional uses.

Census of Manufactures Disclosures: The data provided for the states which contained disclosed information is only an estimate. The derivation of this data attempts to weigh the fuel requirements inherent in the industry against the fuel availability of the region to derive the total fuel breakdowns for each state and industry. A survey of the disclosed states or the eliminating of Census disclosures would greatly improve the quality of the data.

(3) Alternative Approaches

Generally, the alternative which would best cover all industries would be to consider each industry separately. A sample of sources which could be explored are listed below.

SIC 32 - Stone, Clay, and Glass Products: The hydraulic cement industry has been thoroughly studied by the Portland Cement Association. Energy consumption data is available on a national and regional level. This data could be further broken down to a state level of detail by production figures available from the Bureau of Mines.

Similarly, detailed studies of the Glass portion of SIC 32 as well as the Lime and Ready Mix Cement portion have been recently completed. These studies provide process energy requirements and could be used to derive total national consumption figures when used in conjunction with production figures.

The strength of this approach would be that it would contain better regional and national 4-digit information. The major weakness of this approach is that the 2-digit state information would be of poorer quality.

SIC 20 - Food and Kindred Products, SIC 22 - Textile Mill Products, SIC 34 - Fabricated Metal Products, SIC 35 - Machinery, Except Electrical, SIC 37 - Transportation Equipment: These five industries have been studied in depth on a process level in the Industrial Energy Conservation Target Setting Reports recently released by the Department of Commerce. National industry data could be built up from the process energy requirements contained in these reports. The major weakness with this approach is that state data is not available and the errors introduced at low level disaggregations would be compounded in the final totals.

SIC 21, 23-25, 27, 30, 31, 36-39: These industries have not been studied in much detail. Discussions with industry representatives revealed that industries could be classified in these categories: those industries who had never considered collecting energy data; those industries where cost has prohibited collecting data; and those industries who were in the process of collecting data but were not willing to release confidential or interim data.

Listed below are the 2-digit SIC codes, the affiliated trades association, and the present state of energy data collection.

- SIC 21 - Tobacco Manufactures - Tobacco Institute has not compiled energy consumption data and would have to contact individual industries to do so.
- SIC 23 - Apparel and Other
Finished Products - Celanese Corporation states that it is very difficult to collect data. Energy use per unit output is a cost figure and individual industries are reluctant to give such information in a survey.
- SIC 24 - Lumber and Wood
Products, Except
Furniture - Eight trade associations affiliated with SIC 24 were contacted. Two associations discussed Census data as the most reliable source. A variety of small specific surveys are available but a comprehensive energy reporting system for the total 2-digit SIC is unavailable.
- SIC 25 - Furniture and Fix-
tures - National Association of Furniture Manufacturers had not considered an energy study.
- SIC 27 - Printing, Publish-
ing and Allied
Industries - Graphic Arts Technical Foundation is in the process of an energy conservation study, but is not ready to release the results. Printing Industry of America did a study a year ago which was not comprehensive enough for this analysis.
- SIC 30 - Rubber and Mis-
cellaneous Plastics
Products - Rubber Manufactures Association (RMA) is in process of an energy consumption survey. The

information is only available in the aggregate form sent to the Department of Commerce. The RMA does not have enough information presently to provide industry-wide data on energy use.

SIC 31 - Leather and Leather
Products

- The Leather Industry of America and the Luggage and Leather Goods Manufactures concurred that the collection of energy consumption data in this industry would require extensive effort and prohibitive costs.

SIC 28 - Instruments and
Retail Products

SIC 39 - Miscellaneous

Manufacture Industry- No energy related studies have been done in these industries.