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ENERGY USE FOR BUILDING CONSTRUCTION

Preliminary Progress Report for Period
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MASTER

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ABSTRACT

The building construction industry, as broken down by the Bureau of Economic Analysis, U. S. Department of Commerce, was integrated into the Energy Input/Output Model developed at the Center for Advanced Computation, University of Illinois. The resulting expanded model was used to determine energy intensities of various (49) building construction (new and maintenance) sectors and of the overall building construction industry, for year 1967. The latter figure was computed at about 70,000 Btu/$, i.e., the construction industry on the average required about 70,000 Btu of direct and indirect energy per dollar of output produced. The most energy intensive sector was New Construction of Petroleum Pipelines (about 150,000 Btu/$), while the least intensive was Maintenance Construction for Electric Utilities (about 25,000 Btu/$).

Also developed were total energy (direct and indirect) requirements to final demand for the building construction industry, for 1967. The overall industry required about 6000 trillion Btu, or about nine percent of the total U. S. energy requirement. New Highway Construction required the most energy to final demand (about 1000 trillion Btu, or 16 percent of the total construction industry requirement), while Maintenance Construction Residential required the least (about 9 trillion Btu, or .1 percent of the total industry requirement).

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I. INTRODUCTION

This document serves as a preliminary progress report for the first two and a half months of contract duration for "Energy Use for Building Construction," Contract No. E(11-1)-2791. It presents some of the significant results developed so far. These include energy intensities of building construction sectors and the overall building industry plus total energy of final demand required by building construction.

Development of these energy figures involved two major tasks:

1) Embedment of Bureau of Economic Analysis (BEA), U. S. Department of Commerce dollar flow data for the building construction industry into the Energy Input/Output Model [1] developed at the Center for Advanced Computation (CAC), University of Illinois. This process results in an expanded model and is described in Section II.

2) Collection of data on prices paid for direct energy by the construction industry in 1967. This was conducted by Richard G. Stein and Associates (RGSA) and was essential in computing direct energy required by the building construction industry. Data collection and relevant computations are described in Section III. (A separate section with calculational details for refined petroleum prices appears as Appendix B.) Results are given in tabular form in Appendix A.

II. THE EXPANDED ENERGY INPUT/OUTPUT MODEL

In order to develop energy figures for the entire building construction industry, a highly disaggregated BEA breakdown (484 industries in total) containing 49 building construction sectors was used in conjunction with CAC's Energy I/O Model [1], which ordinarily consists of 357 industries. The 357 order system was altered by replacing its usual 7 construction sectors with BEA's expanded 49 sectors. This results in a model with 399 sectors. These are listed in Table 1, along with the I/O codes used by BEA. (All tables can be found in Appendix A.) The expanded construction sectors wind up in positions 23 through 71, inclusively.

In addition to the computations for deriving energy cost figures (which are fully described elsewhere [1]), it was necessary to develop direct energy transfers from the energy sectors (Coal, Crude Petroleum, Refined Petroleum, Electricity, and Natural Gas) to the 49 construction sectors. These figures (see Table 2) were computed using data collected by RGSA on energy prices paid by the construction industry in 1967. (The data collection is detailed in Section III.) Given the price per Btu for a given energy type paid by a given construction sector and the corresponding dollar transaction from BEA, computation of the implied energy (Btu) flow is straightforward. (Where prices supplied by RGSA were in purchaser dollars, BEA margin figures were used along with inter-industry transactions.) As can be seen in Table 2, the building construction industry purchased a total of 1484.7 trillion Btu of direct energy in 1967, most of which was for refined petroleum products.

Once the direct energy figures were embedded in CAC's Energy I/O tables, energy intensities were computed. The intensity figures for building construction sectors (Btu/$) are shown in Table 3. Total primary intensity is the sum of the Coal, Crude Petroleum, and the hydro and nuclear portion of

Electricity figures. The total primary intensities of construction are shown ranked in Table 4. Most intensive are New Construction of Petroleum Pipelines (147197 Btu/$) and New Construction of Gas Utilities (140038 Btu/$; this sector also involves pipeline construction). This is probably due to the use of heavy construction equipment and large amounts of raw materials (steel, pipe, etc.). New Highway Construction is also, understandably, highly energy intensive.

To obtain a broad picture of the building construction industry, various average energy intensities were computed by weighting the figures for the construction sectors by the corresponding gross domestic outputs for those sectors. The results are shown in Table 5, with the total primary intensity of the overall building construction industry turning out to be 70059 Btu/$.

Using the energy intensities of construction sectors along with the total final demand dollar figures for these sectors (from BEA), the total energy of final demand required by the construction sectors was determined. These total energy figures (see Table 6) include direct and indirect energy use. Table 6 also shows the percentage of each construction sector's total energy use which was direct, and the percentage of total energy each sector required with respect to the total construction industry and the total U. S. economy. The construction industry as a whole required 6301.94 trillion Btu of direct plus indirect energy for final demand in 1967, of which just less than 20 percent was for direct energy. The industry represented 9.42 percent of the total U. S. energy requirement in 1967.

Table 7 shows the ranked total final demand energy use figures for building construction. New Highway Construction requires the largest faction: 1035.87 trillion Btu, with nearly 40 percent of it for direct energy. (The zeroes which appear for certain maintenance and repair construction sectors occur because these sectors have no dollar (or energy) transactions to final demand.)

III. ESTABLISHMENT OF PRICES PAID BY THE CONSTRUCTION INDUSTRY FOR DIRECT ENERGY IN 1967.

A. SUMMARY

In order to establish overall use of energy according to different categories of building, it has been necessary to convert the dollar figures in the Input/Output transaction charts, established by BEA and used as the basis of the CAC energy matrix, into Btu quantities. Of the five direct energy sectors only three - Refined Petroleum, Electricity, and Natural Gas - show any direct transactions to the 49 Construction sectors. There are no direct transactions to Construction from the Coal Mining or Crude Petroleum sectors.

The average prices of these energy materials have been developed using regional figures, where available; weighting these according to the extent of construction in the regions; and, further, weighting the price per unit of energy according to the kind of energy purchased. On this basis we have established an overall quantity of energy use and have distributed this according to building category.

In toto, about 1.9 percent of the total dollar transactions in the construction sectors was used to purchase energy directly. This sum - $1,093.2 million - purchased a total of 1485 trillion Btu. (See Table 2.)

B. COMPUTATION OF PRICES PAID BY THE CONSTRUCTION SECTORS FOR DIRECT ENERGY IN 1967.

According to the transactions charted by BEA, there was no direct purchase of coal or crude oil by the Construction Sectors in 1967. Of the remaining direct fuel sectors: Refined Petroleum, Electricity, and Natural Gas, natural gas represented less than one percent of total direct fuel expenditures, and less than 1/100 percent of the total dollar transactions in the 49 Construction

Sectors. Direct purchase of electricity accounted for slightly over four percent of all direct fuel expenditures and approximately 8/100 percent of total dollar transactions; direct purchase of refined petroleum accounted for 95 percent of direct fuel expenditures and 1.8 percent of total dollar transactions.

C. NATURAL GAS

In view of the small percentage of both direct fuel expenditures and total construction expenditures represented by natural gas, and in view of the relatively minor natural gas transactions (quantitatively) in any of the 49 construction sectors, direct energy transfers from the natural gas sector were computed by allocating the previously developed CAC 357-level total among the expanded construction sectors based on their proportional BEA dollar transactions. Price collection for natural gas was attempted, but regional price breakdowns were not available for 1967. Since use of natural gas in construction is restricted to temporary heating purposes, we felt that very little accuracy would be lost if previously developed CAC direct energy flow data were used as mentioned above.

D. ELECTRICITY

Using the Edison Electric Institute's Statistical Year Book for 1967 [2] and the U. S. Department of Commerce 1967 Census of the Construction Industries [3] as sources, figures were obtained for average cost per kilowatt hour and for dollar volume of construction in the United States in 1967, broken down by State, by Region (major and minor) and for the country as a whole. Because the greater volume of construction occurred in more built-up

areas, which, typically, have higher utility prices, the average cost/kwh rose as the geographical breakdown became more particular. Because different types of construction work are subject to different electricity rates, averages were computed for three electric service classifications: Commercial/Industrial: Large Light and Power; Commercial/Industrial: Small Light and Power; and Residential.

All New Construction

It is assumed that the direct electricity purchased by a contractor for new construction - both building and non-building - will be mainly for his home office and thus subject to the Industrial/Commercial: Small Light and Power classification. In the case of building construction, the Contractor will often hook up to the local utility for temporary power at a rate higher than any of the rates we have considered. However, we could find no data regarding either average temporary power rates throughout the country or the percentage of Contractors' electricity costs which temporary power would represent. Although the differential represented by temporary power rates may be quite large (in one specific case , a $30 million hospital project in New York, temporary power costs approximately 60 to 70 percent more per kwh than power supplied at regular Residential or Small Light and Power rates), there is no way of assessing its effect on the overall average price without a great deal more information about the breakdown of Contractors' electricity costs nationwide. The actual effect would be considerably smaller. The Sectors affected would be mainly in the large buildings sectors: High-rise residential, Office Buildings, and Hospital Buildings.

In the Non-building Sectors: Utility Facilities, Oil and Gas Wells, Highways, etc., temporary power needs are comparatively minor. Unless there is enough

time pressure to complete a job quickly to necessitate maintaining night shifts, temporary power will show up in the refined petroleum Sector as fuel for the 1 to 2 kw generator, which is generally all that is required.

Maintenance and Repair Construction

Electricity directly purchased for maintenance and repair sectors was divided among the three service classifications because these Sectors consist of work done within existing facilities and include "do-it-yourself" and other "in-house" work. Therefore, only such work as is normally done by outside contractors, e.g., Highways, or within building types which normally receive the Small Light and Power Rate, e.g., Other Non-farm Buildings, was assigned to "Commercial/Industrial: Small Light and Power." Residential Sectors were assigned to the residential classification; all other categories were such as would normally be classified in the Commercial/Industrial: Large Light and Power service classification and were assigned the appropriate average rate.

Conclusion

Tables 8 and 9 show the detailed data and calculations used to determine average electricity rates paid by the building construction industry in 1967. Prices resulting from the breakdown by state were used by CAC to compute direct electric energy (Btu) used by the construction sectors. The prices were applied to the sectors as follows:

Commercial/Industrial: Large Light & Power (.0101 $/kwhr)	sectors 59-68, 70, 71
Commercial/Industrial: Small Light & Power (.0210 $/kwhr)	sectors 23-54, 56, 69
Residential (.0230 $/kwhr)	sectors 55, 57, 58

(Sector indices are those of 399-order model; see Table 1.)

These average rates are in 1967 purchaser dollars. Thus, although the total Btu of electricity directly purchased by the construction industry (7.64 trillion Btu on transactions of $45.7 million) agrees closely with CAC's 357 level direct energy transfers (within 6 percent), the distribution of direct energy flows to the 49 construction sectors varied. This resulted mainly from the use of the Large Light and Power service classification, (the rate for which is roughly half that of either of the other two service classifications) which shifted a greater proportion of direct energy into the non-building maintenance and repair sectors than had originally been allocated. These results are considered more accurate than previous direct energy computations for construction in CAC's 357 order model.

E. REFINED PETROLEUM

The variables in our study of Contractors' direct purchase of refined petroleum are quite different from those confronted in the case of direct purchase of electricity. First of all, although there are undoubtedly records of regional prices for the various refined petroleum products within private industry files, these are not available to the general public. We therefore used national average prices for 1967; the only regional difference was a recognition of the fact that temporary heat is generally not needed in the Southern region of the United States.

Secondly, and more important, the Refined Petroleum Sector covers a multitude of petroleum products, each of which has a different Btu content and a different dollar cost per unit of product. In order to determine the Btu content per dollar of Construction transaction, it was necessary first to determine which petroleum products were used by the industry and then their ratio of use in each of the 49 Construction Sectors.

In breaking down refined petroleum use into its various product components, it was necessary first to break out asphalt and road oil. Although these are not used as fuels, but are by-products of the process of refining petroleum, they do have Btu content. They must be taken into account, therefore, since they were considered in the original formation of CAC's full 357 level direct energy transfers table [4], into which the table developed here for the construction industry (Table 2) is embedded to form the 399-order expanded I/O model. We therefore subtracted the dollar value of the asphalt and roal oil transactions from the total refined petroleum transactions, accounted for the Btu content of these products, and applied the proper ratio of other refined petroleum to the remainder. (In a sense, we have treated asphalt and road oil as if they were fuels.)

There are mainly four refined petroleum products used as fuel in the Construction Industry.

1. Gasoline:* used for automobiles, pick-up trucks, some electricity generators, and some other small motors.
2. Distillate - Diesel fuel and No. 2 oil: used for large trucks and heavy construction equipment and some electric generators.

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* Although not considered here, it would be interesting to investigate the use of gasoline for automobiles used to bring construction works to the job site. This is reported under personal transportation use and does not show up in the construction sectors. In reality, most construction workers go to the construction site by automobile, first, because many construction sites are remote from public transportation. Second, construction workers commonly have tools and work clothes that they often bring with them: and third, the hours that construction personnel work often require starting jobs before public transportation is available. This amount of automobile use becomes a fairly significant figure. If we assume three and one-half million construction workers working 200 days a year, travelling 10 miles a day by car, getting 15 miles per gallon of gas, and each gallon with an energy content of 140,000 Btu, the total number of Btu involved in this under those assumptions would be 65.33×10^{12} (about one-tenth of one percent of the total U. S. energy requirement in 1967).

3. Residual - No. 6: used for some temporary heat particularly where a permanently installed boiler using No. 6 oil is used for temporary heat during the building process.

4. Propane: used for some temporary heat.

These fuels are used in different proportions by different categories of construction, e.g., one-family residential construction uses virtually no heavy equipment and little or no temporary heat; heavy construction (bridges, dams, highways, etc.) uses no temporary heat and a great deal of heavy equipment. In order to properly assign the percentages of fuels used in the different Construction sectors, we employed the services of a consultant, W. J. Barney Corporation, a large building construction and construction management company in New York City. Other references are: Department of Commerce 1967 Census of Construction Industries [3] for regional variations in the dollar volume of construction within the various building categories; Jack Faucett Associates [5], for average prices of petroleum products; and Department of Commerce, Bureau of Economic Analysis [6], for information regarding the BEA I/O breakdown with regard to the Construction Industry Sectors.

Although the BEA and Census breakdowns are independent of each other and do not coincide, data from each was used as a proportion of its own total, e.g., the BEA asphalt and road oil transactions were considered as a percentage of BEA total refined petroleum transactions; Census construction receipts in the Southern region of the U. S. were considered as a percentage of Census Construction receipts for the entire U. S. A. (Construction transactions by region for 1967 are shown on Table 10.) In our opinion, these percentages remain valid, and they may be applied to either set of data, even though the quantitative information cannot be so transferred from one set to the other.

It should be noted that although asphalt (which is used for driveways and for roofing) represents less than one percent of the total transactions in any of the 49 sectors, it represents a very large percentage of refined petroleum use (24 percent of total for all 49 sectors, but over 49 percent of some individual sectors). Thus, its consideration is important in assuring accuracy of later results.

All prices used in the Refined Petroleum breakdown are 1967 Producer's prices. Prices for Propane and Ashphalt/Road Oil come originally from the U. S. Tariff Commission publication Synthetic Organic Chemicals: United States Production and Sales and from the Census of Manufacturers, respectively, and are considered by Faucett to be extremely reliable. Prices of motor gasoline, diesel fuel No. 2 and No. 6 oil, on the other hand, come originally from Platts' Oilgram Price Service and are averages of spot prices. They are considered by Faucett to be "not completely reliable, but still good enough to be recorded." [5] Annual prices in Standard and Poor's Industry Surveys [7] and in the American Petroleum Institute's Annual Review [8] and Facts and Figures [9] also refer back to Platts' Oilgram Price Service and contain spot prices only. Regional prices, available from the U. S. Department of Labor, Bureau of Labor Statistics, do not go back earlier than 1975 and cannot be adapted to the 1967 economy with any assurance of validity.

The resulting direct energy transfers of refined petroleum to the building construction industry turn out to be 15 percent higher than the previously computed CAC 357 level total. Due to the extensive data collection conducted for refined petroleum transfers, the new result (see Table 2) is considered more

accurate than the old total. (When considered with respect to the direct flows of refined petroleum to all 399 sectors, the difference in the two results drops to less than 1/100 percent.)

Appendix B gives details of the computation of cost per Btu of refined petroleum products purchased directly by the building construction industry. As before, these results, when combined with BEA dollar transactions, yield direct energy flows.

APPENDIX A - TABLES

This section contains the following tables referred to in the main text:

1. 399-Order Sectors
2. Direct Energy Transfers to Construction Sectors -- 1967
3. Energy Intensities for 399-Order Construction Sectors -- 1967
4. Ranked Total Primary Energy Intensities for 399-Order Construction Sectors -- 1967
5. Average Energy Intensities for Construction -- 1967
6. Total Energy of Final Demand for Construction Sectors -- 1967
7. Ranked Total Energy of Final Demand for Construction Sectors -- 1967
8. 1967 Average Electricity Rates by State and Region
9. 1967 Average Electricity Cost to Construction Industry
10. 1967 Transactions ($ MIL) (Gross Construction Receipts) by Region Showing Region as Percentage of Sector and Sector as Percentage of Total.

TABLE 1. 399 - ORDER SECTORS

INDEX	I/O CODE	NAME
1	700	COAL MINING
2	800	CRUDE PETRO. GAS
3	3101	PETRO REFIN PROD
4	6801	ELECTRIC UTIL
5	6802	GAS UTILITIES
6	101	DAIRY
7	102	POULTRY, EGGS
8	103	MEAT,ANIMAL PROD
9	201	COTTON
10	202	FEED GRAINS
11	203	TOBACCO
12	204	FRUITS
13	205	VEGT,MISC CROPS
14	206	OIL BEARING CROP
15	207	FOR,GRHOUSE,NURS
16	300	FOREST FISH PROD
17	400	AG FOR,FISH SER
18	500	IRON ORE MINING
19	601	COPPER MINING
20	602	NONFERR MINING
21	900	STONE CLAY MIN
22	1000	CHEM MINERAL MIN
23	110101	NEW CONST RES--1 FAM.
24	110102	NEW CONST RES--2-4 FAM.
25	110103	NEW CONST RES--GRDN APT.
26	110104	NEW CONST HIGH-RISE APT.
27	110105	NEW CONST RES--ALT.,ADD.
28	110106	NEW CONST HOTELS,MOTELS
29	110107	NEW CONST DORMITORIES
30	110201	NEW CONST INDUST. BLDG.
31	110202	NEW CONST OFFICE BLDG.
32	110203	NEW CONST WAREHOUSES
33	110204	NEW CONST GAR.,SRV. STA.
34	110205	NEW CONST STORES,RSTRNTS
35	110206	NEW CONST RELIG. BLDG.
36	110207	NEW CONST EDUC. BLDG.
37	110208	NEW CONST HOSPITAL BLDG.
38	110209	NEW CONST OTH. NON-FARM
39	110301	NEW CONST TELEPH.,TELEG.
40	110302	NEW CONST RAILROADS
41	110303	NEW CONST ELECT. UTIL.
42	110304	NEW CONST GAS UTIL.
43	110305	NEW CONST PETROL. PIPE.
44	110306	NEW CONST WATER SUPPLY
45	110307	NEW CONST SEWER
46	110308	NEW CONST LOC. TRANSIT
47	110400	NEW CONST HIGHWAYS
48	110501	NEW CONST FARM RESID.
49	110502	NEW CONST FARM SERVICE
50	110503	NEW CONST OIL/GAS WELLS
51	110504	NEW CONST OIL/GAS EXPL.
52	110505	NEW CONST MILITARY
53	110506	NEW CONST CONS.,DEV.
54	110507	NEW CONST OTH. NON-BLDG.
55	120100	MAINT CONST RESID.
56	120201	MAINT CONST OTH. NON-FRM
57	120202	MAINT CONST FARM RESID.
58	120203	MAINT CONST FARM SERVICE
59	120204	MAINT CONST TEL.,TEL.
60	120205	MAINT CONST RAILROADS
61	120206	MAINT CONST ELECT. UTIL.

62	120207	MAINT CONST GAS UTIL.
63	120208	MAINT CONST PETR. PIPE.
64	120209	MAINT CONST WATER SUPPLY
65	120210	MAINT CONST SEWER
66	120211	MAINT CONST LOC. TRANSIT
67	120212	MAINT CONST MILITARY
68	120213	MAINT CONST CONSER.,DEV.
69	120214	MAINT CONST HIGHWAYS
70	120215	MAINT CONST OIL/GS WELLS
71	120216	MAINT CONST OTH. N-BLDG.
72	1301	GUIDED MISSILES
73	1302	AMMUNITION
74	1303	TANKS
75	1304	FIRE CONTROL EQ
76	1305	SMALL ARMS
77	1306	SMALL ARMS AMMUN
78	1307	OTHER ORDNANCE
79	1401	MEAT PRODUCTS
80	1402	BUTTER
81	1403	CHEESE
82	1404	CONDENSED MILK
83	1405	ICE CREAM
84	1406	FLUID MILK
85	1407	CANNED SEA FOODS
86	1408	CANNED SPECIALTY
87	1409	CANNED FRUIT,VEG
88	1410	DEHYDRATED PROD
89	1411	PICKLES,DRESSING
90	1412	FISH
91	1413	FROZEN FRUIT,VEG
92	1414	FLOUR,CEREALS
93	1415	PREP ANIMAL FEED
94	1416	RICE MILLING
95	1417	WET CORN MILLING
96	1418	BAKERY PRODUCTS
97	1419	SUGAR
98	1420	CONFECTIONERY
99	1421	ALCOHOLIC BEV
100	1422	SOFT DRINKS
101	1423	FLAVORINGS
102	1424	COTTONSEED MILLS
103	1425	SOYBEAN MILLS
104	1426	VEG OIL MILLS
105	1427	ANIMAL FATS
106	1428	COFFEE
107	1429	COOKING OILS
108	1430	MANUFACTURED ICE
109	1431	MACARONI
110	1432	FOOD PREPARATION
111	1501	CIGARETTES
112	1502	TOBACCO STEMMING
113	1601	BROAD FAB MILLS
114	1602	NAR FABRIC MILLS
115	1603	YARN MILLS
116	1604	THREAD MILLS
117	1701	FLOOR COVERINGS
118	1702	FELT GOODS
119	1703	LACE GOODS
120	1704	UPHOLSTERY FILL
121	1705	PROC TEX WASTE
122	1706	COATED FABRICS
123	1707	TIRE CORD
124	1708	SCOURING PLANTS
125	1709	CORDAGE, TWINE
126	1710	TEXTILE GOODS
127	1801	HOSIERY
128	1802	KNIT APPRL MILLS
129	1803	KNIT FAB MILLS

130	1804	APPARL.PURCH MAT
131	1901	CURTAINS
132	1902	HOUSEFURNISHINGS
133	1903	FAB TEXTILE PROD
134	2001	LOGGING
135	2002	SAWMILLS
136	2003	HARDWD FLOORING
137	2004	SPEC PROD SAWMIL
138	2005	MILLWORK
139	2006	VENEER,PLYWOOD
140	2007	PREFAB WD STRUC
141	2008	WOOD PRESERVING
142	2009	WOOD PRODUCTS
143	2100	WOOD CONTAINERS
144	2201	WOOD H'HOLD FURN
145	2202	UPH H'HOLD FURN
146	2203	MET H'HOLD FURN
147	2204	MATTRESSES
148	2301	WOOD OFC FURN
149	2302	METAL OFC FURN
150	2303	PUBLIC BLDG FURN
151	2304	WOOD FIXTURES
152	2305	MET FIXTURES
153	2306	BLINDS, SHADES
154	2307	FURN, FIXTURES
155	2401	PULP MILLS
156	2402	PAPER MILLS
157	2403	PAPERBOARD MILLS
158	2404	ENVELOPES
159	2405	SANIT PAPER PROD
160	2406	BUILDING PAPER
161	2407	CONV PAPER PROD
162	2500	PAPERBOARD CONT
163	2601	NEWSPAPERS
164	2602	PERIODICALS
165	2603	BOOK PUBLISHING
166	2604	MISC PUBLISHING
167	2605	COMM PRINTING
168	2606	BUSINESS FORMS
169	2607	GREETING CARDS
170	2608	MISC PRINTING
171	2701	INORG-ORG CHEM
172	2702	FERTILIZERS
173	2703	AG CHEMICALS
174	2704	MISC CHEM PROD
175	2801	PLASTICS
176	2802	SYN RUBBER
177	2803	MAN-MADE FIBERS
178	2804	ORGANIC FIBERS
179	2901	DRUGS
180	2902	CLEANING PREP
181	2903	TOILET PREP
182	3000	PAINT PRODUCTS
183	3102	PAVING
184	3103	ASPHALT
185	3201	TIRES
186	3202	RUBBER FOOTWARE
187	3203	MISC RUBBER PROD
188	3204	MISC PLASTICS
189	3300	INDUST LEATHER
190	3401	FOOTWARE CUT STK
191	3402	FOOTWARE EXC RUB
192	3403	MISC LEATHER
193	3501	GLASS PRODUCTS
194	3502	GLASS CONTAINERS
195	3601	CEMENT
196	3602	BRICKS
197	3603	CERAMIC TILE

198	3604	CLAY REFRACT
199	3605	CLAY PRODUCTS
200	3606	PLUMBING FIXTURE
201	3607	FOOD UTENSILS
202	3608	PORCEL ELEC SUPP
203	3609	POTTERY PRODUCTS
204	3610	CONCRETE BLOCKS
205	3611	CONCRETE PRODUCT
206	3612	READY-MIX CONCR
207	3613	LIME
208	3614	GYPSUM PRODUCTS
209	3615	STONE PRODUCTS
210	3616	ABRASIVE PRODUCT
211	3617	ASBESTOS PRODUCT
212	3618	GASKETS
213	3619	TREATED MINERALS
214	3620	MINERAL WOOL
215	3621	NONCLAY REFRACT
216	3622	NONMET MIN PROD
217	3701	STEEL PROD
218	3702	IR.STL FOUNDRIES
219	3703	IR.STL FORGING
220	3704	PRIMARY MET PROD
221	3801	PRIMARY COPPER
222	3802	PRIMARY LEAD
223	3803	PRIMARY ZINC
224	3804	PRIM ALUMINUM
225	3805	PRIM NONFER MET
226	3806	SEC NONFERR MET
227	3807	COPPER ROLLING
228	3808	ALUM ROLLING
229	3809	NONFER ROLLING
230	3810	NONFER WIRE
231	3811	ALUM CASTINGS
232	3812	BRASS.OTHR CAST
233	3813	NONFER CASTING
234	3814	NONFER FORGING
235	3901	METAL CANS
236	3902	METAL BARRELS
237	4001	METAL SANIT WARE
238	4002	PLUMB FITTINGS
239	4003	HEATING EQUIP
240	4004	FAB STRUC STEEL
241	4005	METAL DOORS
242	4006	FAB PLATE WORK
243	4007	SHEET METAL WORK
244	4008	ARCH METAL WORK
245	4009	MISC METAL WORK
246	4101	SCREW MACH PROD
247	4102	METAL STAMPINGS
248	4201	CUTLERY
249	4202	HANDTOOLS
250	4203	HARDWARE
251	4204	COAT. ENGRAV SER
252	4205	FAB WIRE PRODUCT
253	4206	SAFES. VAULTS
254	4207	STEEL SPRINGS
255	4208	PIPE
256	4209	COLLAPSIBLE TUBE
257	4210	METAL FOIL. LEAF
258	4211	FAB METAL PROD
259	4301	STEAM ENGINES
260	4302	INT COMBUST ENG
261	4400	FARM MACHINERY
262	4501	CONST MACHINERY
263	4502	MINING MACHINERY
264	4503	OIL FIELD MACH
265	4601	ELEVATORS

266	4602	CONVEYORS
267	4603	HOISTS, CRANES
268	4604	INDUSTRIAL TRUCK
269	4701	MET CUTTING TOOL
270	4702	MET FORMING TOOL
271	4703	SPECIAL DIE TOOL
272	4704	MET'WORKING MACH
273	4801	FOOD PROD MACH
274	4802	TEXTILE MACH
275	4803	WOODWORKING MACH
276	4804	PAPER IND MACH
277	4805	PRINTING MACH
278	4806	SPECIAL IND MACH
279	4901	PUMPS,COMPRESORS
280	4902	BEARINGS
281	4903	BLOWERS
282	4904	INDUST PATTERNS
283	4905	POWER TRANS EQ
284	4906	INDUS FURNACES
285	4907	GENERAL IND MACH
286	5000	MACH SHOP PROD
287	5101	COMPUTING MACH
288	5102	TYPEWRITERS
289	5103	SCALES
290	5104	OFC MACHINES
291	5201	MERCH'DISE MACH
292	5202	LAUNDRY EQUIP
293	5203	REFRIG MACH
294	5204	MEASURING PUMPS
295	5205	SERVICE IND MACH
296	5301	ELEC MEAS INSTR
297	5302	TRANSFORMERS
298	5303	SWITCHGEAR
299	5304	MOTORS,GENERATOR
300	5305	IND CONTROLS
301	5306	WELDING APPARAT
302	5307	CARBON PRODUCTS
303	5308	ELEC IND APPARAT
304	5401	H'HOLD COOK EQ
305	5402	H'HOLD REFRIG EQ
306	5403	H'HOLD LAUNDRY
307	5404	ELECTRIC H'WARES
308	5405	H'HOLD VACUUMS
309	5406	SEWING MACHINES
310	5407	H'HOLD APPLIANCE
311	5501	ELECTRIC LAMPS
312	5502	LIGHT FIXTURES
313	5503	WIRING DEVICES
314	5601	RADIO,TV SETS
315	5602	PHONO RECORDS
316	5603	PHONE,TELEGR EQ
317	5604	R-TV COMMUN EQ
318	5701	ELECTRON TUBES
319	5702	SEMICONDUCTORS
320	5703	ELECTRONIC COMP
321	5801	STORAGE BATTERY
322	5802	PRIMARY BATTERY
323	5803	X-RAY EQUIPMENT
324	5804	ENGINE ELEC EQ
325	5805	ELECTRICAL EQUIP
326	5901	TRUCK,BUS BODIES
327	5902	TRUCK TRAILERS
328	5903	MOTOR VEH & PART
329	6001	AIRCRAFT
330	6002	AIRCRAFT ENGINES
331	6003	AIRCRAFT PROPELL
332	6004	AIRCRAFT EQUIP
333	6101	SHIPBUILDING

334	6102	BOATBUILDING
335	6103	LOCOMOTIVES
336	6104	RR, STREET CARS
337	6105	MOTOR, BICYCLES
338	6106	TRAILER COACHES
339	6107	TRANSPORT EQUIP
340	6201	SCIEN INSTR
341	6202	MECH MEAS DEVICE
342	6203	TEMP CONTROLS
343	6204	MEDICAL INSTR
344	6205	SURGICAL SUPPLY
345	6206	DENTAL EQUIPMENT
346	6207	WATCHES, CLOCKS
347	6301	OPTICAL INSTR
348	6302	OPHTHALMIC GOODS
349	6303	PHOTOGRAPHIC EQ
350	6401	JEWELRY
351	6402	MUSICAL INSTR
352	6403	GAMES
353	6404	ATHLETIC EQUIP
354	6405	PENS AND PENCILS
355	6406	ARTIFICAL FLOWER
356	6407	CLOTH FASTENERS
357	6408	BRUSHES
358	6409	HARD FLOOR COV
359	6410	MORTICIAN GOODS
360	6411	SIGNS, ADS
361	6412	MISC MFG
362	6501	RAILROAD
363	6502	LOCAL TRANSPORT
364	6503	MOTOR FGT TRANSP
365	6504	WATER TRANSPORT
366	6505	AIR TRANSPORT
367	6506	PIPE LINE TRANSP
368	6507	TRANSP SERVICES
369	6600	COMMUNICATIONS
370	6700	R-TV BROADCAST
371	6803	WATER,SANIT SER
372	6901	WHOLSALE TRADE
373	6902	RETAIL TRADE
374	7001	BANKING
375	7002	CREDIT AGENCIES
376	7003	SEC, COMMOD BROK
377	7004	INSUR CARRIERS
378	7005	INSURANCE AGENTS
379	7101	OWNER-OCC DWLNG
380	7102	REAL ESTATE
381	7201	HOTELS
382	7202	PERSONAL SERVICE
383	7203	BARB,BEAUT SHOPS
384	7301	MISC BUS SERVICE
385	7302	ADVERTISING
386	7303	MISC PROF SER
387	7500	AUTO REPAIR
388	7601	MOTION PICTURE
389	7602	AMUSMNT,REC SER
390	7701	DOCTORS,DENTISTS
391	7702	HOSPITALS
392	7703	MED, HEALTH SER
393	7704	EDUCATIONAL SER
394	7705	NONPROFIT ORG
395	7801	POST OFFICE
396	7804	FED GOVT ENTERP
397	7903	ST,LOC GOVT ENTR
398	8100	BUSINESS TRAVEL
399	8200	OFFICE SUPPLIES

TABLE 2. DIRECT ENERGY TRANSFERS TO CONSTRUCTION SECTORS -- 1967
(TRILLION BTUS)

NUMBER	399-ORDER INDEX	NAME	COAL	CRUDE PETROLEUM	REFINED PETROLEUM	ELECTRICITY	NATURAL GAS	TOTAL
1	23	NEW CONST RES--1 FAM.	0.0	0.0	74.01	1.02	2.63	77.66
2	24	NEW CONST RES--2-4 FAM.	0.0	0.0	4.45	0.05	0.18	4.68
3	25	NEW CONST RES--GRDN APT.	0.0	0.0	20.89	0.16	0.35	21.40
4	26	NEW CONST HIGH-RISE APT.	0.0	0.0	18.89	0.20	0.53	19.61
5	27	NEW CONST RES--ALT.,ADD.	0.0	0.0	7.26	0.08	0.18	7.51
6	28	NEW CONST HOTELS,MCTELS	0.0	0.0	11.67	0.13	0.35	12.15
7	29	NEW CONST DORMITORIES	0.0	0.0	10.45	0.10	0.18	10.72
8	30	NEW CONST INDUST. BLDG.	0.0	0.0	37.41	0.21	0.53	38.15
9	31	NEW CONST OFFICE BLDG.	0.0	0.0	44.55	0.44	1.05	46.04
10	32	NEW CONST WAREHOUSES	0.0	0.0	6.33	0.05	0.18	6.56
11	33	NEW CONST GAR.,SRV. STA.	0.0	0.0	4.96	0.05	0.18	5.19
12	34	NEW CONST STORES,RSTRNTS	0.0	0.0	36.09	0.34	0.88	37.31
13	35	NEW CONST RELIG. BLDG.	0.0	0.0	10.95	0.11	0.18	11.24
14	36	NEW CONST EDUC. BLDG.	0.0	0.0	65.41	0.70	1.58	67.69
15	37	NEW CONST HOSPITAL BLDG.	0.0	0.0	18.70	0.21	0.53	19.44
16	38	NEW CONST OTH. NON-FARM	0.0	0.0	39.17	0.39	0.88	40.44
17	39	NEW CONST TELEPH.,TELEG.	0.0	0.0	12.08	0.08	0.18	12.34
18	40	NEW CONST RAILROADS	0.0	0.0	2.78	0.02	0.0	2.79
19	41	NEW CONST ELECT. UTIL.	0.0	0.0	37.36	0.34	0.88	38.58
20	42	NEW CONST GAS UTIL.	0.0	0.0	61.53	0.16	0.35	62.04
21	43	NEW CONST PETROL. PIPE.	0.0	0.0	15.69	0.02	0.0	15.71
22	44	NEW CONST WATER SUPPLY	0.0	0.0	15.69	0.11	0.18	15.98
23	45	NEW CONST SEWER	0.0	0.0	15.42	0.13	0.35	15.90
24	46	NEW CONST LOC. TRANSIT	0.0	0.0	2.22	0.02	0.0	2.24
25	47	NEW CONST HIGHWAYS	0.0	0.0	407.50	0.78	1.93	410.21
26	48	NEW CONST FARM RESID.	0.0	0.0	1.32	0.02	0.0	1.34
27	49	NEW CONST FARM SERVICE	0.0	0.0	2.64	0.02	0.0	2.65
28	50	NEW CONST OIL/GAS WELLS	0.0	0.0	71.53	0.11	0.35	71.99
29	51	NEW CONST OIL/GAS EXPL.	0.0	0.0	15.83	0.03	0.0	15.87
30	52	NEW CONST MILITARY	0.0	0.0	10.14	0.07	0.18	10.38
31	53	NEW CONST CONS.,DEV.	0.0	0.0	90.56	0.20	0.53	91.28
32	54	NEW CONST OTH. NON-BLDG.	0.0	0.0	26.94	0.11	0.35	27.41
33	55	MAINT CONST RESID.	0.0	0.0	21.64	0.31	0.88	22.82
34	56	MAINT CONST OTH. NON-FRM	0.0	0.0	36.51	0.29	0.70	37.51
35	57	MAINT CONST FARM RESID.	0.0	0.0	1.85	0.03	0.0	1.88
36	58	MAINT CONST FARM SERVICE	0.0	0.0	1.85	0.0	0.0	1.85
37	59	MAINT CONST TEL.,TEL.	0.0	0.0	2.92	0.03	0.0	2.95
38	60	MAINT CONST RAILROADS	0.0	0.0	5.83	0.03	0.0	5.87
39	61	MAINT CONST ELECT. UTIL.	0.0	0.0	2.36	0.03	0.0	2.39
40	62	MAINT CONST GAS UTIL.	0.0	0.0	5.83	0.0	0.0	5.83
41	63	MAINT CONST PETR. PIPE.	0.0	0.0	2.78	0.0	0.0	2.78
42	64	MAINT CONST WATER SUPPLY	0.0	0.0	14.31	0.07	0.0	14.37
43	65	MAINT CONST SEWER	0.0	0.0	4.03	0.03	0.0	4.06
44	66	MAINT CONST LOC. TRANSIT	0.0	0.0	0.42	0.0	0.0	0.42
45	67	MAINT CONST MILITARY	0.0	0.0	14.58	0.10	0.18	14.86
46	68	MAINT CONST CONSER.,DEV.	0.0	0.0	13.19	0.0	0.0	13.19
47	69	MAINT CONST HIGHWAYS	0.0	0.0	98.75	0.08	0.18	99.01
48	70	MAINT CONST OIL/GS WELLS	0.0	0.0	11.81	0.03	0.0	11.84
49	71	MAINT CONST OTH. N-BLDG.	0.0	0.0	20.28	0.14	0.18	20.59
		TOTAL	0.0	0.0	1459.36	7.64	17.71	1484.71

TABLE 3. ENERGY INTENSITIES FOR 399-ORDER CONSTRUCTION SECTORS -- 1967
(BTUS/$)

NUMBER	399 ORDER INDEX	I/O CODE	NAME	COAL	CRUDE PETROLEUM	REFINED PETROLEUM	ELECTRICITY	NATURAL GAS	TOTAL PRIMARY
1	23	110101	NEW CONST RES--1 FAM.	14003.	39413.	19978.	3397.	18462.	55511.
2	24	110102	NEW CONST RES--2-4 FAM.	13355.	36875.	19221.	3096.	16768.	52139.
3	25	110103	NEW CONST RES--GRDN APT.	13605.	37351.	20061.	3095.	16408.	52864.
4	26	110104	NEW CONST HIGH-RISE APT.	16495.	41452.	21938.	3329.	18536.	60000.
5	27	110105	NEW CONST RES--ALT.,ADD.	15047.	34245.	14833.	3820.	18514.	51646.
6	28	110106	NEW CONST HOTELS,MOTELS	18493.	48311.	26089.	3862.	21071.	69184.
7	29	110107	NEW CONST DORMITORIES	18828.	49390.	26507.	3869.	21711.	70604.
8	30	110201	NEW CONST INDUST. BLDG.	22820.	45543.	21141.	4055.	23311.	70864.
9	31	110202	NEW CONST OFFICE BLDG.	19360.	46984.	25301.	3882.	20564.	68737.
10	32	110203	NEW CONST WAREHOUSES	24198.	50752.	26327.	4227.	23224.	77556.
11	33	110204	NEW CONST GAR.,SRV. STA.	22108.	51517.	28071.	4203.	22250.	76217.
12	34	110205	NEW CONST STORES,RSTRNTS	19519.	51308.	29090.	3821.	21039.	73183.
13	35	110206	NEW CONST RELIG. BLDG.	17318.	46060.	24464.	3598.	20481.	65597.
14	36	110207	NEW CONST EDUC. BLDG.	18677.	46869.	24693.	3857.	20996.	67924.
15	37	110208	NEW CONST HOSPITAL BLDG.	16746.	41563.	21726.	3670.	18809.	60572.
16	38	110209	NEW CONST OTH. NON-FARM	19887.	47587.	25532.	3925.	20939.	69894.
17	39	110301	NEW CONST TELEPH.,TELEG.	17424.	45895.	22999.	5381.	21808.	66636.
18	40	110302	NEW CONST RAILROADS	28458.	46451.	23908.	4339.	21433.	77585.
19	41	110303	NEW CONST ELECT. UTIL.	20993.	43175.	21598.	4008.	20546.	66639.
20	42	110304	NEW CONST GAS UTIL.	45636.	91094.	59589.	5366.	29562.	140038.
21	43	110305	NEW CONST PETROL. PIPE.	42247.	101722.	70642.	5235.	28955.	147197.
22	44	110306	NEW CONST WATER SUPPLY	23406.	47726.	25645.	4227.	20957.	73738.
23	45	110307	NEW CONST SEWER	18434.	56272.	28998.	3442.	25944.	76828.
24	46	110308	NEW CONST LOC. TRANSIT	20327.	40174.	21904.	3157.	17338.	62447.
25	47	110400	NEW CONST HIGHWAYS	20241.	101369.	75998.	3464.	23254.	123745.
26	48	110501	NEW CONST FARM RESID.	15569.	35935.	15948.	3681.	19060.	53773.
27	49	110502	NEW CONST FARM SERVICE	26409.	46623.	21702.	4744.	23754.	75956.
28	50	110503	NEW CONST OIL/GAS WELLS	37407.	76881.	49357.	4229.	25680.	116895.
29	51	110504	NEW CONST OIL/GAS EXPL.	5356.	86708.	74494.	1422.	10144.	92941.
30	52	110505	NEW CONST MILITARY	20415.	55006.	31182.	3884.	22537.	77815.
31	53	110506	NEW CONST CONS.,DEV.	12722.	70539.	54079.	2476.	14970.	84788.
32	54	110507	NEW CONST OTH. NON-BLDG.	18129.	69414.	48460.	3120.	19467.	89466.
33	55	120100	MAINT CONST RESID.	11488.	36812.	20899.	2875.	15033.	50072.
34	56	120201	MAINT CONST OTH. NON-FRM	12150.	35776.	18784.	2910.	16154.	49720.
35	57	120202	MAINT CONST FARM RESID.	20102.	48673.	26137.	4083.	21373.	71292.
36	58	120203	MAINT CONST FARM SERVICE	26852.	66421.	38132.	4890.	26744.	96288.
37	59	120204	MAINT CONST TEL.,TEL.	8819.	25240.	14395.	2385.	10267.	35530.
38	60	120205	MAINT CONST RAILROADS	15268.	26129.	13882.	2270.	11617.	42796.
39	61	120206	MAINT CONST ELECT. UTIL.	8253.	17092.	8891.	1741.	7802.	26418.
40	62	120207	MAINT CONST GAS UTIL.	22634.	58705.	40899.	2821.	16578.	83078.
41	63	120208	MAINT CONST PETR. PIPE.	32697.	82023.	57954.	3956.	22337.	117158.
42	64	120209	MAINT CONST WATER SUPPLY	11793.	48781.	34501.	2193.	13261.	61927.
43	65	120210	MAINT CONST SEWER	10341.	33544.	20229.	1880.	12580.	45044.
44	66	120211	MAINT CONST LOC. TRANSIT	11190.	35902.	23320.	2353.	11786.	48542.
45	67	120212	MAINT CONST MILITARY	11130.	49546.	34243.	2718.	14238.	62352.
46	68	120213	MAINT CONST CONSER.,DEV.	4484.	87809.	76723.	1088.	9348.	92963.
47	69	120214	MAINT CONST HIGHWAYS	7345.	67689.	55122.	1638.	11228.	76044.
48	70	120215	MAINT CONST OIL/GS WELLS	39382.	67146.	39866.	4177.	25703.	109103.
49	71	120216	MAINT CONST OTH. N-BLDG.	7104.	53819.	42237.	1819.	10464.	62045.

TABLE 4. RANKED TOTAL PRIMARY ENERGY INTENSITIES
FOR 399-ORDER CONSTRUCTION SECTORS -- 1967
(BTUS/$)

RANK	399-ORDER INDEX	I/O CODE	NAME	TOTAL PRIMARY INTENSITY
1	43	110305	NEW CONST PETROL. PIPE.	147197.
2	42	110304	NEW CONST GAS UTIL.	140038.
3	47	110400	NEW CONST HIGHWAYS	123745.
4	63	120208	MAINT CONST PETR. PIPE.	117158.
5	50	110503	NEW CONST OIL/GAS WELLS	116895.
6	70	120215	MAINT CONST OIL/GS WELLS	109103.
7	58	120203	MAINT CONST FARM SERVICE	96288.
8	68	120213	MAINT CONST CONSER.,DEV.	92963.
9	51	110504	NEW CONST OIL/GAS EXPL.	92941.
10	54	110507	NEW CONST OTH. NON-BLDG.	89466.
11	53	110506	NEW CONST CONS.,DEV.	84788.
12	62	120207	MAINT CONST GAS UTIL.	83078.
13	52	110505	NEW CONST MILITARY	77815.
14	40	110302	NEW CONST RAILROADS	77585.
15	32	110203	NEW CONST WAREHOUSES	77556.
16	45	110307	NEW CONST SEWER	76828.
17	33	110204	NEW CONST GAR.,SRV. STA.	76217.
18	69	120214	MAINT CONST HIGHWAYS	76044.
19	49	110502	NEW CONST FARM SERVICE	75956.
20	44	110306	NEW CONST WATER SUPPLY	73738.
21	34	110205	NEW CONST STORES,RSTRNTS	73183.
22	57	120202	MAINT CONST FARM RESID.	71292.
23	30	110201	NEW CONST INDUST. BLDG.	70864.
24	29	110107	NEW CONST DORMITORIES	70604.
25	38	110209	NEW CONST OTH. NON-FARM	69894.
26	28	110106	NEW CONST HOTELS,MOTELS	69184.
27	31	110202	NEW CONST OFFICE BLDG.	68737.
28	36	110207	NEW CONST EDUC. BLDG.	67924.
29	41	110303	NEW CONST ELECT. UTIL.	66639.
30	39	110301	NEW CONST TELEPH.,TELEG.	66636.
31	35	110206	NEW CONST RELIG. BLDG.	65597.
32	46	110308	NEW CONST LOC. TRANSIT	62447.
33	67	120212	MAINT CONST MILITARY	62352.
34	71	120216	MAINT CONST OTH. N-BLDG.	62045.
35	64	120209	MAINT CONST WATER SUPPLY	61927.
36	37	110208	NEW CONST HOSPITAL BLDG.	60572.
37	26	110104	NEW CONST HIGH-RISE APT.	60000.
38	23	110101	NEW CONST RES--1 FAM.	55511.
39	48	110501	NEW CONST FARM RESID.	53773.
40	25	110103	NEW CONST RES--GRDN APT.	52864.
41	24	110102	NEW CONST RES--2-4 FAM.	52139.
42	27	110105	NEW CONST RES--ALT.,ADD.	51646.
43	55	120100	MAINT CONST RESID.	50072.
44	56	120201	MAINT CONST OTH. NON-FRM	49720.
45	66	120211	MAINT CONST LOC. TRANSIT	48542.
46	65	120210	MAINT CONST SEWER	45044.
47	60	120205	MAINT CONST RAILROADS	42796.
48	59	120204	MAINT CONST TEL.,TEL.	35530.
49	61	120206	MAINT CONST ELECT. UTIL.	26418.

TABLE 5. AVERAGE ENERGY INTENSITIES FOR CONSTRUCTION -- 1967
(BTUS/$)

	NEW CONSTRUCTION	MAINTENANCE AND REPAIR CONSTRUCTION	ALL CONSTRUCTION
COAL	19138.	12059.	17535.
CRUDE PETROLEUM	52678.	42498.	50372.
REFINED PETROLEUM	30755.	26946.	29893.
ELECTRICITY	3742.	2635.	3492.
NATURAL GAS	20695.	14601.	19315.
TOTAL PRIMARY	74122.	56182.	70059.

TABLE 6. TOTAL ENERGY OF FINAL DEMAND FOR CONSTRUCTION SECTORS -- 1967 (TRILLIONS OF BTUS)

NUMBER	399-ORDER INDEX	I/O CODE	NAME	TOTAL ENERGY (DIRECT AND INDIRECT)	PERCENT DIRECT	PERCENT OF TOTAL CONSTRUCTION (DIRECT AND INDIRECT)	PERCENT OF TOTAL UNITED STATES (DIRECT AND INDIRECT)
1	23	110101	NEW CONST RES--1 FAM.	780.98	9.94	12.39	1.17
2	24	110102	NEW CONST RES--2-4 FAM.	34.83	13.43	0.55	0.05
3	25	110103	NEW CONST RES--GRDN APT.	147.76	14.49	2.34	0.22
4	26	110104	NEW CONST HIGH-RISE APT.	117.96	16.63	1.87	0.18
5	27	110105	NEW CONST RES--ALT.,ADD.	261.85	2.87	4.16	0.39
6	28	110106	NEW CONST HOTELS,MOTELS	69.05	17.60	1.10	0.10
7	29	110107	NEW CONST DORMITORIES	57.82	18.54	0.92	0.09
8	30	110201	NEW CONST INDUST. BLDG.	463.38	8.23	7.35	0.69
9	31	110202	NEW CONST OFFICE BLDG.	258.66	17.80	4.10	0.39
10	32	110203	NEW CONST WAREHOUSES	57.78	11.35	0.92	0.09
11	33	110204	NEW CONST GAR.,SRV. STA.	32.24	16.09	0.51	0.05
12	34	110205	NEW CONST STORES,RSTRNTS	197.01	18.94	3.13	0.29
13	35	110206	NEW CONST RELIG. BLDG.	68.61	16.39	1.09	0.10
14	36	110207	NEW CONST EDUC. BLDG.	437.36	15.48	6.94	0.65
15	37	110208	NEW CONST HOSPITAL BLDG.	117.21	16.58	1.86	0.18
16	38	110209	NEW CONST OTH. NON-FARM	231.07	17.50	3.67	0.35
17	39	110301	NEW CONST TELEPH.,TELEG.	109.15	11.31	1.73	0.16
18	40	110302	NEW CONST RAILROADS	25.37	11.01	0.40	0.04
19	41	110303	NEW CONST ELECT. UTIL.	303.94	12.69	4.82	0.45
20	42	110304	NEW CONST GAS UTIL.	216.92	28.60	3.44	0.32
21	43	110305	NEW CONST PETROL. PIPE.	45.93	34.21	0.73	0.07
22	44	110306	NEW CONST WATER SUPPLY	93.65	17.07	1.49	0.14
23	45	110307	NEW CONST SEWER	81.28	19.56	1.29	0.12
24	46	110308	NEW CONST LOC. TRANSIT	12.74	17.57	0.20	0.02
25	47	110400	NEW CONST HIGHWAYS	1035.87	39.60	16.44	1.55
26	48	110501	NEW CONST FARM RESID.	30.22	4.42	0.48	0.05
27	49	110502	NEW CONST FARM SERVICE	57.88	4.59	0.92	0.09
28	50	110503	NEW CONST OIL/GAS WELLS	235.54	30.56	3.74	0.35
29	51	110504	NEW CONST OIL/GAS EXPL.	22.58	70.25	0.36	0.03
30	52	110505	NEW CONST MILITARY	54.08	19.19	0.86	0.08
31	53	110506	NEW CONST CONS.,DEV.	180.09	50.68	2.86	0.27
32	54	110507	NEW CONST OTH. NON-BLDG.	82.76	33.12	1.31	0.12
33	55	120100	MAINT CONST RESID.	8.81	7.28	0.14	0.01
34	56	120201	MAINT CONST OTH. NON-FRM	70.79	10.53	1.12	0.11
35	57	120202	MAINT CONST FARM RESID.	0.0	0.0	0.0	0.0
36	58	120203	MAINT CONST FARM SERVICE	0.0	0.0	0.0	0.0
37	59	120204	MAINT CONST TEL.,TEL.	0.0	0.0	0.0	0.0
38	60	120205	MAINT CONST RAILROADS	0.0	0.0	0.0	0.0
39	61	120206	MAINT CONST ELECT. UTIL.	0.0	0.0	0.0	0.0
40	62	120207	MAINT CONST GAS UTIL.	0.0	0.0	0.0	0.0
41	63	120208	MAINT CONST PETR. PIPE.	0.0	0.0	0.0	0.0
42	64	120209	MAINT CONST WATER SUPPLY	0.0	0.0	0.0	0.0
43	65	120210	MAINT CONST SEWER	0.0	0.0	0.0	0.0
44	66	120211	MAINT CONST LOC. TRANSIT	0.0	0.0	0.0	0.0
45	67	120212	MAINT CONST MILITARY	52.94	28.07	0.84	0.08
46	68	120213	MAINT CONST CONSER.,DEV.	18.03	73.16	0.29	0.03
47	69	120214	MAINT CONST HIGHWAYS	220.00	43.57	3.49	0.33
48	70	120215	MAINT CONST OIL/GS WELLS	0.0	0.0	0.0	0.0
49	71	120216	MAINT CONST OTH. N-BLDG.	9.85	50.13	0.16	0.01
			TOTAL	6301.94	19.52	100.00	9.42

TABLE 7. RANKED TOTAL ENERGY OF FINAL DEMAND
FOR CONSTRUCTION SECTORS -- 1967
(TRILLION BTUS)

RANK	399-ORDER INDEX	NAME	TOTAL ENERGY (DIRECT AND INDIRECT)	PERCENT DIRECT
1	47	NEW CONST HIGHWAYS	1035.87	39.60
2	23	NEW CONST RES--1 FAM.	780.98	9.94
3	30	NEW CONST INDUST. BLDG.	463.38	8.23
4	36	NEW CONST EDUC. BLDG.	437.36	15.48
5	41	NEW CONST ELECT. UTIL.	303.94	12.69
6	27	NEW CONST RES--ALT.,ADD.	261.85	2.87
7	31	NEW CONST OFFICE BLDG.	258.66	17.80
8	50	NEW CONST OIL/GAS WELLS	235.54	30.56
9	38	NEW CONST OTH. NON-FARM	231.07	17.50
10	69	MAINT CONST HIGHWAYS	220.00	43.57
11	42	NEW CONST GAS UTIL.	216.92	28.60
12	34	NEW CONST STORES,RSTRNTS	197.01	18.94
13	53	NEW CONST CONS.,DEV.	180.09	50.68
14	25	NEW CONST RES--GRDN APT.	147.76	14.49
15	26	NEW CONST HIGH-RISE APT.	117.96	16.63
16	37	NEW CONST HOSPITAL BLDG.	117.21	16.58
17	39	NEW CONST TELEPH.,TELEG.	109.15	11.31
18	44	NEW CONST WATER SUPPLY	93.65	17.07
19	54	NEW CONST OTH. NON-BLDG.	82.76	33.12
20	45	NEW CONST SEWER	81.28	19.56
21	56	MAINT CONST OTH. NON-FRM	70.79	10.53
22	28	NEW CONST HOTELS,MOTELS	69.05	17.60
23	35	NEW CONST RELIG. BLDG.	68.61	16.39
24	49	NEW CONST FARM SERVICE	57.88	4.59
25	29	NEW CONST DORMITORIES	57.82	18.54
26	32	NEW CONST WAREHOUSES	57.78	11.35
27	52	NEW CONST MILITARY	54.08	19.19
28	67	MAINT CONST MILITARY	52.94	28.07
29	43	NEW CONST PETROL. PIPE.	45.93	34.21
30	24	NEW CONST RES--2-4 FAM.	34.83	13.43
31	33	NEW CONST GAR.,SRV. STA.	32.24	16.09
32	48	NEW CONST FARM RESID.	30.22	4.42
33	40	NEW CONST RAILROADS	25.37	11.01
34	51	NEW CONST OIL/GAS EXPL.	22.58	70.25
35	68	MAINT CONST CONSER.,DEV.	18.03	73.16
36	46	NEW CONST LOC. TRANSIT	12.74	17.57
37	71	MAINT CONST OTH. N-BLDG.	9.85	50.13
38	55	MAINT CONST RESID.	8.81	7.28
39	57	MAINT CONST FARM RESID.	0.0	0.0
40	58	MAINT CONST FARM SERVICE	0.0	0.0
41	59	MAINT CONST TEL.,TEL.	0.0	0.0
42	60	MAINT CONST RAILROADS	0.0	0.0
43	61	MAINT CONST ELECT. UTIL.	0.0	0.0
44	62	MAINT CONST GAS UTIL.	0.0	0.0
45	63	MAINT CONST PETR. PIPE.	0.0	0.0
46	64	MAINT CONST WATER SUPPLY	0.0	0.0
47	65	MAINT CONST SEWER	0.0	0.0
48	66	MAINT CONST LOC. TRANSIT	0.0	0.0
49	70	MAINT CONST OIL/GS WELLS	0.0	0.0

TABLE 8. 1967 AVERAGE ELECTRICITY RATES BY STATE AND REGION

	COMMERCIAL/INDUSTRIAL CLASS						RESIDENTIAL CLASS		
	Large Light & Power			Small Light & Power					
	Revenues ($Thous)	Sales (Mil Kwh)	Rate $/Kwh	Revenues ($Thous)	Sales (Mil Kwh)	Rate $/Kwh	Revenues ($Thous)	Sales (Mil Kwh)	Rate $/Kwh
ME	18,803	1,540	.0122	20,071	724	.0277	38,652	1,350	.0286
NH	14,883	1,070	.0139	12,013	388	.0310	30,465	1,043	.0292
VT	8,135	566	.0144	8,649	372	.0233	18,366	812	.0226
MA	116,086	7,300	.0159	131,480	4,773	.0275	197,503	6,624	.0298
RI	22,350	1,407	.0159	14,297	469	.0305	31,069	1,025	.0303
CT	64,225	4,737	.0136	74,538	3,150	.0237	113,439	4,583	.0248
New England	244,482	16,620	.0147	261,048	9,876	.0264	429,494	15,437	.0278
NY	261,834	25,166	.0104	521,399	20,422	.0255	579,725	19,440	.0298
NJ	153,885	13,147	.0117	181,833	7,621	.0239	233,559	8,967	.0260
PA	333,693	31,480	.0106	214,326	10,348	.0207	387,997	17,003	.0228
Mid-Atlantic	749,412	69,793	.0107	917,558	38,391	.0239	1,201,281	45,410	.0265
TOTAL NORTHEAST	993,894	86,413	.0115	1,178,606	48,267	.0244	1,630,775	60,847	.0268
OH	367,759	43,038	.0085	217,636	10,019	.0217	381,430	16,094	.0237
IN	166,519	14,938	.0111	104,036	4,803	.0217	204,468	9,109	.0224
IL	223,372	20,991	.0106	332,645	14,692	.0226	398,961	15,099	.0264
MI	231,405	21,143	.0109	191,674	8,363	.0229	305,383	13,188	.0232
WI	96,557	7,747	.0125	88,268	3,896	.0227	166,544	7,748	.0215
East North-Central	1,085,612	107,857	.0101	934,259	41,773	.0224	1,456,786	61,238	.0238
MN	83,141	6,187	.0134	66,362	2,505	.0265	151,916	6,363	.0239
IA	50,595	4,135	.0122	70,817	2,744	.0258	126,856	4,903	.0259
MO	99,956	8,397	.0119	109,889	4,712	.0233	181,397	7,105	.0255
ND	5,124	259	.0198	17,322	738	.0235	29,319	1,154	.0254
SD	4,818	336	.0143	17,288	643	.0269	31,424	1,228	.0256
NE	17,801	1,663	.0107	38,530	2,259	.0171	60,287	2,833	.0213
KS	46,766	4,288	.0109	64,561	3,084	.0209	88,606	3,552	.0249
West North-Central	308,201	25,265	.0122	384,769	16,685	.0231	669,805	27,138	.0247
TOTAL NORTH-CENTRAL	1,393,813	133,122	.0105	1,319,028	58,458	.0226	2,126,591	88,376	.0241

Source: Edison Electric Institute, Statistical Yearbook of the Electric Utility Industry for 1967. [2]

	COMMERCIAL/INDUSTRIAL CLASS						RESIDENTIAL CLASS		
	Large Light & Power			Small Light & Power					
	Revenues ($Thous)	Sales (Mil Kwh)	Rate $/Kwh	Revenues ($Thous)	Sales (Mil Kwh)	Rate $/Kwh	Revenues ($Thous)	Sales (Mil Kwh)	Rate $/Kwh
DE	17,672	2,050	.0086	14,322	689	.0208	20,953	842	.0249
MD & DC	92,762	7,996	.0116	131,368	6,372	.0206	137,206	5,836	.0235
VA	57,864	6,020	.0096	95,676	5,276	.0181	156,790	7,657	.0205
WV	63,953	7,877	.0081	29,461	1,512	.0195	54,727	2,458	.0223
NC	102,967	12,111	.0085	91,329	5,633	.0162	189,268	10,290	.0184
SC	69,082	9,327	.0074	49,281	3,000	.0164	95,782	4,993	.0192
GA	77,824	8,901	.0087	106,339	5,420	.0196	148,534	8,636	.0172
FL	98,142	8,923	.0110	198,265	8,809	.0225	324,053	14,980	.0216
South Atlantic	580,266	63,205	.0092	716,041	36,711	.0195	1,127,313	55,692	.0202
KT	120,756	20,648	.0058	45,815	2,322	.0197	98,068	4,866	.0202
TN	157,036	30,349	.0052	36,210	2,854	.0127	131,218	14,398	.0091
AL	106,774	16,753	.0064	57,732	3,340	.0173	113,098	7,891	.0143
MS	38,028	4,353	.0087	42,491	2,408	.0176	70,417	4,011	.0176
East South-Central	422,594	72,103	.0059	182,248	10,924	.0167	412,801	31,166	.0132
AR	42,467	4,957	.0086	44,729	2,077	.0215	69,291	2,805	.0247
LA	72,523	8,940	.0081	85,761	4,092	.0210	143,984	6,337	.0227
OK	40,950	4,076	.0100	69,424	3,448	.0201	100,285	3,877	.0259
TX	244,812	29,579	.0083	316,159	17,703	.0179	431,170	19,720	.0219
West South-Central	400,752	47,552	.0084	516,073	27,320	.0189	744,730	32,739	.0227
TOTAL SOUTH	1,403,612	182,860	.0077	1,414,362	74,955	.0189	2,284,844	119,597	.0191

	COMMERCIAL/INDUSTRIAL CLASS						RESIDENTIAL CLASS		
	Large Light & Power			Small Light & Power					
	Revenues ($Thous)	Sales (Mil Kwh)	Rate $/Kwh	Revenues ($Thous)	Sales (Mil Kwh)	Rate $/Kwh	Revenues ($Thous)	Sales (Mil Kwh)	Rate $/Kwh
MT	18,362	4,338	.0042	17,692	936	.0189	26,705	1,310	.0204
ID	24,822	4,255	.0058	27,403	1,930	.0142	31,912	1,962	.0163
WY	12,029	1,207	.0100	15,994	898	.0178	12,496	501	.0249
CO	22,716	1,955	.0116	64,557	3,125	.0207	70,350	2,697	.0261
NM	12,907	1,189	.0109	32,682	1,606	.0203	29,131	1,094	.0266
AZ	37,510	3,221	.0116	61,025	3,377	.0181	64,432	2,778	.0232
UT	18,495	1,471	.0126	23,985	1,202	.0200	30,253	1,345	.0225
NV	9,280	1,525	.0061	24,453	1,539	.0159	21,494	1,470	.0146
Mountain	156,121	19,161	.0081	267,791	14,613	.0183	286,773	13,157	.0218
WA	68,695	22,149	.0031	72,713	6,507	.0112	130,980	12,712	.0103
OR	35,867	9,242	.0039	54,967	4,334	.0127	92,454	7,743	.0119
CA	292,519	31,749	.0092	600,967	34,521	.0174	592,981	27,755	.0214
Pacific	397,081	63,140	.0063	728,647	45,362	.0161	816,415	48,210	.0169
AK	1,550	84	.0185	10,415	307	.0339	11,738	348	.0337
HI	18,688	1,263	.0148	17,062	530	.0322	26,772	990	.0270
Alaska & Hawaii	20,238	1,347	.0150	27,477	837	.0328	38,510	1,338	.0288
TOTAL WEST	573,440	83,648	.0069	1,023,915	60,812	.0168	1,136,698	62,705	.0181
TOTAL UNITED STATES	4,364,759	486,043	.0090	4,935,911	242,492	.0204	7,183,908	331,525	.0217

TABLE 9. 1967 AVERAGE ELECTRICITY COST TO CONSTRUCTION INDUSTRY

	1967 NET CONST RECEIPTS BY STATE, REGION, & COUNTRY		% OF TOTAL NET CONSTRUCTION RECEIPTS x AVERAGE ELECTRIC RATE PER CLASS (AVERAGE COST OF ELECTRICITY PRORATED BY AMOUNT OF CONSTRUCTION IN AREA)		
	Net Constr * Receipts ($Thous)	% of Total Net Receipts	Commercial & Industrial Class		Residential
			Lg Lt & Power	Sm Lt & Power	
ME	232,197	0.3	.0000366	.0000831	.0000858
NH	223,399	0.3	.0000417	.0000930	.0000876
VT	126,433	0.2	.0000288	.0000466	.0000452
MA	1,838,013	2.7	.0004293	.0007425	.0008046
RI	338,067	0.5	.0000795	.0001525	.0001515
CT	1,135,311	1.6	.0002176	.0003792	.0003968
New England	3,893,420	5.6	.0008232	.0014784	.0015568
NY	6,038,566	8.7	.0009048	.0022185	.0025926
NJ	2,543,258	3.7	.0004329	.0008843	.0009620
PA	4,133,954	5.9	.0006254	.0012213	.0013452
Mid-Atlantic	12,715,778	18.3	.0019581	.0043737	.0048495
TOTAL NORTHEAST	16,609,198	23.9	.0027485	.0058316	.0064052
OH	3,529,794	5.1	.0004335	.0011067	.0012037
IN	1,675,362	2.4	.0002664	.0005208	.0005376
IL	4,390,894	6.3	.0006678	.0014238	.0016632
MI	2,967,588	4.3	.0004687	.0009847	.0009976
WI	1,385,860	2.0	.0002500	.0004540	.0004300
East North-Central	13,949,498	20.1	.0020301	.0045024	.0047838
MN	1,572,418	2.3	.0003082	.0006095	.0005497
IA	909,232	1.3	.0001586	.0003354	.0003367
MO	1,483,849	2.1	.0002499	.0004893	.0005355
ND	187,157	0.25	.0000495	.0000588	.0000635
SD	161,002	0.2	.0000286	.0000538	.0000512
NE	594,453	0.9	.0000963	.0001539	.0001917
KS	697,843	1.0	.0001090	.0002090	.0002490
West North Central	5,605,954	8.05	.009821	.0018596	.0019884
TOTAL NORTH CENTRAL	19,555,452	28.15	.0029558	.0063619	.0067842

*Source: U.S. Department of Commerce, 1967 Census of Construction Industries [3]

	1967 NET CONST RECEIPTS BY STATE, REGION, & COUNTRY		% OF TOTAL NET CONSTRUCTION RECEIPTS X AVERAGE ELECTRIC RATE PER CLASS (AVERAGE COST OF ELECTRICITY PRORATED BY AMOUNT OF CONSTRUCTION IN AREA)		
	Net Constr Receipts ($Thous)	% of Total Net Receipts	Commercial & Industrial Class		Residential
			Lg Lt & Power	Sm Lt & Power	
DE	460,179	0.65	.0000559	.0001352	.0001619
MD & DC	1,795,666	2.6	.0003016	.0005356	.0006111
VA	1,436,112	2.05	.0001968	.0003711	.0004203
WV	509,469	0.75	.0000608	.0001463	.0001673
NC	1,522,692	2.2	.0001870	.0003564	.0004048
SC	917,365	1.3	.0000962	.0002132	.0002496
GA	1,467,453	2.1	.0001827	.0004116	.0003612
FL	2,357,902	3.4	.0003740	.0007650	.0007344
South Atlantic	10,466,838	15.05	.0013846	.0029348	.0030401
KT	787,794	1.13	.0000655	.0002226	.0002283
TN	1,223,057	1.75	.0000910	.0002223	.0001593
AL	863,900	1.25	.0000800	.0002163	.0001788
MS	431,627	0.62	.0000539	.0001091	.0001091
East South Central	3,306,378	4.75	.0002803	.0007933	.0006270
AR	451,448	0.6	.0000516	.0001290	.0001482
LA	1,232,592	1.8	.0001458	.0003780	.0004086
OK	698,238	1.0	.0001000	.0002010	.0002590
TX	4,442,539	6.4	.0005312	.0011456	.0014016
West South Central	6,824,817	9.8	.0008232	.0018522	.0022246
TOTAL SOUTH	20,598,033	29.6	.0022792	.0055944	.0056536

	1967 NET CONST RECEIPTS BY STATE, REGION, & COUNTRY		% OF TOTAL NET CONSTRUCTION RECEIPTS x AVERAGE ELECTRIC RATE PER CLASS (AVERAGE COST OF ELECTRICITY PRORATED BY AMOUNT OF CONSTRUCTION IN AREA)		
	Net Constr Receipts ($Thous)	% of Total Net Receipts	Commercial & Industrial Class		Residential
			Lg Lt & Power	Sm Lt & Power	
MT	187,083	0.25	.0000105	.0000473	.0000510
ID	239,075	0.3	.0000174	.0000426	.0000489
WY	109,553	0.15	.0000150	.0000267	.0000374
CO	814,026	1.2	.0001392	.0002484	.0003132
NM	275,372	0.4	.0000436	.0000812	.0001064
AZ	520,039	0.75	.0000870	.0001358	.0001740
UT	341,502	0.5	.0000630	.0001000	.0001125
NV	259,493	0.4	.0000244	.0000636	.0000584
Mountain	2,476,143	3.95	.0003200	.0007229	.0008611
WA	1,446,503	2.1	.0000651	.0002352	.0002163
OR	669,283	0.95	.0000371	.0001207	.0001131
CA	7,372,453	10.6	.0009752	.0018444	.0022684
Pacific	9,488,239	13.65	.0008600	.0021977	.0023069
AK	167,363	0.25	.0000463	.0000848	.0000843
HI	355,630	0.5	.0000740	.0001610	.0001350
Alaska & Hawaii	522,993	0.75	.0001125	.0002460	.0002160
TOTAL WEST	12,757,375	18.35	.0012662	.0030828	.0032214
TOTAL USA	$69,520,058	100.0			
COLUMN TOTALS EQUAL AVERAGE ELECTRIC RATE ($/KWH) TO CONSTRUCTION INDUSTRY IN 1967		By State Breakdown:	$0.0100549 (Say $0.0101)	$0.0209707 (Say $0.0210)	$0.0230081 (Say $0.0230)
		By Minor Area Breakdown:	$0.0095720	$0.0209610	$0.0224542
		By Major Area Breakdown:	$0.0092497	$0.0208707	$0.022064
		By National Average (No. Breakdown):	$0.0090	$0.0204	$0.0217

TABLE 10. 1967 TRANSACTIONS ($ MIL) (GROSS CONSTRUCTION RECEIPTS) BY REGION SHOWING REGION AS PERCENTAGE OF SECTOR & SECTOR AS PERCENTAGE OF TOTAL*

SECTOR	NORTHEAST	%	NORTH-CENT	%	SOUTH	%	WEST	%	TOTAL	%
1-Family Residence	4,127.636	22.3	5,215.568	28.2	5,520.280	29.9	3,605.988	19.5	18,469.472	19.9
Multi-Family Res.	1,543.050	30.3	1,382.189	27.2	1,328.812	26.1	833.921	16.4	5,087.972	5.5
Other Residences	422.147	21.8	480.396	24.8	733.948	37.8	304.063	15.7	1,940.554	2.1
Indus & Warehouses	3,479.205	24.4	4,793.765	33.6	3,707.913	26.1	2,273,178	15.9	14,254.061	15.4
Office & Bank	1,473.791	27.5	1,335.967	24.9	1,451.279	27.0	1,106.509	20.6	5,367.546	5.8
Stores/Rest/Pub. Gar/Service Sta.	802.797	20.3	1,173.206	29.7	1,110.301	28.1	869.443	22.0	3,955.747	4.3
Religious Buldgs.	489.926	26.0	625.917	33.2	534.560	28.3	235.282	12.5	1,885.685	2.0
Educational	2,211.898	27.5	2,203.627	27.4	2,208.695	27.4	1,432.705	17.8	8,056.925	8.7
Hospital/Inst.	980.565	27.2	1,013.889	28.1	993.712	27.6	617.441	17.1	3,605.607	3.9
Amusement	226.724	27.7	194.962	23.9	225.042	27.5	170.445	20.9	817.173	0.9
Farm	21.623	13.3	103.091	63.4	28.510	17.5	9.333	5.7	162.557	0.2
Other Non-Res.	58.221	26.6	54.020	24.7	70.300	32.1	36.205	16.6	218.746	0.2
Non-building	5,054.320	21.1	5,867.656	24.5	7,523.456	31.4	5,544.869	23.1	23,990.281	25.9
Miscellaneous	1,183.603	24.8	1,229.201	25.7	1,593.661	33.4	769.211	16.1	4,775.676	5.2
Total	22,075.506	23.8	25,673.454	27.7	27,030.449	29.2	17,808.593	19.2	92,588.002	100.0

*Source: U.S. Department of Commerce, 1967 Census of Construction Industries [3]

Residential = 27.5%
Other Bldg = 41.4%
Non-Bldg = 25.9%
Misc = 5.2%

APPENDIX B

COMPUTATION OF AVERAGE COST OF REFINED PETROLEUM TO THE CONSTRUCTION INDUSTRY IN 1967 ACCORDING TO TYPE OF CONSTRUCTION

SUMMARY

This section shows the exact computations used to calculate prices paid by the building construction industry for refined petroleum products in 1967 ($/ MM Btu).

GENERAL INFORMATION

1. Construction types are in accordance with the U. S. Department of Commerce, 1967 Census of Construction Industries [3]. Applicable CAC Sectors for each construction type are listed with each type.
2. "Asphalt Transactions" include both asphalt and road oil.
3. All dollar amounts are in $ million 1967 producer's dollar. All energy amounts are in MMBtu (million Btu).
4. Computation of cost of energy ($/MMBtu) of each of the refined petroleum products considered:

Product	MMBtu/bbl	U.S. Average Cost 1967 $/bbl	U.S. Average Cost 1967 $/MMBtu
Asphalt/Road Oil	6.640	$3.063	$0.46
Gasoline	5.248	5.210	0.99
Diesel Fuel No. 2	5.7475	4.408	0.77
No. 6	6.287	2.492	0.40
Propane	4.011	2.309	0.58

(On the following pages, CAC sector indices are those of the 399-order model. See Table 1 for sector names.)

COMPUTATIONS ACCORDING TO CONSTRUCTION TYPE

1. SINGLE-FAMILY RESIDENTIAL: FARM BUILDINGS

Applicable to CAC Sectors: 23, 27, 48, 49, 55, 57, 58.

Computation of Refined Petroleum breakdown in these sectors:

A. Asphalt Transactions from applicable CAC Sectors / B. Total Ref. Pet. Trans. from applicable CAC sectors = $36.6 / $83.8 = 43.7%

C. Other Refined Petroleum in these sectors = 100% - 43.7% = 56.3%

D. Breakdown of Refined Petroleum other than asphalt:

Gasoline: 100% x 56.3% = 56.3% total refined petroleum

Computation of Refined Petroleum cost: $/MMBtu these sectors:

Product	% x Product Cost ($/MMBtu)	= Contribution of Product to Weighted average cost: $/MMBtu
Asphalt/Road Oil:	43.7% x $0.46 =	$0.20102
Gasoline:	56.3% x $0.99 =	0.55737
		$0.75839

Say: $0.758/MMBtu these sectors

2. MULTI-FAMILY RESIDENTIAL; OTHER RESIDENTIAL; OFFICE & BANK BUILDINGS; OTHER NON-FARM BUILDINGS

Applicable to CAC Sectors: 24, 25, 26, 28, 29, 31, 38.

Computation of Refined Petroleum Breakdown in these sectors:

A. Asphalt Transactions from CAC applicable sectors / B. Total Refined Petro. from CAC applicable sectors = $46.0 / $97.7 = 47.1%

C. Other Refined Petroleum in these sectors = 100% - 47.1% = 52.9%

D. Breakdown of Refined Petroleum Other than Asphalt:

	% of product use by region of U.S.	
Petroleum Product	Northeast; North-Central & West (D_1)	South (D_2)
Gasoline	30%	32.6%
Diesel/#2	62%	67.4%
#6	4%	--
Propane	4%	--
	100%	100.0%

E. Breakdown of Construction Transactions in these sectors by region of U.S. (Census of Construction Industries)

E_1: Northeast; North-Central & West: 72%

E_2: South: 28%

F. Computation of Other Refined Petroleum breakdown weighted regionally:

$(C \times D_1 \times E_1) + (C \times D_2 \times E_2)$ = % of Other Refined Petroleum in those sectors.

Gasoline:	.529 (.30 x 72) + .529(.326 x 28) =	16.2551
Diesel/#2:	.529 (.62 x 72) + .529(.674 x 28) =	33.5979
#6:	.529 (.04 x 72) =	1.5235
Propane:	.529 (.04 x 72) =	1.5235
		52.9000

G. Computation of Refined Petroleum cost: $/MMBtu in these sectors:

Product % x Product $/MMBtu = Contribution of Product to weighted average cost in $/MMBtu

Asphalt/Road Oil:	47.1% x $0.46 =	$0.21666
Gasoline:	16.3% x 0.99 =	0.16137
Diesel/#2	33.6% x 0.77 =	0.25872
#6:	1.5% x 0.40 =	0.00600
Propane:	1.5% x 0.58 =	0.00870
		$0.65145

Say $0.651 per MMBtu in these sectors

3. INDUSTRIAL & WAREHOUSE BUILDINGS

Applicable to CAC Sectors: 30, 32.

Computation of Refined Petroleum Breakdown in these sectors:

A. Asphalt Transactions from applicable CAC sectors: $10.6
B. Total Ref. Pet. Trans. from applicable CAC sectors: $29.7 = 35.7%

C. Other Refined Petroleum in these sectors = 100% - 35.7% = 64.3%

D. Breakdown of Refined Petroleum other than Asphalt:

Petroleum Product	% of product use by region of U.S. Northeast; North-Central & West (D_1)	South D_2
Gasoline	20%	22%
Diesel/#2	70%	78%
#6	--	--
Propane	10%	--
	100%	100%

E. Breakdown of Construction Transactions in these sectors by region of U.S. (from Census of Construction Industries)

E_1: Northeast; North-Central & West: 73.9%

E_2: South: 26.1%

100.0%

F. Computation of Other Refined Petroleum breakdown weighted regionally:

$(C \times D_1 \times E_1) + (C \times D_2 \times E_2)$ = % of Other Refined Petroleum in in these sectors.

Gasoline	(.643 x .20 x 73.9) + (.643 x .22 x 26.1)	= 13.2
Diesel/#2	(.643 x .70 x 73.9) + (.643 x .78 x 26.1)	= 46.4
Propane	(.643 x .10 x 73.9)	= 4.7
		64.3

G. Computation of Refined Petroleum cost: $/MMBtu in these sectors:

Product % x Product $/MMBtu = Contribution of Product to weighted average cost in $/MMBtu

Asphalt/Road Oil:	35.7% x $0.46	= $0.16422
Gasoline:	13.2% x 0.99	= 0.13068
Diesel/#2:	46.4% x 0.77	= 0.35728
Propane:	4.7% x 0.58	= 0.02726
		$0.67944

Say $0.679 per MMBtu in these sectors

4. STORES; RESTAURANTS; PUBLIC GARAGES/SERVICE STATIONS

Applicable to CAC Sectors: 33, 34.

Computation of Refined Petroleum Breakdown in these sectors:

A. Asphalt Transactions from applicable CAC sectors: $11.7
B. Total Ref. Pet. Trans. from applicable CAC sectors: $27.3 = 42.9%

C. Other Refined Petroleum in these sectors = 100% - 42.9% = 57.1%

D. Breakdown of Refined Petroleum other than Asphalt:

Petroluem Product	% of product use by region of U.S. Northeast; North-Central & West (D_1)	South (D_2)
Gasoline	30%	35.3%
Diesel/#2	55%	64.7%
#6	--	--
Propane	15%	--
	100%	100.0%

E. Breakdown of Construction Transactions in these sectors by region of U.S. (from Census of Construction Industries)

E_1: Northeast; North-Central; West: 71.9%

E_2: South: 28.1%

100.0%

F. Computation of Other Refined Petroleum breakdown weighted regionally:

$(C \times D_1 \times E_1) + (C \times D_2 \times E_2)$ = % of Other Refined Petroleum in these sectors.

Gasoline: (.571 x .30 x 71.9) + (.571 x .353 x 28.1) = 17.98
Diesel/#2: (.571 x .55 x 71.9) + (.571 x .647 x 28.1) = 32.96
Propane: (.571 x .15 x 71.9) = 6.16

57.10

4 Con't

G. Computation of Refined Petroleum cost: $/MMBtu in these sectors:

	Product %		Product $/MMBtu		Contribution of Product to weighted average cost in $/MMBtu
Asphalt/Road Oil:	42.90%	x	$0.46	=	$0.197340
Gasoline:	17.98%	x	0.99	=	0.178002
Diesel/#2	32.96%	x	0.77	=	0.253792
Propane:	6.16%	x	0.58	=	0.035728
					$0.664862

Say $0.665 per MMBtu in these sectors

5. RELIGIOUS BUILDINGS; EDUCATIONAL BUILDINGS; AMUSEMENT & RECREATIONAL FACILITIES

Applicable to CAC Sectors: 35, 36.

Computation of Refined Petroleum Breakdown in these sectors:

A. Asphalt Transactions from applicable CAC sectors: $22.2
B. Total Ref. Pet. Trans. from applicable CAC sectors: $48.8
= 45.5%

C. Other Refined Petroleum in these sectors = 100% - 45.5% = 54.5%

D. Breakdown of Refined Petroleum other than Asphalt:

Petroleum Product	% of product use by region of U.S. Northeast; North-Central & West (D_1)	South (D_2)
Gasoline	15%	16.7%
Diesel/#2	75%	83.3%
#6	2%	--
Propane	8%	--
	100%	100.0%

E. Breakdown of Construction Transactions in these sectors by region of U.S. (from Census of Construction Industries)

E_1: Northeast; North-Central; West: 72.4%

E_2: South: 27.6%

100.0%

F. Computation of Other Refined Petroleum breakdown weighted regionally:

$(C \times D_1 \times E_1) + (C \times D_2 \times E_2)$ = % of Other Refined Petroleum in these sectors.

Gasoline:	(.545 x .15 x 72.4) + (.545 x .167 x 27.6)	= 8.43
Diesel/#2:	(.545 x .75 x 72.4) + (.545 x .833 x 27.6)	= 42.12
#6:	(.545 x .02 x 72.4)	= .79
Propane:	(.545 x .08 x 72.4)	= 3.16
		54.50

5 Con't

G. Computation of Refined Petroleum cost: $/MMBtu in these sectors:

	Product %		Product $/MMBtu	=	Contribution of Product to weighted average cost in $/MMBtu
Asphalt/Road Oil:	45.50%	x	$0.46	=	$0.209300
Gasoline:	8.43%	x	0.99	=	0.083457
Diesel/#2:	42.12%	x	0.77	=	0.324324
#6:	0.79%	x	0.40	=	0.003160
Propane:	3.16%	x	0.58	=	0.018328
					$0.638569

Say $0.639 per MMBtu in these sectors

6. HOSPITAL/INSTITUTIONAL BUILDINGS

Applicable to CAC Sector: 37

Computation of Refined Petroleum Breakdown in this sector:

A. Asphalt Transactions from applicable CAC sector: $5.7
B. Total Ref. Pet. Trans. from applicable CAC sector: $11.5 = 49.6%

C. Other Refined Petroleum in this sector = 100% - 49.6% = 50.4%

D. Breakdown of Refined Petroleum other than Asphalt:

Petroleum Product	% of product use by region of U.S. Northeast; North-Central & West (D_1)	South (D_2)
Gasoline:	10%	11.1%
Diesel/#2:	80%	88.9%
#6:	8%	--
Propane:	2%	--
	100%	100.0%

E. Breakdown of Construction Transactions in this sector by region of U.S. (from Census of Construction Industries)

E_1: Northeast; North-Central; West: 72.4%

E_2: South: 27.6%

100.0%

F. Computation of Other Refined Petroleum breakdown weighted regionally:

$(C \times D_1 \times E_1) + (C \times D_2 \times E_2)$ = % of Other Refined Petroleum in this sector.

Gasoline:	(.504 x .10 x 72.4) + (.504 x .111 x 27.6)	= 5.19%
Diesel/#2:	(.504 x .80 x 72.4) + (.504 x .889 x 27.6)	= 41.56%
#6:	(.504 x .08 x 72.4)	= 2.92%
Propane:	(.504 x .02 x 72.4)	= 0.73%
		50.40%

6 Con't

G. Computation of Refined Petroleum cost: $/MMBtu in this sector:

	Product %		Product $/MMBtu		Contribution of Product to weighted average cost in $/MMBtu
Asphalt/Road Oil:	49.60%	x	$0.46	=	$0.228160
Gasoline:	5.19%	x	0.99	=	0.051381
Diesel/#2:	41.56%	x	0.77	=	0.320012
#6:	2.92%	x	0.40	=	0.011680
Propane:	.73%	x	0.58	=	0.004234
					$0.615467

Say $0.615 per MMBtu in this sector

7. NON-BUILDING FACILITIES; NON-BUILDING MAINTENANCE & REPAIR

Applicable to CAC Sectors: 39-47, 50-54, 59-71.

Computation of Refined Petroleum Breakdown in these sectors:

A. Asphalt Transactions from applicable CAC sectors: $133.8
B. Total Ref. Pet Trans. from applicable CAC sectors: $707.3 = 18.9%

C. Other Refined Petroleum in these sectors = 100% - 18.9% = 81.1%

Gasoline: 5% x 81.1 = 4.06% of total refined petroleum.
Diesel/#2: 95% x 81.1 = 77.04% of total refined petroleum.
81.10%

Computation of Refined Petroleum cost: $/MMBtu these sectors:

Product	%	x	Product $/MMBtu	=	Contribution of Product to weighted average cost in $/MMBtu
Asphalt/Road Oil:	18.9 %	x	$0.46	=	$0.086940
Gasoline:	04.06%	x	0.99	=	0.040194
Diesel/#2:	77.04%	x	0.77	=	0.593208
					$0.720342

Say: $0.720/MMBtu these sectors

8. REPAIR & MAINTENANCE - NON-RESIDENTIAL BUILDINGS

Applicable to CAC Sector 56

Computation of Refined Petroleum Breakdown in this sector:

A. Asphalt Transactions from applicable CAC sectors: $7.2
B. Total Ref. Pet. Trans. from applicable CAC sectors: $31.4 = 22.9%

C. Other Refined Petroleum in these sectors = 100% - 22.9% = 77.1%

D. Breakdown of Refined Petroleum other than Asphalt:

Gasoline: 95% x 77.1 = 73.2% of total refined petroleum
Diesel/#2: 5% x 77.1 = 3.9% of total refined petroleum
77.1%

Computation of Refined Petroleum cost: $/MMBtu in this sector

Product % x Product $/MMBtu = Contribution of Product to weighted average cost in $/MMBtu

Asphalt/Road Oil:	22.9% x	$0.46 =	$0.105340
Gasoline:	73.2% x	0.99 =	0.724680
Diesel/#2:	3.9% x	0.77 =	0.030030
			$0.860050

Say: $0.860/MMBtu this sector

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