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A Commercial Energy Use Model for the Ten U.S. Federal Regions

Steve M. Cohn
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James Kurish
Craig Emerson

MASTER

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A COMMERCIAL-ENERGY-USE MODEL FOR THE TEN U.S. FEDERAL REGIONS*

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ABSTRACT

This report describes the development of a regional forecasting tool for energy demand in the commercial sector of the U.S. Data bases for each of the ten federal regions are developed as input to the ORNL commercial energy demand model to evaluate conservation policies, new technologies and fuel price strategies on a regional basis from 1970 to 2000. Commercial floor space econometric models for each of ten commercial building types in each of the ten federal regions are estimated to forecast the growth of energy using capital on a regional basis. In addition, regional energy use indices (Btu/ft^2)* are calculated using revised commercial energy use and floor space estimates.

Comparisons are made between the commercial floor space forecasts of the regional models and the national commercial energy use model. In addition, validation of the forecasting accuracy of the regional models is made for a historical period.

All regions show fuel switching away from fuel oil and natural gas to electricity. Regions 4, 6 and 10 (southeastern, southwestern and lower western states) show the largest growth rates of projected primary energy consumption for the ten federal regions with the Great Lakes states the lowest.

*All energy inputs to the computer model are in terms of Btu and ft^2 therefore, the EUI values presented in this report are given in Btu/ft^2 instead of the more appropriate metric units of Joules/meter^2.

1. INTRODUCTION

This report describes the development of models for each of the ten federal regions (Fig. 1) that simulate energy use in the commercial sector of the United States from 1970 to 2000. These regional models complement and share a similar structure to residential engineering-economic models of regional energy use developed at ORNL.[1]

Like the residential sector energy use modeling, the modeling efforts in the commercial sector of ORNL[2] were originally designed to provide policymakers with a tool to evaluate the impacts of a variety of policies affecting such instruments as fuel prices, taxes, building standards, and technology development on national energy use. Nevertheless, a regional evaluation of energy futures is vital to gain insight on the impact of varying regional population and per capita income growth rates, fuel price differences, climate, and growth of commercial floor space on regional energy use. For example, regions 9 and 10 in the far west are projected to have a higher rate of growth of population than the rest of the United States (30% from 1973 to 1995 for the far west versus 20% for the U.S.), resulting in not only a faster growing commercial sector but one whose age distribution of buildings is considerably newer than the rest of the United States. Both these factors have important influences on commercial sector energy use.

Table 1 gives a survey of regional differences of some primary determinates of energy use in the commercial sector as well as market shares by fuel type and end use. Electricity and natural gas prices vary by a factor of two and three, respectively, in 1970 for the regions shown.

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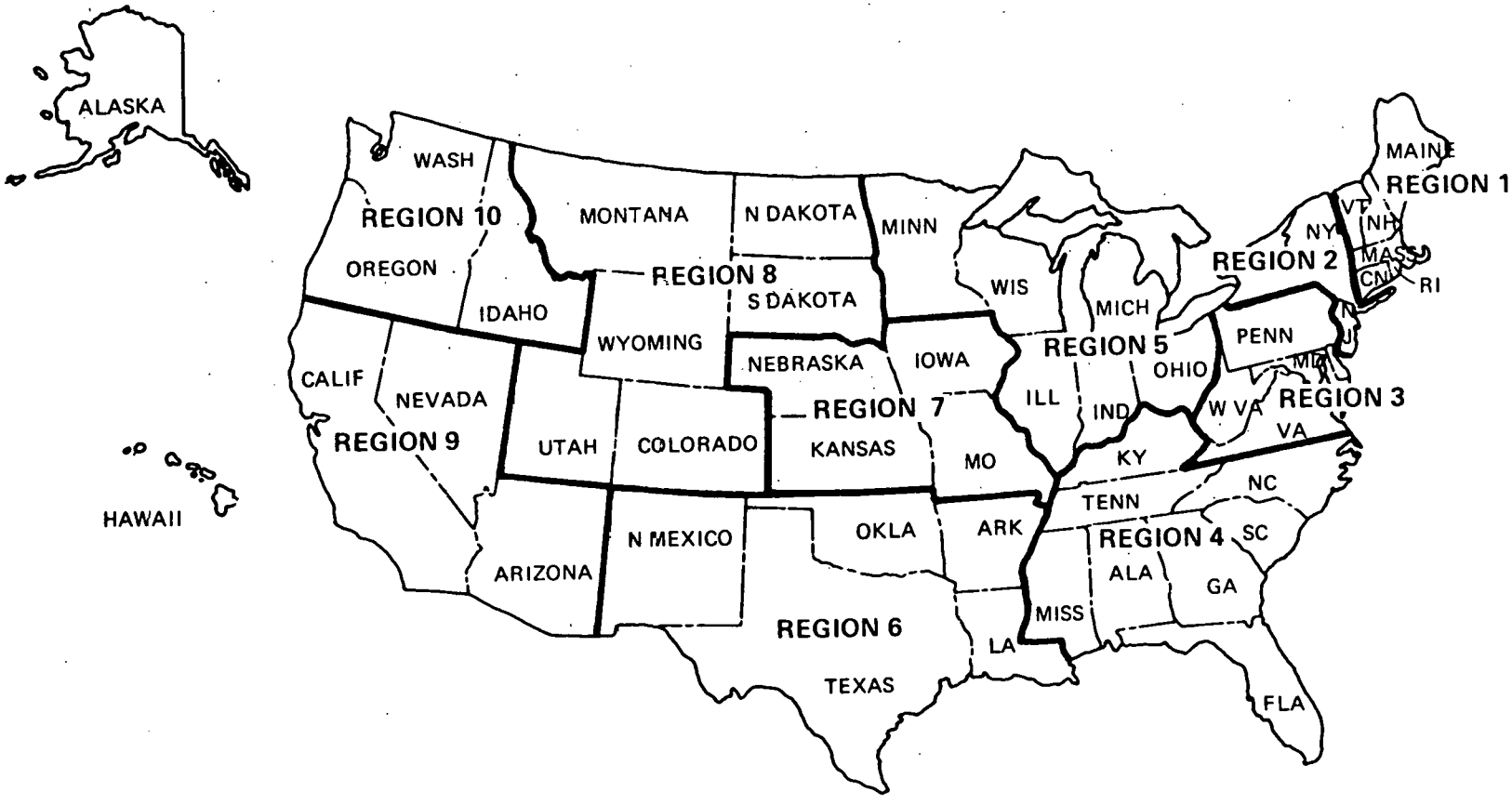

Fig. 1. Map of the U.S. showing the 10 Federal regions.

Per capita disposable income varies 40% from the southeastern to the lower northeast region.

Table 1. Regional variations in commercial energy use determinants, 1970

	High (Region)	Low (Region)
Fuel prices (1970-$/$10^6$ Btu)		
Electricity (Primary)	3.02 (II)	1.45 (X)
Natural gas	1.93 (I)	0.62 (VI)
Oil	1.47 (VIII)	1.05 (III)
Population (x 10^6)	44.4 (V)	5.73 (VIII)
Per capita income (1970-$)	5,504 (II)	3,948 (IV)
Heating degree days	7,798 (VIII)	2,611 (IX)
Cooling degree days	2,278 (VI)	259 (X)
Share of fuel in total energy use		
Electricity	0.659 (IX)	0.228 (I)
Natural gas	0.400 (VIII)	0.062 (I)
Oil	0.699 (I)	0.029 (IX)
Other fuels	0.037 (VIII)	0.006 (II)
End use shares		
Heating	0.688 (I)	0.341 (IX)
Air conditioning	0.352 (VI)	0.055 (I)
Water heating	0.102 (I)	0.011 (VIII)
Lighting	0.225 (IV)	0.129 (I)
Other	0.079 (IV)	0.049 (I)

Region 1 (New England states) has the lowest regional market shares of electricity and natural gas consumption and the highest share of fuel oil use. Natural gas supply problems exist for the northeast, consequently fuel oil is the primary fossil fuel used for space heating. Region 1, of all the regions, has the largest fraction of its total energy used for

space heating and water heating and the lowest fraction of air conditioning, lighting and other (office machines, refrigeration, cooking, etc.). Region 6 (southwestern states), with the highest level of cooling degree days has the largest fraction of air conditioning energy use of the ten regions.

While the national commercial demand model has proven useful in evaluating a variety of policy options[3] and has been utilized by numerous organizations evaluating national energy futures, a version of the model which could reflect regional differences in climate, historical energy use, fuel prices and economic growth was desirable. Organizations desiring this commercial energy analysis have adapted the regional models to their particular needs; i.e., utilities such as the Tennessee Valley Authority and Southern California Gas Company have modified the regional models for federal regions four and nine respectively to closely match their service areas in terms of commercial floor space, demographic conditions and energy price and consumption. State energy agencies such as the Wisconsin State Energy Commission and the Minnesota Energy Agency have further modified the commercial model for region five to evaluate the energy and economic effects in their respective states.

The smallest geographical area in the U.S. that plans to utilize the commercial model is Seattle, Washington, of which both the Seattle Energy Office and Seattle City and Light are modifying the commercial model originally developed for region 10.

2. MODEL STRUCTURE AND MODIFICATIONS

The regional commercial energy use models follow the same capital stock modeling approach as the national model. Prior information in the form of energy use estimates by equipment type, fuel type and age of capital stock are utilized for each of ten building types to produce a detailed simulation of commercial sector energy use. A summary of the structure of the model is presented here, and a more detailed description is available in an earlier report.[2]

The regional models assume that energy demands in year T for building type j using fuel i in equipment type k equals the sum of demands from each year's energy consuming capital stock additions and is represented as:

$$Q^T_{i,j,k} = \sum_{t=t_0}^{T} U\left(P_T\right)^t_{i,j,k} \cdot S^t_{i,j,k} \qquad (1)$$

where

i = fuel type (electricity, gas, oil, other),

j = building type (retail-wholesale, educational, office, health, hotel-motel, public administration, warehouses, religious, garages and service stations, miscellaneous)

k = end-use (space heating, cooling, lighting, water heating, other)

$Q^T_{i,j,k}$ = annual energy use, and

$U\left(P_T\right)^t_{i,j,k}$ = the utilization rate of t-vintage energy using equipment as a function of energy prices in year T relative to the base year of the model.

Changes in the utilization rate of equipment are also a function of changes in efficiency of this equipment (e.g., space heating equipment introducted into new buildings or replacement of worn-out space heating units). Whereas an increase in the fuel price for space heating causes a decrease in utilization of that equipment, an increase in efficiency of new equipment makes it possible to maintain higher temperatures without a fuel cost increase; therefore, improved efficiency of equipment is expected to increase utilization rate. The stock of equipment $S^t_{i,j,k}$ is measured in terms of potential energy use and is defined as the fraction of commercial floor space served by a particular end use in year t for each of the ten building types. This stock of equipment is further broken down into a relationship containing information on potential energy use per square foot, the fraction of floor space additions utilized by a particular class of end uses, and the age structure of floor space. This function relationship is represented as

$$S^t_{i,j,k} = e^t_{i,j,k} \cdot a^t_{i,j,k} \cdot A^t_j \cdot d(T-t) \qquad (2)$$

This stock relationship (eq. 2) is substituted into equation 1 and summed over stock vintages to give a final component of energy demand for year T by fuel type, building type and end use to give:

$$Q^t_{i,j,k} = \sum_{t=t_0}^{T} U\left(P_T\right)^t_{i,j,k} \cdot e^t_{i,j,k} \cdot a^t_{i,j,k} \cdot A^t_j \cdot d(T-t) \qquad (3)$$

$e^t_{i,j,k}$ is the potential energy use per square foot required by t-vintage equipment k. This value changes for new heating, ventilating, and air conditioning (HVAC) systems when the ratio of energy price to equipment capital cost changes. Technology tradeoff curves for HVAC systems by fuel type are utilized to determine the reduction in HVAC energy use as capital cost for the equipment increases. As fuel prices rise it is assumed that commercial establishments will substitute more expensive energy using equipment having increased efficiency. The development of national energy use indices (EUI) is described in reference 4; a similar analysis to develop EUI on a regional basis is described in section 3 of this report.

The fraction of t-vintage floor space additions allocated to fuel i for end use k is $a^t_{i,j,k}$. As existing buildings are retrofitted with new energy consuming equipment or new buildings are constructed this fraction of floor space is altered. The fraction of floor space additions for year t is also dependent on the relative life-cycle costs for each fuel specific HVAC system.

The floor space added in year t for building j is A^t_j. Historical data for floor space additions by building type are available from 1925 to 1970 from the F. W. Dodge Division of McGraw-Hill;[4] thereafter, floor space additions are forecasted for all building types in each region by demand equations relating the stock of floor space to the growth of population and the demand for commercial services.

A logistic decay function, d(T-t), which when multiplied by each t-vintage addition to floor space, gives the amount of that addition still standing in year T.

The primary variation across regions in fuel use and fuel choice in the commercial sector is due to space heating. In the development of the national fuel use model, the effects of annual variations of climatic conditions on fuel use was not considered meaningful.[5] Over a recent eight year period, the weighted by population average heating degree days was 4926 with a standard deviation of only 80 degree days. This lack of variation does not hold when one looks at the climatic variations across regions. Table 2 shows the 1970 regional variation of heating and cooling degree days for 1970. Heating degree days vary from a low of 2611 in region 9 (lower western states) to a high of 7792 in region 8 (upper western mountain states).

Table 2. Regional climatic variations in 1970

Federal region	Heating degree days	Cooling degree days
1	6787	479
2	5984	809
3	5367	955
4	2913	2113
5	6677	806
6	2575	2278
7	5763	1273
8	7792	480
9	2611	909
10	5625	259
US	4932	1172

Cooling degree days, which reflects air conditioning requirements, varies from a low of 259 in region 10 (upper pacific states) to a high of 2278 in region 6 (southwestern states).

Since fuel choice (in level of consumption as well as fuel type) in space heating is considered to be a function of fuel prices, climatic conditions, and economic activity, a sub-model of these determinants was included in the national energy model of commercial fuel use. Initially, a fuel choice model developed by Baughman & Joskow[5] (B & J) was utilized to determine market shares of fuel used for floor space heating and ultimately the fraction of floor space heated by each fuel.[6] The B & J model was estimated with state level data over five years with combined household/commercial fuel use and price data.

In our regional version of the energy use model an improved fuel choice model was developed to more accurately reflect market share changes in the commercial sector alone.[7] A more accurately defined energy use data base was developed at the state level utilizing improved estimates of master-metered residential electricity and gas use; these uses are included in the traditional energy consumption data sources for the commercial sector[8,9] but must be excluded from our analysis for consistency with our definition of the commercial sector. In addition, the fraction of distillate oil used by the commercial sector is estimated individually on a state by state basis.

The fuel choice submodel used in the regional model is comprised of two fuel choice equations relating changes in market shares of the three major fuels to fuel prices, climatic variables, availability of natural gas, and per capita income (reflecting the demand for commercial services). An aggregate or total energy demand function is estimated with the same explanatory variables as the fuel choice equations plus the addition of the level of commercial floor space. The state level floor space data is utilized as a proxy for energy using capital in the commercial sector. The three equations including three identities are represented as follows:

$$\ln\left(\frac{S_g}{S_e}\right)_{i,t} = \alpha_o + \alpha_1 \ln\left(\frac{P_g}{\lambda_g P_e}\right)_{i,t} + \alpha_2 X_{i,t} + (1-\alpha_3) \ln\left(\frac{S_g}{S_e}\right)_{i,t-1} \tag{4}$$

$$\ln\left(\frac{S_o}{S_e}\right)_{i,t} = \beta_0 + \beta_1 \ln\left(\frac{P_o}{\lambda_o P_e}\right)_{i,t} + \beta_2 X_{i,t} + (1-\beta_3) \ln\left(\frac{S_o}{S_e}\right)_{i,t-1} \tag{5}$$

$$\ln Q_{i,t} = \gamma_o + \gamma_1 \ln P_{i,t} + \gamma_2 \ln FLR_{i,t} + \gamma_3 \ln PCI_{i,t} + \gamma_4 CDD_{i,t} + \gamma_6 G_{i,t} + (1-\gamma_7) \ln Q_{i,t-1} \tag{6}$$

where $S_g + S_e + S_o = 1$ and $\alpha_1 = \beta_1$, $\alpha_3 = \beta_3$

Where S_k and P_k are the market share and state level fuel price for fuel type k (electricity, natural gas, and fuel oil). The space heating conversion efficiency factors for gas and oil, λ_g and λ_o, are assumed to be 0.60 and 0.55 respectively, and λ_e for electricity equals 1.0. The vector of the non-price variables for state i and year t is $X_{i,t}$. State level commercial floor space is represented by $FLR_{i,t}$ and $PCI_{i,t}$ represents

real per capita income (a measure of economic activity). Cooling and heating degree days are represented by $CDD_{i,t}$ and $HDD_{i,t}$ respectively, and $G_{i,t}$ is the percentage change of miles of gas pipeline, included to measure natural gas availability.

It is assumed that fuel choice decisions made by firms and organizations in the commercial sector are long-run decisions based primarily on relative fuel prices. When these fuel prices change, a short-run or one-year response is noticed on the fuel share levels. This short-run response affects the fuel share levels and induces a response represented in the model by a change in the utilization of space heating equipment. The estimated short-run coefficients are subtracted from the calculated long-run price coefficients in order to avoid double counting the price induced short-run utilization effect after the first year (since the fuel choice equations are modelled in a flow adjustment framework, the long-run coefficients are α_1/α_3 and β_1/β_3).

Conventional short-run fuel price elasticities of demand are calculated analytically using the estimated fuel share equations and the total demand equation. These short-run elasticities are employed in the model as utilization elasticities.

The modified fuel choice equations are represented in a reduced form in the regional models as:

$$S_e = (1.0-S_{oth})/\left[1.0 + C_o\ (P_o/P_e)^{-0.562} + C_g\ (P_g/P_e)^{-0.562}\right]$$

$$S_g = C_g\ (P_g/P_e)^{-0.562}\ S_e\ ,$$

$$S_o = C_o\ (P_o/P_e)^{-0.562}\ S_e\ ,$$

$$S_{oth} = C_{oth}\left[0.9457^{\ (T-1970)}\right]\ ,$$

where S_e, S_g, S_o and S_{oth} are fuel shares of electricity, natural gas, oil and other fuels; P_o, P_e, P_g are fuel prices, C_o, C_g and C_{oth} are calculated constants for each region which make the fuel shares for each fuel equal to their 1970 values for model calibration purposes. The value -0.562 is the result of subtracting the short run fuel choice coefficient (-0.37) from the calculated long-run price coefficient [-0.37/(1.0 - 0.603) = -0.932]. It is assumed that fuels in the "other" classification (coal and liquid gases) are declining exponentially at a rate approximately 5% annually. The value of T (time) increases from 1971 to 2000.

A characteristic of the multinomial logit form[7] of the fuel choice model is that, when a particular fuel's market share approaches unity (complete saturation), that fuel's own price market share elasticity approaches zero, while its cross-price elasticities increase in magnitude. This is both a desirable and plausible characteristic for use in the regional models, since in regions with a small market share of a particular fuel one would expect a more elastic response to that fuel's price increases. Similarly it is realistic to believe that regions with large market shares of a particular fuel would have a relatively inelastic response to the fuel's price increases. While the market share elasticities of this fuel choice model vary in each of the regional models due to regional fuel share differences, further research should be aimed at developing unique fuel choice models for each region.

3. ENERGY USE INDICES

As in the national commercial energy use model, our regional models require information in the form of annual energy use per square foot of floor space (Btu/ft^2) for the ten building types by four fuels and five end-uses for 1970. It is these energy use indices (EUI) that are utilized in the commercial energy use model and demand equation as the factor $e^t_{i,j,k}$. The approach used in developing EUI for the ten federal regions is similar to that for developing national EUI described in an earlier report.[4]

A requirement for computing the regional EUI is accurate fuel use and floor space estimates for each region. As mentioned in the discussion on the fuel choice submodel, improvements have been made in fuel use estimates by region. Removing the mass-metered apartment electricity and natural gas use from commercial sector energy use data sources is important in developing national EUI but vital in estimating regional EUI due to the regional variation in mass-metered electricity and gas use. Initially, it was estimated that nationally 22.2% of reported commercial gas use was actually consumed by mass-metered multi-family housing.[10] However, a re-examination of mass-metered residential gas use[7] lowered this value to approximately 12%. Our estimate of mass-metered multi-family electricity use is precisely the same as the Jack Faucett Associates estimate of 4% of residential electricity consumption.[11] The estimated fraction of distillate heating oils used in the commercial sector nationally was lowered from 35% to 30% by first estimating residential distillate use for each state then subtracting these values from total distillate oil use.[7]

The importance of adjusting the reported regional commercial fuel use figures by the regional corrections described above, rather than using an average U.S. correction for all regions is apparent in Table 3. Mass-metered apartment electricity use varies from 1.7% of residential electricity use in region 4 (southeastern states) to 9.2% in region 6 (southwestern states). The fraction of mass-metered residential gas use included in traditional commercial sector natural gas data sources varies from 4.4% in region 4 (Southeastern states) to a high of 24.9% in region 3 (upper Atlantic states). Of the reported combined residential/commercial distillate oil use for heating purposes in the United States only 12.8% in region 10 (upper Pacific states) belongs to the commercial sector whereas the commercial sector in region 6 (southwest) consumes 92.6% of distillate heating oil.

A regional model of commercial floor space stock by building type for 1970 was developed to (1) produce EUI estimates for all fuel types and end-uses by building type; (2) calibrate the model to begin its simulation at 1970; and (3) estimate regional floor space demand equations for each sector.

Regional information on the stock of floor space by building type was available from a study by General Electric[12] which utilized F. W. Dodge floor space additions estimates by Business Economic Area (BEA) for 1975. To conform with our requirements for floor space stock in 1970, the following relationship was used to adjust the GE 1975 stock to a 1970 stock ($FL_{j,k}^{(70)}$):

$$FL_{j,k}^{(70)} = GE_{j,k}^{(75)} * \frac{POP_j^{(70)}}{POP_j^{(75)}}$$

Table 3. Regional variations in mass-metered apartment electricity/gas use and commercial distillate oil use, 1970*

Federal region	Percent of mass-metered electricity use to total residential electricity use	Percent of mass-metered gas use to total residential gas use	Percent distillate heating oils used in commercial sector
1	3.8	19.3	36.1
2	6.6	7.8	21.4
3	6.0	24.9	22.2
4	1.7	4.4	52.5
5	2.5	11.2	34.2
6	9.2	7.4	92.6
7	2.3	7.3	50.3
8	2.3	9.1	37.0
9	4.9	9.8	71.3
10	1.9	4.6	12.8
US	4.0	11.8	30.4

*Source: Reference 7.

where $GE_{j,k}^{(75)}$ is the reported GE floor space stock in 1975 for region j and building type k, and $POP_j^{(70)}$ and $POP_j^{(75)}$ are the reported populations of region j for 1970 and 1975 respectively. This floor space relationship assumes that, over this five year period, floor space stock changes by building type will adjust similar to changes in the overall population of the region.

Regional floor space additions compiled by F. W. Dodge are utilized to increment the initial estimated stock of floor space from 1924 to 1970 for each federal region by the ten building types. The regional additions to stock are assumed to be removed or decay at the same rate as the floor space stock in the national model. A logistic function of the form $f(t) = 1 - \frac{1}{1 + \exp(6.91 - 0.1536t)}$ is used to simulate a low removal rate for commercial building stock during its first 20 years, while a much faster removal rate is realized as the assumed half-life of 45 years is approached.

Table 4 presents an estimated matrix of commercial floor space stock by building type and region for 1975.

Combining the 1970 regional stocks of commercial floor space by building type and the revised 1970 commercial fuel use estimates with the aforementioned methodology used in calculating national energy use indices,[4] regional energy use indices were calculated and are presented in Appendix A. These regional EUI's are consistent with the 1970 regional fuel use estimates, floor space and assumed relationships of heating, cooling, and lighting between the ten building types.

Table 4. 1975 stock of commercial floor space by subsector and federal region (millions of m^2)[a]

Commercial subsector	Federal region										
	1	2	3	4	5	6	7	8	9	10	U.S.
Retail/wholesale	23.6	55.2	44.4	63.4	94.4	42.6	23.8	11.2	53.6	14.0	426.2
Office/finance	23.3	59.2	59.2	55.7	68.6	36.0	17.6	9.8	47.1	10.9	371.4
Auto/garage	3.2	9.2	5.0	5.3	8.6	4.6	1.5	0.9	7.4	1.3	47.1
Warehouse	8.2	21.5	19.1	32.1	43.3	21.3	10.9	5.6	21.9	5.9	189.6
Educational	37.1	81.8	72.7	84.0	133.4	59.3	33.4	17.3	68.6	19.2	606.8
Health	11.3	25.4	21.0	24.5	37.0	16.2	9.6	4.6	20.0	5.2	174.7
Public administration	5.2	12.6	12.6	13.7	19.3	8.9	5.6	3.2	13.8	4.4	99.3
Religious	7.7	17.8	15.6	19.7	30.0	13.3	7.6	3.6	15.0	4.1	134.5
Hotel/motel	7.3	17.8	15.2	26.8	26.2	14.5	6.1	3.8	22.9	4.6	145.4
Miscellaneous	16.0	43.6	32.5	46.9	59.9	29.2	15.9	10.0	52.2	11.2	317.4
Total	142.9	344.0	281.7	371.9	520.8	245.9	131.9	70.0	322.5	80.7	2512.3

[a]Source: General Electric Center for Energy Systems (Ref. 12).

As expected, the EUI for heating and cooling varies widely across regions. For example, space heating of office buildings by gas varies from a low of 102×10^3 Btu/ft^2 in region 9 to a high of 331×10^3 Btu/ft^2 in region 1 (the national value for this end/use fuel type combination is 160×10^3 Btu/ft^2). Air conditioning energy use ranges from a low of 75.7×10^3 Btu/ft^2 in region 1 to 241.5×10^3 Btu/ft^2 in region 8 (130×10^3 Btu/ft^2 is the calculated national EUI for air conditioning).

4. PROJECTIONS OF FUTURE STOCK OF COMMERCIAL FLOOR SPACE

A requirement in developing the regional commercial energy use models is the ability to forecast the stock of floor space by building type. Additions to the stock of forecasted floor space for a particular year T (A_j^T) can then be determined by subtracting the sum of previous additions to stock and initial stock (times their appropriate decay function) from the estimate of floor space stock for year T.

In our development of the original national commercial energy use model, the stock of commercial floor space was assumed to follow a demand function of the form

$FLR_{j,t} = B_{0\,j} + B_{1j}POP_t + B_{2j}PCI_t + B_{3j}PCI_t^2$; where FLR_j refers to floor space of the jth sector for year t, POP_t refers to population, PCI_t is per capita disposable income. Both population and income are considered important determinants for the demand of commercial output. The omission of important explanatory variables, such as female participation rate, urbanization and age distribution of the population, is not serious because these macro variables are highly colinear with population and income. This was especially the case with the aggregate time series data that was used to estimate the original national stock equations. The per capita income quadratic term was originally included to capture the tendency of the commercial sector to grow faster than population or the U.S. economy in the 1950 to 1974 time period of the national data series used in our estimation of the floor space equations. Under moderate growth conditions of the U.S. economy, represented in our

floor space stock equation primarily as income growth, the floor space equations perform reasonably well. When high income growth rate scenarios are used in evaluating the national model, unreasonably high floor space stock estimates are obtained. Consequently, a different approach was used in estimating regional floor space stock equations that still utilized population and per capita income as the primary determinates of floor space growth.

General Electric commercial floor space stock data[12] for 1975 by BEA was suitable for cross-sectional estimation of floor space stock demand equations except that many BEA's cross state lines (and federal region lines in thirty-eight cases). To allocate the fraction of floor space to federal regions for BEA's that cross state lines, county employment information from an ORNL regional study[13] was utilized. For example, the reported warehouse floor space for BEA 14 (occupying portions of Connecticut in region 1 and New York and New Jersey in region 2) is proportioned into three BEA observations by warehouse/trucking employment of counties within BEA 14 in the three states. Table 5 gives the employment categories used to allocate floor space in the ten commercial subsectors for BEA's that cross federal region lines.

There are 211 BEA floor space observations used in our econometric analysis of the demand for commercial floor space (173 U.S. BEA's plus 38 fractional BEA's crossing federal region lines). A log-linear relationship between floor space and its determinates of the form

Table 5. MULTIREGION[13] County Employment Categories used to proportion floor space for BEA's situated across Federal region lines

Commercial Subsector	MULTIREGION Employment Categories
Retail-wholesale	Retail trade, wholesale trade
Educational	Population (ages 5-24)
Finance and other offices	Finance insurance/real estate and professional services
Health	Population
Hotel-motel	Lodging and personal services
Public administration	Public administration
Warehouses	Trucking and warehouse
Religious	Population
Garages and service stations	Population
Miscellaneous	Population

$\ln FLR_{i,j} = \alpha_{0j} + \alpha_{1j} \ln POP_i + \alpha_{2j} \ln PCI_i$, was decided upon (for BEA i and subsector j). This offered an advantage over the original national model specification by removing the quadratic per capita income term but still retaining a non-linear relationship between floor space and income.

A deficiency in our log-linear functional form for floor space demand is its sensitivity to abrupt income changes. The estimated regression coefficients are considered long-run elasticities due to the cross-sectional nature of this data; consequently, when there is a sharp change in real per capital disposable income (e.g., the 1974 recession), the effects on the estimated stock and hence the additions to floor space are over estimated. This problem is minor, however, when considering

that various ranges of incomes scenarios given as input to the model have characteristically smooth transitions during the simulation period from 1980 to 2000.

The 211 BEA observations for floor space by commercial subsector combined with BEA population and per capita disposable income data[14] were divided into federal regions (Regions 1, 2 and 3 have a small number of BEA's in each region and were grouped together in one group of 34 BEA's to increase the degrees of freedom in the regression analysis. Federal regions 9 and 10 comprising 21 observations were grouped together for the same reason). Seventy floor space demand equations were estimated for the regional energy use models (ten building subsectors for seven regional groupings). The econometric results for all regions are presented in Appendix B.

In most regions, the public administration and garage/service station subsectors were estimated as a function of population only. Estimation results for public administration floor space demand equations revealed per capita income coefficients that, in most cases, were statistically insignificant; therefore PCI was omitted as an explanatory variable in these equations. Federal regions 7, 9 and 10 did have significant PCI coefficients. The estimated PCI elasticities for the garage/service station subsector were judged to be excessively large, averaging 2.36 for all regions. The possibility that urban (higher income) BEA's would have a larger concentration of auto repair, parking garages and service stations than the more rural BEA's would explain the large PCI elasticities obtained in our estimation. Further, it seems likely that with sharply increasing liquid fuel prices, growth in automobile use will be curtailed with corresponding reductions in the growth rate of the garage/service station

subsector. Therefore, it is felt that this subsector would grow at a rate more closely tied to population increases. Consequently, the garage/service station floor space equations were reestimated as a function of population only.

Slope and intercept dummy variables were added in the estimation of equations for the grouped observations of regions 1, 2 and 3 to determine if any significant regional differences were present in the response of floor space growth to population and per capita income. The slope dummies for population as well as per capita income were significant for the observations of region 1 in the retail-wholesale sector and these results are presented in Table B.1.

The estimated floor space equation results for the retail-wholesale subsector in regions 9 and 10 (far west) resulted in a negative per capita income coefficient (i.e., elasticity). This was considered unsatisfactory and implausible for a high growth area such as the west coast. A re-estimation of regions 9 and 10 retail/wholesale sector was made by placing the predominately urban BEA's into one group and the rural BEA's into another and using dummy variables to distinguish the two groups. The results were also unsatisfactory for this estimation; therefore, estimated national coefficients using all 211 BEA observations for the retail/wholesale subsector were used for regions 9 and 10.

The estimated results for the warehouse subsector in region 4 (south-east) were also unreasonable. The per capita income coefficient was excessively large for this region. We were unable to explain these results and consequently decided to use the estimated national floor space

equation using all 211 BEA observations for the warehouse subsector for region 4.

As expected, the coefficients or long-run elasticities of floor space with respect to population are close to 1.0 for the seventy equations (the mean value of the coefficients is 1.055 with a standard deviation of 0.099). However the per capita income (PCI) elasticities show considerably more variability across commercial subsectors. Table 6 presents the calculated mean value of the per capita income coefficients and their standard deviations across regions for eight commercial subsectors (garages and public administration are excluded since per capita income was not included in most equations for these building types).

The office and finance subsector had the largest mean value for the per capita income elasticity at 1.492 but its variability across regions was also high with a standard deviation of 0.513. Along with the office/finance subsector, the retail/wholesale, hotel/motel, warehouse and miscellaneous subsectors all had average PCI elasticities in the range of 0.8 to 1.125. The three non-profit subsectors (education, health and religion) had lower mean PCI elasticities in the range of 0.48 to 0.58. It was not surprising that the non-profit subsectors (those not dealing in trade or commerce) have a lower growth in response to per capita income increases in the economy than do the five business-oriented subsectors.

To make the national model consistent with the regional model, a re-estimation of national floor space forecasting equations was performed using the same log-linear functional form for the demand equations and

Table 6. Mean value and standard deviation of per capita income coefficients across regions by commercial subsector

Subsector	Retail-wholesale	Education	Office/finance	Health	Hotel/motel	Warehouse	Religious	Miscellaneous
Mean value	0.988	0.481	1.492	0.581	0.792	1.125	0.502	0.973
Standard deviation	0.172	0.153	0.513	0.196	0.404	0.589	0.149	0.483

the same BEA level data as the regional model floor space equations. These re-estimated national floor space equations are presented in Appendix B, Table B.5.

A per capita income and population scenario[15] was developed by the Energy Information Administration (EIA) of the Department of Energy for each of the ten federal regions. These forecasts were used as input to the regional commercial models to drive the floor space forecasting submodels which represent energy consuming capital stock for each subsector.

The results of the floor space forecasts from 1971 to 1995 and growth rates during this period are presented in Table 7. A comparison of the conformity between a summation of the regional floor space forecasts for each commercial sector and an equivalent forecast of the re-estimated national floor space equations during the 1971 to 1995 time period is also presented (the national per capita income scenario used as input to the national floor space equations is a weighted by population average of the regional EIA per capita income values).

The summed regional and national floor space forecasts agree reasonably well, with the regional floor space projections growing at a slightly faster rate than the national equation's projections. In 1995, the sum of the regional floor space equations project a level of 4297×10^6 m^2 compared to 4123×10^6 m^2 for the national floor space projections - a difference of only 4%.

Table 7. Comparison of regional and national floor space demand model forecasts (1971 to 1995)

Commercial subsector	Summation of regional model floor space projections ($m^2 \times 10^6$)		National model floor space projection ($m^2 \times 10^6$)	Floor space growth rates (%)			
				1971-1985		1985-1995	
	1971	1995	1995	Regional models	National model	Regional models	National model
Retail/ wholesale	381.	769.	732.	3.0	2.8	2.8	2.5
Office/ finance	318.	894.	765.	4.4	3.8	4.2	3.4
Garages/ service stations	45.	57.	58.	1.0	1.0	0.9	0.9
Warehouses	170.	336.	380.	2.9	3.4	2.8	3.1
Education	566.	859.	878.	1.8	1.8	1.6	1.7
Health	161.	266.	258.	2.2	2.0	2.0	1.8
Public admin.	94.	130.	116.	1.3	0.9	1.4	0.8
Religious	126.	186.	187.	1.7	1.7	1.5	1.5
Hotel/motel	130.	256.	222.	2.9	2.3	2.7	2.1
Miscellaneous	286.	545.	530.	2.7	2.7	2.6	2.4
Total	2278.	4297.	4126.	2.7	2.5	2.6	2.3
Per capita income growth rate	-	-	-	-	2.0	-	1.8
Population growth rate	-	-	-	-	0.9	-	0.8

5. REGIONAL ENERGY USE PROJECTIONS

As mentioned in the previous section of projections of the growth of floor space, a regional forecast of PCI and population, as well as fuel prices, was applied by the Department of Energy (DOE Series C). The inputs comprise the bulk of exogenous variables which drive the regional commercial model forecasts. (Other variables which are inputs to the model are the energy use indices, initial stock and additions to floor space from 1925 to 1970, initial floor space fraction served by each fuel type/end use for each building type, regression coefficients for floor space forecasting equations, capital costs of HVAC equipment and structural costs by building type). Table 8 presents a summary of regional energy use forecasts and growth rates of primary energy consumption from 1975 to 2000 utilizing the DOE midrange fuel price and per capita income scenario.[15]

The total annual growth rate of energy use in the commercial sector from 1975 to 2000 is 2.0% using our base income, fuel price and population scenario. With two exceptions, the regional shares of this total energy use do not change significantly during this period. The share of total commercial sector primary energy use by region 4 (southeast) increases from 13 to 21% from 1975 to 2000. During this same time period, the forecasted share of energy consumption for region 5 (Great Lakes states) declines from 21 to 16% (projections of energy use by fuel type and commercial subsector are reported for each region from 1975 to 2000 in Appendix C).

Table 8. Regional forecasts of commercial energy use (total primary energy in 10^{15} Btu)

Federal region	1975	1980	1990	2000	Share of Total commercial energy use in 2000 (%)	Annual growth rate (%); 1975-2000
1	0.70	0.77	0.91	1.11	7	1.84
2	1.24	1.30	1.45	1.63	11	1.09
3	0.95	1.03	1.28	1.58	10	2.03
4	1.26	1.56	2.31	3.29	21	3.84
5	1.96	2.03	2.25	2.48	16	0.94
6	0.97	1.03	1.29	1.68	11	2.20
7	0.52	0.54	0.63	0.78	5	1.62
8	0.35	0.37	0.45	0.59	5	2.09
9	1.07	1.09	1.31	1.61	10	1.63
10	0.38	0.41	0.53	0.65	4	2.15
Total	9.42	10.13	12.42	15.41	100	1.97

The fuel mix during the simulation period of the model also changes significantly. Table 9 presents the share of primary fuels used in federal region 4 (southeast) for three time periods in the simulation.

Table 9. Share of primary fuel use in the commercial sector for region 4; 1970, 1985 and 2000

Fuel type	1970	1985	2000
Electricity	0.59	0.71	0.74
Gas	0.24	0.19	0.17
Oil	0.13	0.09	0.08
Other	0.03	0.02	0.01

All fuels except electricity show declines in all regions in their market shares of primary energy use. This is primarily due to the projected real price of electricity increasing at a slower rate than the projected prices of oil and gas (e.g., electricity and natural gas prices in region 4 are expected to increase 51% and 375% respectively from 1970 to 2000). In addition important end-uses powered by electricity, such as air conditioning, lighting and electromechanical, show sizable increases in their share of fuel use due to increased market penetration from 1970 to 2000. Air conditioning, electromechanical uses and lighting are expected to increase their share of commercial energy use by 22%, 30%, and 7% respectively during the 30 year period after 1970. This general pattern is also expected to hold for the other nine federal regions.

A mean square percentage error (MSPE)* test was considered appropriate for evaluating the forecasting ability of the ten regional models. Fuel use forecasts are compared with reported fuel use consumption for 1971

$$^{*}\text{MSPE} = 100\sqrt{\frac{1}{N}\sum_{i=1}^{N}\left(\frac{\text{Prediction}_i-\text{Data}_i}{\text{Data}_i}\right)^2}$$

through 1976. Table 10 presents the MSPE values for each fuel for all ten regions and the U.S. (the U.S. forecasted values are the sum of the regional forecasts for each fuel). The calculated MSPE's for electricity are the lowest for the three fuels followed by natural gas and fuel oil. The average MSPE for electricity is 3.70 with a high of 6.87 for federal region 7.

The models do not track gas and oil consumption as accurately as electricity. Both gas and oil have average MSPE's close to 10.0. For natural gas this is primarily due to the reported values of "other" gas sales in three regions being erratic during the comparison period. Removing the high MSPE's for regions 1, 4 and 9 yields an average MSPE of 6.11.

Table 10. Comparison between forecasted regional commercial energy use and reported data: 1971-1976*

	Mean square percentage error (%)			
Federal region	Electricity	Natural gas	Oil	Total
1	3.73	10.81	5.58	4.86
2	2.41	6.39	1.38	1.50
3	2.29	6.92	5.93	1.81
4	3.35	19.36	2.30	11.43
5	2.47	6.40	7.26	2.68
6	3.56	3.28	21.29	13.97
7	6.87	7.81	8.55	6.40
8	6.71	3.68	18.96	4.44
9	3.37	20.59	30.95	8.23
10	2.27	8.27	7.07	2.77
US	2.15	6.84	2.67	1.96

*For oil use, the comparison period was 1971-1974.

Federal regions 6, 8, and 9 have high MSPE's for oil use. These regions show very high growth rates of reported oil use; averaging 18% annually from 1970 through 1974. In the case of oil, the regional model forecast results for these three regions do not respond to the exogenous input increases in per capita income, population and fuel prices to match the level of oil use during the validation period. In addition, we assume that all residual fuel oil for heating purposes is consumed by the commercial sector.*

The regional variations of the model energy demand forecasts in large part cancel out when the regional energy use values are summed and compared to the reported national energy consumption data.

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*It is assumed some residual fuel oil is used in the industrial sector for space heating, however, no accurate information has been reported.

SUMMARY

Regional commercial energy use models for the ten U.S. federal regions were developed to project regional differences in the growth of energy use to the year 2000 and to evaluate energy conservation strategies on a regional basis. A detailed regional data base was developed as input to the ORNL commercial energy use simulation model consisting of:

1) floor space additions to the stock for each building type,
2) refined commercial sector energy use estimates by removing the mass-metered residential energy use component from reported consumption of electricity and natural gas, and estimating the commercial sector's share of distillate oil use, and
3) developed energy use indices (Btu/ft2) for ten building types, four fuels and five end uses.

Re-estimated floor space forecasting equations for each building type for the national energy use model were developed to be consistent with the improved data and functional form of the regional floor space models. Good agreement exists between the forecasting ability of the two sets of models, which simulate growth of energy using capital in the commercial sector.

The results of an improved fuel choice submodel for space heating were implemented in the regional models. This submodel deals explicitly with the commercial sector, replacing a model that dealth with the combined household/commercial sector.

Improvements to the regional models could be made in two areas:

1. Regional fuel choice models should be developed to reflect original differences in market share elasticities and fuel availability. The fuel choice model implemented in our regional models is a national model, where it is assumed that regional fuel choice responses to changes in floor space stock, per capita income, climatic conditions, and fuel prices are the same for each region as is fuel choice response for the nation as a whole.
2. Regional technology relationships should be developed between efficiency and capital cost of heating, ventilating and air conditioning equipment (HVAC) which capture the tradeoffs between purchasing higher priced but more efficient HVAC systems in response to higher fuel prices. Currently the technology curves used in all regional models are the same as used in the national model, excluding regional differences.

Appendix A

Energy Use Estimates for Ten Building Types, Four Fuels and Five End Uses: 1970

Table A.1. Energy use indices for region 1 by building type, fuel and end use: 1970

(thousand Btu/square ft)

Building type		Commercial end-use				
		Heating	Cooling	Water heating	Lighting	Other
Retail/ wholesale	ELEC	501.60	85.00	42.82	87.34	38.48
	GAS	337.80	85.00	18.27	0.0	32.60
	OIL	371.50	0.0	23.38	0.0	0.0
	OTHR	371.50	0.0	0.0	0.0	0.0
Office	ELEC	491.50	75.70	86.50	80.92	15.39
	GAS	331.00	75.70	36.90	0.0	0.0
	OIL	364.10	0.0	47.23	0.0	0.0
	OTHR	364.10	0.0	0.0	0.0	0.0
Auto repair	ELEC	221.70	33.50	6.85	32.54	5.77
	GAS	149.30	33.50	2.92	0.0	0.0
	OIL	164.20	0.0	3.74	0.0	0.0
	OTHR	164.20	0.0	0.0	0.0	0.0
Warehouse	ELEC	221.70	32.90	6.85	27.83	5.77
	GAS	149.30	32.90	2.92	0.0	0.0
	OIL	164.20	0.0	3.74	0.0	0.0
	OTHR	164.20	0.0	0.0	0.0	0.0
Educational	ELEC	414.30	61.90	86.50	54.59	11.54
	GAS	279.00	61.90	36.90	0.0	0.0
	OIL	306.90	0.0	47.23	0.0	0.0
	OTHR	306.90	0.0	0.0	0.0	0.0
Health	ELEC	774.90	117.10	414.50	87.86	46.17
	GAS	521.80	117.10	176.80	0.0	0.0
	OIL	574.00	0.0	226.30	0.0	0.0
	OTHR	574.00	0.0	0.0	0.0	0.0
Public administration	ELEC	491.50	75.70	86.50	80.92	15.39
	GAS	331.00	75.70	36.90	0.0	0.0
	OIL	364.10	0.0	47.23	0.0	0.0
	OTHR	364.10	0.0	0.0	0.0	0.0
Religious	ELEC	327.50	46.70	13.83	31.15	3.85
	GAS	220.60	46.70	5.90	0.0	0.0
	OIL	242.60	0.0	7.55	0.0	0.0
	OTHR	242.60	0.0	0.0	0.0	0.0
Hotel/motel	ELEC	774.90	105.00	145.20	32.22	7.70
	GAS	521.80	105.00	61.93	0.0	0.0
	OIL	574.00	0.0	79.27	0.0	0.0
	OTHR	574.00	0.0	0.0	0.0	0.0
Miscellaneous	ELEC	433.90	68.40	71.08	85.63	11.54
	GAS	292.20	68.40	30.32	0.0	0.0
	OIL	321.40	0.0	38.82	0.0	0.0
	OTHR	321.40	0.0	0.0	0.0	0.0

Table A.2. Energy use indices for region 2 by building type, fuel and end use: 1970

(thousand Btu/square ft)

Building type		Commercial end-use				
		Heating	Cooling	Water heating	Lighting	Other
Retail/ wholesale	ELEC	313.10	123.70	18.04	86.94	38.88
	GAS	210.80	123.70	7.69	0.0	32.60
	OIL	231.90	0.0	9.85	0.0	0.0
	OTHR	231.90	0.0	0.0	0.0	0.0
Office	ELEC	306.80	105.70	36.43	80.55	15.55
	GAS	206.60	105.70	15.54	0.0	0.0
	OIL	227.30	0.0	19.90	0.0	0.0
	OTHR	227.30	0.0	0.0	0.0	0.0
Auto repair	ELEC	138.40	46.30	2.89	32.39	5.83
	GAS	93.20	46.30	1.23	0.0	0.0
	OIL	102.50	0.0	1.58	0.0	0.0
	OTHR	102.50	0.0	0.0	0.0	0.0
Warehouse	ELEC	138.40	45.10	2.89	27.70	5.83
	GAS	93.20	45.10	1.23	0.0	0.0
	OIL	102.50	0.0	1.58	0.0	0.0
	OTHR	102.50	0.0	0.0	0.0	0.0
Educational	ELEC	258.60	85.20	36.43	54.34	11.66
	GAS	174.10	85.20	15.54	0.0	0.0
	OIL	191.50	0.0	19.90	0.0	0.0
	OTHR	191.50	0.0	0.0	0.0	0.0
Health	ELEC	483.70	162.10	174.60	87.45	46.66
	GAS	325.70	162.10	74.48	0.0	0.0
	OIL	358.30	0.0	95.34	0.0	0.0
	OTHR	358.30	0.0	0.0	0.0	0.0
Public administration	ELEC	306.80	105.70	36.43	80.55	15.55
	GAS	206.60	105.70	15.54	0.0	0.0
	OIL	227.30	0.0	19.90	0.0	0.0
	OTHR	227.30	0.0	0.0	0.0	0.0
Religious	ELEC	204.40	62.80	5.83	31.01	3.89
	GAS	137.70	62.80	2.49	0.0	0.0
	OIL	151.40	0.0	3.18	0.0	0.0
	OTHR	151.40	0.0	0.0	0.0	0.0
Hotel/motel	ELEC	483.70	137.40	61.14	32.07	7.78
	GAS	325.70	137.40	26.08	0.0	0.0
	OIL	358.30	0.0	33.39	0.0	0.0
	OTHR	358.30	0.0	0.0	0.0	0.0
Miscellaneous	ELEC	270.80	96.50	29.94	85.24	11.66
	GAS	182.40	96.50	12.77	0.0	0.0
	OIL	200.60	0.0	16.35	0.0	0.0
	OTHR	200.60	0.0	0.0	0.0	0.0

Table A.3. Energy use indices for region 3 by building type, fuel and end use: 1970

(thousand Btu/square ft)

Building type		Commercial end-use				
		Heating	Cooling	Water heating	Lighting	Other
Retail/ wholesale	ELEC	242.80	158.00	9.50	88.32	39.25
	GAS	163.50	158.00	4.05	0.0	32.60
	OIL	179.80	0.0	5.19	0.0	0.0
	OTHR	179.80	0.0	0.0	0.0	0.0
Office	ELEC	237.90	131.50	19.19	81.82	15.70
	GAS	160.20	131.50	8.19	0.0	0.0
	OIL	176.20	0.0	10.48	0.0	0.0
	OTHR	176.20	0.0	0.0	0.0	0.0
Auto repair	ELEC	107.30	57.30	1.52	32.90	5.89
	GAS	72.30	57.30	0.65	0.0	0.0
	OIL	79.50	0.0	0.83	0.0	0.0
	OTHR	79.50	0.0	0.0	0.0	0.0
Warehouse	ELEC	107.30	55.40	1.52	28.14	5.89
	GAS	72.30	55.40	0.65	0.0	0.0
	OIL	79.50	0.0	0.83	0.0	0.0
	OTHR	79.50	0.0	0.0	0.0	0.0
Educational	ELEC	200.50	104.90	19.19	55.20	11.78
	GAS	135.00	104.90	8.19	0.0	0.0
	OIL	148.60	0.0	10.48	0.0	0.0
	OTHR	148.60	0.0	0.0	0.0	0.0
Health	ELEC	375.10	200.40	91.98	88.84	47.10
	GAS	252.60	200.40	39.24	0.0	0.0
	OIL	277.90	0.0	50.23	0.0	0.0
	OTHR	277.90	0.0	0.0	0.0	0.0
Public administration	ELEC	237.90	131.50	19.19	81.82	15.70
	GAS	160.20	131.50	8.19	0.0	0.0
	OIL	176.20	0.0	10.48	0.0	0.0
	OTHR	176.20	0.0	0.0	0.0	0.0
Religious	ELEC	158.50	76.10	3.07	31.50	3.93
	GAS	106.80	76.10	1.31	0.0	0.0
	OIL	117.40	0.0	1.68	0.0	0.0
	OTHR	117.40	0.0	0.0	0.0	0.0
Hotel/motel	ELEC	375.10	162.90	32.21	32.58	7.85
	GAS	252.60	162.90	13.74	0.0	0.0
	OIL	277.90	0.0	17.59	0.0	0.0
	OTHR	277.90	0.0	0.0	0.0	0.0
Miscellaneous	ELEC	210.00	120.90	15.77	86.59	11.78
	GAS	141.40	120.90	6.73	0.0	0.0
	OIL	155.60	0.0	8.61	0.0	0.0
	OTHR	155.60	0.0	0.0	0.0	0.0

Table A.4. Energy use indices for region 4 by building type, fuel and end use: 1970

(thousand Btu/square ft)

Building type		Commercial end-use				
		Heating	Cooling	Water heating	Lighting	Other
Retail/ wholesale	ELEC	178.80	168.10	6.07	89.24	39.68
	GAS	120.40	168.10	2.59	0.0	32.60
	OIL	132.50	0.0	3.32	0.0	0.0
	OTHR	132.50	0.0	0.0	0.0	0.0
Office	ELEC	175.20	135.20	12.27	82.68	15.87
	GAS	118.00	135.20	5.23	0.0	0.0
	OIL	129.80	0.0	6.70	0.0	0.0
	OTHR	129.80	0.0	0.0	0.0	0.0
Auto repair	ELEC	79.00	58.40	0.97	33.25	5.95
	GAS	53.20	58.40	0.41	0.0	0.0
	OIL	58.50	0.0	0.53	0.0	0.0
	OTHR	58.50	0.0	0.0	0.0	0.0
Warehouse	ELEC	79.00	56.00	0.97	28.43	5.95
	GAS	53.20	56.00	0.41	0.0	0.0
	OIL	58.50	0.0	0.53	0.0	0.0
	OTHR	58.50	0.0	0.0	0.0	0.0
Educational	ELEC	147.70	106.40	12.27	55.77	11.90
	GAS	99.50	106.40	5.23	0.0	0.0
	OIL	109.40	0.0	6.70	0.0	0.0
	OTHR	109.40	0.0	0.0	0.0	0.0
Health	ELEC	276.30	204.30	58.78	89.76	47.62
	GAS	186.00	204.30	25.08	0.0	0.0
	OIL	204.60	0.0	32.10	0.0	0.0
	OTHR	204.60	0.0	0.0	0.0	0.0
Public administration	ELEC	175.20	135.20	12.27	82.68	15.87
	GAS	118.00	135.20	5.23	0.0	0.0
	OIL	129.80	0.0	6.70	0.0	0.0
	OTHR	129.80	0.0	0.0	0.0	0.0
Religious	ELEC	116.80	75.40	1.96	31.82	3.97
	GAS	78.60	75.40	0.84	0.0	0.0
	OIL	86.50	0.0	1.07	0.0	0.0
	OTHR	86.50	0.0	0.0	0.0	0.0
Hotel/motel	ELEC	276.30	156.70	20.59	32.92	7.94
	GAS	186.00	156.70	8.78	0.0	0.0
	OIL	204.60	0.0	11.24	0.0	0.0
	OTHR	204.60	0.0	0.0	0.0	0.0
Miscellaneous	ELEC	154.70	125.50	10.08	87.49	11.90
	GAS	104.20	125.50	4.30	0.0	0.0
	OIL	114.60	0.0	5.50	0.0	0.0
	OTHR	114.60	0.0	0.0	0.0	0.0

Table A.5. Energy use indices for region 5 by building type, fuel and end use: 1970

(thousand Btu/square ft)

Building type		Commercial end-use				
		Heating	Cooling	Water heating	Lighting	Other
Retail/ wholesale	ELEC	298.90	141.80	5.58	88.65	38.81
	GAS	201.30	141.80	2.38	0.0	32.60
	OIL	221.40	0.0	3.05	0.0	0.0
	OTHR	221.40	0.0	0.0	0.0	0.0
Office	ELEC	292.90	120.70	11.28	82.13	15.53
	GAS	197.20	120.70	4.81	0.0	0.0
	OIL	216.90	0.0	6.16	0.0	0.0
	OTHR	216.90	0.0	0.0	0.0	0.0
Auto repair	ELEC	132.10	52.80	0.89	33.03	5.82
	GAS	89.00	52.80	0.38	0.0	0.0
	OIL	97.80	0.0	0.49	0.0	0.0
	OTHR	97.80	0.0	0.0	0.0	0.0
Warehouse	ELEC	132.10	51.30	0.89	28.25	5.82
	GAS	89.00	51.30	0.38	0.0	0.0
	OIL	97.80	0.0	0.49	0.0	0.0
	OTHR	97.80	0.0	0.0	0.0	0.0
Educational	ELEC	246.90	97.00	11.28	55.40	11.64
	GAS	166.20	97.00	4.81	0.0	0.0
	OIL	182.90	0.0	6.16	0.0	0.0
	OTHR	182.90	0.0	0.0	0.0	0.0
Health	ELEC	461.70	184.60	54.05	89.17	46.58
	GAS	310.90	184.60	23.06	0.0	0.0
	OIL	342.00	0.0	29.52	0.0	0.0
	OTHR	342.00	0.0	0.0	0.0	0.0
Public administration	ELEC	292.90	120.70	11.28	82.13	15.53
	GAS	197.20	120.70	4.81	0.0	0.0
	OIL	216.90	0.0	6.16	0.0	0.0
	OTHR	216.90	0.0	0.0	0.0	0.0
Religious	ELEC	195.20	71.30	1.80	31.61	3.88
	GAS	131.40	71.30	0.77	0.0	0.0
	OIL	144.60	0.0	0.98	0.0	0.0
	OTHR	144.60	0.0	0.0	0.0	0.0
Hotel/motel	ELEC	461.70	155.20	18.93	32.70	7.76
	GAS	310.90	155.20	8.08	0.0	0.0
	OIL	342.00	0.0	10.34	0.0	0.0
	OTHR	342.00	0.0	0.0	0.0	0.0
Miscellaneous	ELEC	258.50	110.30	9.27	86.91	11.64
	GAS	174.10	110.30	3.95	0.0	0.0
	OIL	191.50	0.0	5.06	0.0	0.0
	OTHR	191.50	0.0	0.0	0.0	0.0

Table A.6. Energy use indices for region 6 by building type, fuel and end use: 1970

(thousand Btu/square ft)

Building type		Commercial end-use				
		Heating	Cooling	Water heating	Lighting	Other
Retail/ wholesale	ELEC	203.90	227.40	3.85	88.52	39.12
	GAS	137.30	227.40	1.64	0.0	32.60
	OIL	151.00	0.0	2.10	0.0	0.0
	OTHR	151.00	0.0	0.0	0.0	0.0
Office	ELEC	199.80	185.80	7.77	82.01	15.65
	GAS	134.50	185.80	3.32	0.0	0.0
	OIL	148.00	0.0	4.25	0.0	0.0
	OTHR	148.00	0.0	0.0	0.0	0.0
Auto repair	ELEC	90.10	80.60	0.62	32.98	5.87
	GAS	60.70	80.60	0.26	0.0	0.0
	OIL	66.70	0.0	0.34	0.0	0.0
	OTHR	66.70	0.0	0.0	0.0	0.0
Warehouse	ELEC	90.10	77.60	0.62	28.20	5.87
	GAS	60.70	77.60	0.26	0.0	0.0
	OIL	66.70	0.0	0.34	0.0	0.0
	OTHR	66.70	0.0	0.0	0.0	0.0
Educational	ELEC	168.40	147.10	7.77	55.32	11.74
	GAS	113.40	147.10	3.32	0.0	0.0
	OIL	124.70	0.0	4.25	0.0	0.0
	OTHR	124.70	0.0	0.0	0.0	0.0
Health	ELEC	315.00	281.70	37.26	89.04	46.95
	GAS	212.10	281.70	15.89	0.0	0.0
	OIL	233.30	0.0	20.34	0.0	0.0
	OTHR	233.30	0.0	0.0	0.0	0.0
Public administration	ELEC	199.80	185.80	7.77	82.01	15.65
	GAS	134.50	185.80	3.32	0.0	0.0
	OIL	148.00	0.0	4.25	0.0	0.0
	OTHR	148.00	0.0	0.0	0.0	0.0
Religious	ELEC	133.10	105.30	1.24	31.57	3.91
	GAS	89.60	105.30	0.53	0.0	0.0
	OIL	98.60	0.0	0.68	0.0	0.0
	OTHR	98.60	0.0	0.0	0.0	0.0
Hotel/motel	ELEC	315.00	222.00	13.05	32.65	7.82
	GAS	212.10	222.00	5.57	0.0	0.0
	OIL	233.30	0.0	7.12	0.0	0.0
	OTHR	233.30	0.0	0.0	0.0	0.0
Miscellaneous	ELEC	176.30	171.70	6.39	86.78	11.74
	GAS	118.80	171.70	2.73	0.0	0.0
	OIL	130.60	0.0	3.49	0.0	0.0
	OTHR	130.60	0.0	0.0	0.0	0.0

Table A.7. Energy use indices for region 7 by building type, fuel and end use: 1970

(thousand Btu/square ft)

Building type		Commercial end-use				
		Heating	Cooling	Water heating	Lighting	Other
Retail/ wholesale	ELEC	282.20	179.20	4.50	87.99	38.46
	GAS	190.00	179.20	1.92	0.0	32.60
	OIL	209.00	0.0	2.46	0.0	0.0
	OTHR	209.00	0.0	0.0	0.0	0.0
Office	ELEC	276.50	151.70	9.08	81.52	15.38
	GAS	186.20	151.70	3.88	0.0	0.0
	OIL	204.80	0.0	4.96	0.0	0.0
	OTHR	204.80	0.0	0.0	0.0	0.0
Auto repair	ELEC	124.70	66.30	0.72	32.78	5.77
	GAS	84.00	66.30	0.31	0.0	0.0
	OIL	92.40	0.0	0.39	0.0	0.0
	OTHR	92.40	0.0	0.0	0.0	0.0
Warehouse	ELEC	124.70	64.40	0.72	28.04	5.77
	GAS	84.00	64.40	0.31	0.0	0.0
	OIL	92.40	0.0	0.39	0.0	0.0
	OTHR	92.40	0.0	0.0	0.0	0.0
Educational	ELEC	233.10	121.70	9.08	54.99	11.54
	GAS	156.90	121.70	3.88	0.0	0.0
	OIL	172.60	0.0	4.96	0.0	0.0
	OTHR	172.60	0.0	0.0	0.0	0.0
Health	ELEC	435.90	231.70	43.53	88.51	46.15
	GAS	293.60	231.70	18.57	0.0	0.0
	OIL	322.90	0.0	23.77	0.0	0.0
	OTHR	322.90	0.0	0.0	0.0	0.0
Public administration	ELEC	276.50	151.70	9.08	81.52	15.38
	GAS	186.20	151.70	3.88	0.0	0.0
	OIL	204.80	0.0	4.96	0.0	0.0
	OTHR	204.80	0.0	0.0	0.0	0.0
Religious	ELEC	184.20	89.10	1.45	31.38	3.85
	GAS	124.10	89.10	0.62	0.0	0.0
	OIL	136.50	0.0	0.79	0.0	0.0
	OTHR	136.50	0.0	0.0	0.0	0.0
Hotel/motel	ELEC	435.90	193.30	15.24	32.46	7.69
	GAS	293.60	193.30	6.50	0.0	0.0
	OIL	322.90	0.0	8.32	0.0	0.0
	OTHR	322.90	0.0	0.0	0.0	0.0
Miscellaneous	ELEC	244.10	138.80	7.46	86.27	11.54
	GAS	164.40	138.80	3.18	0.0	0.0
	OIL	180.80	0.0	4.08	0.0	0.0
	OTHR	180.80	0.0	0.0	0.0	0.0

Table A.8. Energy use indices for region 8 by building type, fuel and end use: 1970

(thousand Btu/square ft)

Building type		Commercial end-use				
		Heating	Cooling	Water heating	Lighting	Other
Retail/ wholesale	ELEC	349.80	279.80	4.44	87.93	39.51
	GAS	235.60	279.80	1.89	0.0	32.60
	OIL	259.10	0.0	2.43	0.0	0.0
	OTHR	259.10	0.0	0.0	0.0	0.0
Office	ELEC	342.80	241.50	8.97	81.47	15.80
	GAS	230.90	241.50	3.83	0.0	0.0
	OIL	253.90	0.0	4.90	0.0	0.0
	OTHR	253.90	0.0	0.0	0.0	0.0
Auto repair	ELEC	154.60	106.10	0.71	32.76	5.93
	GAS	104.10	106.10	0.30	0.0	0.0
	OIL	114.50	0.0	0.39	0.0	0.0
	OTHR	114.50	0.0	0.0	0.0	0.0
Warehouse	ELEC	154.60	103.50	0.71	28.02	5.93
	GAS	104.10	103.50	0.30	0.0	0.0
	OIL	114.50	0.0	0.39	0.0	0.0
	OTHR	114.50	0.0	0.0	0.0	0.0
Educational	ELEC	289.00	195.20	8.97	54.96	11.85
	GAS	194.60	195.20	3.83	0.0	0.0
	OIL	214.00	0.0	4.90	0.0	0.0
	OTHR	214.00	0.0	0.0	0.0	0.0
Health	ELEC	540.50	371.20	42.99	88.45	47.41
	GAS	364.00	371.20	18.34	0.0	0.0
	OIL	400.40	0.0	23.48	0.0	0.0
	OTHR	400.40	0.0	0.0	0.0	0.0
Public administration	ELEC	342.80	241.50	8.97	81.47	15.80
	GAS	230.90	241.50	3.83	0.0	0.0
	OIL	253.90	0.0	4.90	0.0	0.0
	OTHR	253.90	0.0	0.0	0.0	0.0
Religious	ELEC	228.40	144.70	1.43	31.36	3.95
	GAS	153.80	144.70	0.61	0.0	0.0
	OIL	169.20	0.0	0.78	0.0	0.0
	OTHR	169.20	0.0	0.0	0.0	0.0
Hotel/motel	ELEC	540.50	318.80	15.06	32.44	7.90
	GAS	364.00	318.80	6.42	0.0	0.0
	OIL	400.40	0.0	8.22	0.0	0.0
	OTHR	400.40	0.0	0.0	0.0	0.0
Miscellaneous	ELEC	302.60	219.90	7.37	86.21	11.85
	GAS	203.80	219.90	3.15	0.0	0.0
	OIL	224.10	0.0	4.03	0.0	0.0
	OTHR	224.10	0.0	0.0	0.0	0.0

Table A.9. Energy use indices for region 9 by building type, fuel and end use: 1970

(thousand Btu/square ft)

Building type		Commercial end-use				
		Heating	Cooling	Water heating	Lighting	Other
Retail/ wholesale	ELEC	154.60	186.40	4.02	87.02	39.53
	GAS	104.10	186.40	1.72	0.0	32.60
	OIL	114.50	0.0	2.20	0.0	0.0
	OTHR	114.50	0.0	0.0	0.0	0.0
Office	ELEC	151.50	147.30	8.12	80.62	15.81
	GAS	102.00	147.30	3.47	0.0	0.0
	OIL	112.20	0.0	4.44	0.0	0.0
	OTHR	112.20	0.0	0.0	0.0	0.0
Auto repair	ELEC	68.30	63.40	0.64	32.42	5.93
	GAS	46.00	63.40	0.27	0.0	0.0
	OIL	50.60	0.0	0.35	0.0	0.0
	OTHR	50.60	0.0	0.0	0.0	0.0
Warehouse	ELEC	68.30	60.60	0.64	27.73	5.93
	GAS	46.00	60.60	0.27	0.0	0.0
	OIL	50.60	0.0	0.35	0.0	0.0
	OTHR	50.60	0.0	0.0	0.0	0.0
Educational	ELEC	127.70	115.20	8.12	54.38	11.86
	GAS	86.00	115.20	3.47	0.0	0.0
	OIL	94.60	0.0	4.44	0.0	0.0
	OTHR	94.60	0.0	0.0	0.0	0.0
Health	ELEC	238.90	222.10	38.92	87.53	47.43
	GAS	160.80	222.10	16.61	0.0	0.0
	OIL	176.90	0.0	21.26	0.0	0.0
	OTHR	176.90	0.0	0.0	0.0	0.0
Public administration	ELEC	151.50	147.30	8.12	80.62	15.81
	GAS	102.00	147.30	3.47	0.0	0.0
	OIL	112.20	0.0	4.44	0.0	0.0
	OTHR	112.20	0.0	0.0	0.0	0.0
Religious	ELEC	101.00	80.80	1.30	31.03	3.95
	GAS	68.00	80.80	0.55	0.0	0.0
	OIL	74.80	0.0	0.71	0.0	0.0
	OTHR	74.80	0.0	0.0	0.0	0.0
Hotel/motel	ELEC	238.90	165.70	13.63	32.10	7.91
	GAS	160.80	165.70	5.82	0.0	0.0
	OIL	176.90	0.0	7.44	0.0	0.0
	OTHR	176.90	0.0	0.0	0.0	0.0
Miscellaneous	ELEC	133.70	137.20	6.68	85.31	11.86
	GAS	90.10	137.20	2.85	0.0	0.0
	OIL	99.10	0.0	3.65	0.0	0.0
	OTHR	99.10	0.0	0.0	0.0	0.0

Table A.10. Energy use indices for region 10 by building type, fuel and end use: 1970

(thousand Btu/square ft)

Building type		Commercial end-use				
		Heating	Cooling	Water heating	Lighting	Other
Retail/ wholesale	ELEC	289.80	184.40	10.93	87.64	38.89
	GAS	195.10	184.40	4.66	0.0	32.60
	OIL	214.60	0.0	5.97	0.0	0.0
	OTHR	214.60	0.0	0.0	0.0	0.0
Office	ELEC	284.00	156.40	22.09	81.20	15.55
	GAS	191.20	156.40	9.42	0.0	0.0
	OIL	210.30	0.0	12.06	0.0	0.0
	OTHR	210.30	0.0	0.0	0.0	0.0
Auto repair	ELEC	128.10	68.40	1.75	32.65	5.83
	GAS	86.20	68.40	0.75	0.0	0.0
	OIL	94.90	0.0	0.96	0.0	0.0
	OTHR	94.90	0.0	0.0	0.0	0.0
Warehouse	ELEC	128.10	66.50	1.75	27.93	5.83
	GAS	86.20	66.50	0.75	0.0	0.0
	OIL	94.90	0.0	0.96	0.0	0.0
	OTHR	94.90	0.0	0.0	0.0	0.0
Educational	ELEC	239.30	125.60	22.09	54.78	11.67
	GAS	161.20	125.60	9.42	0.0	0.0
	OIL	177.30	0.0	12.06	0.0	0.0
	OTHR	177.30	0.0	0.0	0.0	0.0
Health	ELEC	447.70	239.30	105.80	88.16	46.66
	GAS	301.50	239.30	45.15	0.0	0.0
	OIL	331.60	0.0	57.80	0.0	0.0
	OTHR	331.60	0.0	0.0	0.0	0.0
Public administration	ELEC	284.00	156.40	22.09	81.20	15.55
	GAS	191.20	156.40	9.42	0.0	0.0
	OIL	210.30	0.0	12.06	0.0	0.0
	OTHR	210.30	0.0	0.0	0.0	0.0
Religious	ELEC	189.20	92.20	3.53	31.25	3.89
	GAS	127.40	92.20	1.51	0.0	0.0
	OIL	140.20	0.0	1.93	0.0	0.0
	OTHR	140.20	0.0	0.0	0.0	0.0
Hotel/motel	ELEC	447.70	200.40	37.07	32.33	7.78
	GAS	301.50	200.40	15.81	0.0	0.0
	OIL	331.60	0.0	20.24	0.0	0.0
	OTHR	331.60	0.0	0.0	0.0	0.0
Miscellaneous	ELEC	250.60	143.10	18.15	85.92	11.67
	GAS	168.80	143.10	7.74	0.0	0.0
	OIL	185.70	0.0	9.91	0.0	0.0
	OTHR	185.70	0.0	0.0	0.0	0.0

Appendix B

Detailed Regression Results for Regional Floor Space Demand Equations

Table B.1. Estimated regression results of floor space demand equations for federal regions 1, 2 and 3

Dependent Variable: $\ln FLR_{i,j}$ (BEA floor space for subsection j)
Estimation method: OLS*, 34 observations

Building subsector	Explanatory variables					R^2
	Intercept	$\ln PØP_i$		$\ln PCI_i$		
Retail-wholesale	-13.38	1.073	-0.092†	0.802	0.76‡	0.997
	(60.04)	(67.84)	(-2.83)	(4.95)	(2.93)	
Educational	-11.67	1.004		0.631		0.997
	(-94.38)	(124.50)		(7.88)		
Finance and office	-16.52	1.097		2.180		0.989
	(-40.22)	(40.97)		(8.19)		
Health	-13.58	1.016		0.961		0.997
	(-71.03)	(81.45)		(7.75)		
Hotel-motel	-13.62	1.049		0.694		0.975
	(-24.09)	(28.45)		(1.89)		
Public administration	-14.17	1.138				0.981
	(-36.58)	(40.16)				
Warehouses	-13.01	1.033		0.558		0.960
	(-18.73)	(22.81)		(1.24)		
Religious	-12.96	0.989		0.599		0.999
	(-111.93)	(131.07)		(7.87)		
Garages and service stations	-15.70	1.215				0.897
	(-15.79)	(16.71)				
Miscellaneous	-12.35	0.983		0.688		0.996
	(-52.46)	(67.40)		(4.97)		

*t - ratios in parenthesis.

†Refers to ln D1*PØP where D1 is a region 1 dummy variable used to distinguish region 1 from regions 2 and 3.

‡Refers to ln D1*PCI.

Table B.2. Estimated regression results of floor space demand equations for federal regions 4 and 5

Dependent Variable: $\ln FLR_{i,j}$ (BEA floor space for subsector j)
Estimation Method: ØLS* (42 observations for regions 4, 43 observations for region 5)

Building	Region 4				Region 5			
	Intercept	$\ln PØP_i$	$\ln PCI_i$	R^2	Intercept	$\ln PØP_i$	$\ln PCI_i$	R^2
Retail-wholesale	-14.66	1.121	1.230	0.985	-13.36	1.062	0.925	0.994
	(-37.94)	(46.27)	(5.60)		(-54.09)	(68.83)	(5.69)	
Educational	-10.53	0.951	0.317	0.995	-11.61	1.017	0.476	0.997
	(-54.63)	(78.65)	(2.89)		(-98.90)	(138.7)	(6.16)	
Finance and office	-17.54	1.199	2.085	0.977	-14.98	1.151	0.860	0.982
	(-32.95)	(35.92)	(6.88)		(-31.32)	(38.53)	(2.73)	
Health	-12.77	0.993	0.622	0.990	-12.75	1.004	0.545	0.994
	(-46.79)	(57.99)	(4.01)		(-52.06)	(65.34)	(3.37)	
Hotel-motel	-15.51	1.160	1.045	0.948	-13.64	1.079	0.428	0.984
	(-20.26)	(24.15)	(2.40)		(-32.75)	(41.48)	(1.56)	
Public administration	-12.74	1.028		0.957	-12.91	1.044		0.977
	(-27.67)	(29.80)			(-39.10)	(41.95)		
Warehouses	-15.06	1.102	1.232	0.945	-14.28	1.184	0.200	0.957
	(-44.84)	(56.34)	(7.41)		(-18.92)	(25.20)	(0.40)	
Religious	-12.38	0.986	0.250	0.994	-13.06	1.008	0.507	0.998
	(-61.07)	(77.53)	(2.17)		(-103.28)	(127.68)	(6.10)	
Garages and service stations	-16.01	1.221		0.824	-17.09	1.310		0.958
	(-13.44)	(13.68)			(-29.90)	(30.38)		
Miscellaneous	-13.06	0.991	1.076	0.992	-12.63	1.046	0.332	0.995
	(-53.38)	(64.61)	(7.73)		(-56.74)	(75.23)	(2.27)	

*t — ratios in parentheses.

Table B.3. Estimated regression results of floor space demand equations for federal regions 6 and 7

Dependent Variable: $\ln FLR_{i,j}$ (BEA floor space for subsector j)
Estimation Method: ØLS* (30 observations for regions 6, 21 observations for region 7)

Building	Region 6				Region 7			
	Intercept	$\ln PØP_i$	$\ln PCI_i$	R^2	Intercept	$\ln PØP_i$	$\ln PCI_i$	R^2
Retail-wholesale	-13.93	1.092	1.044	0.975	-13.45	1.037	1.175	0.991
	(-27.51)	(28.50)	(4.50)		(-24.66)	(43.33)	(4.74)	
Educational	-11.01	0.943	0.699	0.996	-11.58	1.007	0.540	0.999
	(-63.34)	(71.70)	(8.77)		(-63.77)	(126.26)	(6.54)	
Finance and office	-16.94	1.224	1.486	0.973	-15.49	1.091	1.608	0.961
	(-28.00)	(26.74)	(5.36)		(-14.76)	(23.68)	(3.37)	
Health	-12.82	1.001	0.589	0.994	-13.02	1.023	0.562	0.995
	(-56.03)	(57.85)	(5.62)		(-33.87)	(60.67)	(3.22)	
Hotel-motel	-13.55	0.996	1.127	0.970	-14.79	1.169	0.381	0.994
	(-26.19)	(25.46)	(4.75)		(-30.84)	(55.56)	(1.75)	
Public administration	-12.95	1.046		0.970	-14.00	1.013	0.884	0.983
	(-28.42)	(30.24)			(-19.54)	(32.21)	(2.71)	
Warehouses	-17.13	1.235	1.425	0.922	-15.54	1.075	1.715	0.961
	(-16.07)	(15.31)	(2.92)		(-13.30)	(20.97)	(3.23)	
Religious	-12.57	0.955	0.633	0.994	-13.14	1.011	0.531	0.999
	(-58.14)	(58.38)	(6.36)		(-72.40)	(126.98)	(6.43)	
Garages and service stations	-18.43	1.413		0.863	-13.56	1.033		0.884
	(-13.12)	(13.25)			(-12.44)	(12.05)		
Miscellaneous	-12.75	0.998	0.797	0.990	-12.66	1.011	0.625	0.992
	(-44.30)	(45.86)	(6.05)		(-26.38)	(48.03)	(2.86)	

*t — ratios in parentheses.

Table B.4. Estimated regression results of floor space demand equations for federal regions 8, 9 and 10

Dependent variable: ln $FLR_{i,j}$ (BEA floor space for subsector j). Estimation method: ØLS* (19 observations for region 8, 22 observations for regions 9 and 10)

Building subsector	Region 8				Regions 9 and 10					
	Intercept	ln PØP$_i$	ln PCI$_i$	R^2	Intercept	ln PØP$_i$	ln PCI$_i$	D9		R^2
Retail-wholesale	-12.19 (-19.76)	0.988 (41.51)	0.783 (2.54)	0.991	-13.24 (-93.39)	1.048 (126.89)	0.957 (13.63)			0.989
Educational	-11.38 (-38.29)	1.008 (87.96)	0.403 (2.71)	0.998	-11.23 (-58.96)	1.007 (96.48)	0.299 (3.02)			0.998
Finance and office	-14.60 (-15.05)	1.075 (28.72)	1.273 (2.63)	0.981	-15.05 (-22.41)	1.147 (31.16)	0.952 (2.72)			0.984
Health	-12.82 (-30.14)	1.016 (61.91)	0.469 (2.21)	0.996	-12.96 (-42.42)	1.040 (62.14)	0.316 (1.99)			0.999
Hotel-motel	-10.91 (-3.86)	0.870 (7.98)	0.461 (0.33)	0.800	-12.29 (-6.89)	0.846 (8.39)	1.409 1.53		0 355† (2.505)	0.866
Public administration	-11.70 (-27.80)	0.967 (27.74)		0.978	-16.78 (-26.52)	1.191 (28.86)	1.176 (4.52)	3.363 (4.64)	-0.246‡ (-4.54)	0.991
Warehouses	-16.49 (-10.84)	1.149 (19.57)	1.681 (2.21)	0.960	-13.45 (-17.40)	1.000 (23.61)	1.062 (2.64)			0.972
Religious	-11.98 (-64.14)	0.989 (66.91)		0.996	-11.70 (-48.28)	0.968 (52.09)		-0.749 (-2.25)	0.055‡ (2.20)	0.997
Garages and service stations	-11.96 (-8.80)	0.907 (8.05)		0.792	-13.69 (-11.97)	1.091 (12.82)				0.892
Miscellaneous	-13.73 (-9.64)	0.979 (17.84)	1.547 (2.18)	0.952	-13.50 (-8.51)	0.935 (10.76)	1.746 (2.11)			8.886

*t — ratios in parentheses.

†Refers to lnD9*PCI where D9 is region 9 dummy variable.

‡Refers to lnD9*POP.

Table B.5. Estimated regression results of national floor space demand equations for U.S. commercial sector.

Dependent variable: $\ln FLR_{i,j}$ (floor space for BEA i, and subsector j)
Estimation method: ØLS*, 211 observations.

Building subsector	Explanatory variables			R^2
	Intercept	$\ln PØP_i$	$\ln PCI_i$	
Retail-wholesale	-13.24 (-93.39)	1.048 (126.89)	0.957 (13.63)	0.989
Educational	-11.43 (-163.29)	0.998 (244.71)	0.509 (14.69)	0.997
Finance and office	-15.59 (-73.29)	1.128 (91.04)	1.413 (13.42)	0.979
Health	-13.00 (-127.63)	1.017 (170.76)	0.575 (11.36)	0.994
Hotel-motel	-13.51 (-36.97)	1.045 (49.06)	0.689 (3.81)	0.927
Public administration	-12.75 (-73.47)	1.035 (78.73)		0.967
Warehouses	-15.06 (-44.84)	1.102 (56.34)	1.232 (7.41)	0.945
Religious	-12.74 (-177.62)	0.995 (238.04)	0.411 (11.58)	0.997
Garages and service stations	-15.29 (-37.97)	1.179 (38.63)		0.877
Miscellaneous	-12.84 (-60.98)	0.994 (81.00)	0.894 (8.58)	0.972

*t-ratios in parentheses.

Appendix C

PROJECTED COMMERCIAL SECTOR ENERGY DEMAND BY BUILDING TYPE, FUEL AND END USE: 1975-2000

Table C.1. Projected commercial sector energy demand for region 1 by building type, fuel and end use: 1975-2000

(10^{15} Btu)

Building type		1975	1980	1985	1990	1995	2000
Retail/ wholesale	ELEC	0.0481	0.0625	0.0734	0.0868	0.1028	0.1193
	GAS	0.0144	0.0162	0.0192	0.0219	0.0245	0.0275
	OIL	0.0715	0.0780	0.0810	0.0908	0.0998	0.1097
	OTHR	0.0007	0.0007	0.0006	0.0005	0.0004	0.0003
	TOTAL	0.1347	0.1575	0.1743	0.2000	0.2276	0.2569
Office	ELEC	0.0380	0.0523	0.0650	0.0821	0.1019	0.1238
	GAS	0.0068	0.0084	0.0112	0.0143	0.0171	0.0203
	OIL	0.0730	0.0853	0.0942	0.1125	0.1297	0.1501
	OTHR	0.0007	0.0007	0.0006	0.0006	0.0005	0.0004
	TOTAL	0.1185	0.1467	0.1710	0.2094	0.2492	0.2947
Auto repair	ELEC	0.0020	0.0022	0.0022	0.0023	0.0025	0.0026
	GAS	0.0004	0.0004	0.0004	0.0004	0.0005	0.0005
	OIL	0.0042	0.0040	0.0035	0.0034	0.0034	0.0033
	OTHR	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	TOTAL	0.0066	0.0066	0.0062	0.0062	0.0064	0.0064
Warehouse	ELEC	0.0048	0.0055	0.0059	0.0064	0.0072	0.0078
	GAS	0.0010	0.0010	0.0012	0.0013	0.0014	0.0014
	OIL	0.0105	0.0104	0.0098	0.0099	0.0102	0.0105
	OTHR	0.0001	0.0001	0.0001	0.0001	0.0000	0.0000
	TOTAL	0.0164	0.0171	0.0169	0.0177	0.0188	0.0198
Educational	ELEC	0.0428	0.0491	0.0526	0.0576	0.0644	0.0704
	GAS	0.0095	0.0094	0.0109	0.0121	0.0129	0.0138
	OIL	0.1007	0.0957	0.0928	0.0960	0.0994	0.1025
	OTHR	0.0010	0.0008	0.0006	0.0005	0.0004	0.0003
	TOTAL	0.1539	0.1550	0.1569	0.1662	0.1771	0.1870
Health	ELEC	0.0270	0.0329	0.0367	0.0413	0.0471	0.0527
	GAS	0.0063	0.0066	0.0079	0.0091	0.0099	0.0109
	OIL	0.0696	0.0688	0.0686	0.0732	0.0779	0.0827
	OTHR	0.0006	0.0005	0.0004	0.0003	0.0003	0.0002
	TOTAL	0.1035	0.1087	0.1136	0.1239	0.1352	0.1465
Public administration	ELEC	0.0083	0.0089	0.0090	0.0093	0.0099	0.0104
	GAS	0.0015	0.0015	0.0016	0.0017	0.0018	0.0018
	OIL	0.0164	0.0156	0.0141	0.0136	0.0134	0.0132
	OTHR	0.0002	0.0001	0.0001	0.0001	0.0001	0.0000
	TOTAL	0.0264	0.0262	0.0248	0.0247	0.0252	0.0254
Religious	ELEC	0.0052	0.0060	0.0064	0.0070	0.0079	0.0087
	GAS	0.0014	0.0015	0.0017	0.0018	0.0019	0.0020
	OIL	0.0149	0.0148	0.0140	0.0143	0.0147	0.0150
	OTHR	0.0002	0.0001	0.0001	0.0001	0.0001	0.0000
	TOTAL	0.0216	0.0224	0.0222	0.0233	0.0245	0.0257
Hotel/motel	ELEC	0.0080	0.0095	0.0105	0.0118	0.0135	0.0151
	GAS	0.0034	0.0036	0.0041	0.0045	0.0048	0.0052
	OIL	0.0366	0.0364	0.0345	0.0356	0.0369	0.0383
	OTHR	0.0004	0.0003	0.0002	0.0002	0.0002	0.0001
	TOTAL	0.0484	0.0498	0.0492	0.0521	0.0554	0.0587
Miscellaneous	ELEC	0.0250	0.0288	0.0307	0.0336	0.0375	0.0409
	GAS	0.0041	0.0044	0.0049	0.0055	0.0059	0.0062
	OIL	0.0443	0.0443	0.0423	0.0434	0.0447	0.0462
	OTHR	0.0004	0.0004	0.0003	0.0002	0.0002	0.0001
	TOTAL	0.0739	0.0778	0.0782	0.0828	0.0883	0.0936
Total	ELEC	0.2091	0.2578	0.2924	0.3383	0.3947	0.4518
	GAS	0.0459	0.0530	0.0631	0.0725	0.0806	0.0897
	OIL	0.4425	0.4533	0.4548	0.4929	0.5302	0.5715
	OTHR	0.0041	0.0036	0.0030	0.0025	0.0022	0.0017
	TOTAL	0.7025	0.7677	0.8133	0.9062	1.0077	1.1147

Table C.2. Projected commercial sector energy demand for region 2 by building type, fuel and end use: 1975-2000

(10^{15} Btu)

Building type		1975	1980	1985	1990	1995	2000
Retail/ wholesale	ELEC	0.1141	0.1292	0.1411	0.1550	0.1659	0.1772
	GAS	0.0427	0.0415	0.0436	0.0447	0.0455	0.0468
	OIL	0.0928	0.0902	0.0838	0.0841	0.0851	0.0855
	OTHR	0.0011	0.0009	0.0007	0.0006	0.0005	0.0003
	TOTAL	0.2508	0.2618	0.2692	0.2844	0.2971	0.3099
Office	ELEC	0.0984	0.1244	0.1508	0.1851	0.2124	0.2428
	GAS	0.0258	0.0286	0.0348	0.0411	0.0455	0.0504
	OIL	0.1008	0.1096	0.1128	0.1258	0.1364	0.1483
	OTHR	0.0012	0.0011	0.0009	0.0008	0.0007	0.0006
	TOTAL	0.2261	0.2637	0.2993	0.3527	0.3950	0.4420
Auto repair	ELEC	0.0060	0.0062	0.0063	0.0066	0.0068	0.0071
	GAS	0.0017	0.0016	0.0017	0.0017	0.0016	0.0016
	OIL	0.0067	0.0062	0.0053	0.0050	0.0049	0.0047
	OTHR	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000
	TOTAL	0.0145	0.0141	0.0134	0.0133	0.0134	0.0134
Warehouse	ELEC	0.0129	0.0141	0.0151	0.0164	0.0175	0.0186
	GAS	0.0040	0.0038	0.0041	0.0043	0.0044	0.0044
	OIL	0.0154	0.0146	0.0132	0.0129	0.0129	0.0128
	OTHR	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001
	TOTAL	0.0324	0.0327	0.0325	0.0337	0.0349	0.0359
Educational	ELEC	0.0960	0.1045	0.1125	0.1227	0.1311	0.1395
	GAS	0.0312	0.0285	0.0313	0.0330	0.0338	0.0347
	OIL	0.1196	0.1084	0.1015	0.1015	0.1023	0.1025
	OTHR	0.0014	0.0010	0.0008	0.0006	0.0005	0.0004
	TOTAL	0.2481	0.2426	0.2460	0.2579	0.2677	0.2771
Health	ELEC	0.0606	0.0695	0.0776	0.0867	0.0938	0.1013
	GAS	0.0200	0.0191	0.0215	0.0233	0.0243	0.0254
	OIL	0.0797	0.0743	0.0708	0.0725	0.0745	0.0763
	OTHR	0.0008	0.0006	0.0005	0.0004	0.0003	0.0002
	TOTAL	0.1611	0.1635	0.1704	0.1829	0.1930	0.2032
Public administration	ELEC	0.0203	0.0211	0.0215	0.0223	0.0230	0.0237
	GAS	0.0057	0.0052	0.0054	0.0054	0.0053	0.0052
	OIL	0.0215	0.0198	0.0174	0.0164	0.0159	0.0153
	OTHR	0.0003	0.0002	0.0001	0.0001	0.0001	0.0001
	TOTAL	0.0478	0.0463	0.0444	0.0442	0.0443	0.0443
Religious	ELEC	0.0124	0.0135	0.0145	0.0159	0.0171	0.0183
	GAS	0.0050	0.0049	0.0052	0.0054	0.0055	0.0056
	OIL	0.0191	0.0184	0.0168	0.0167	0.0166	0.0164
	OTHR	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001
	TOTAL	0.0367	0.0370	0.0367	0.0381	0.0392	0.0403
Hotel/motel	ELEC	0.0198	0.0223	0.0246	0.0276	0.0302	0.0328
	GAS	0.0121	0.0117	0.0126	0.0132	0.0136	0.0139
	OIL	0.0475	0.0448	0.0407	0.0404	0.0406	0.0407
	OTHR	0.0005	0.0004	0.0003	0.0003	0.0002	0.0002
	TOTAL	0.0300	0.0793	0.0782	0.0815	0.0846	0.0875
Miscellaneous	ELEC	0.0692	0.0759	0.0815	0.0892	0.0952	0.1012
	GAS	0.0170	0.0166	0.0179	0.0188	0.0192	0.0197
	OIL	0.0655	0.0629	0.0582	0.0577	0.0578	0.0580
	OTHR	0.0008	0.0006	0.0005	0.0004	0.0003	0.0002
	TOTAL	0.1525	0.1561	0.1581	0.1661	0.1726	0.1791
Total	ELEC	0.5058	0.5808	0.6455	0.7276	0.7931	0.8624
	GAS	0.1588	0.1616	0.1779	0.1909	0.1988	0.2078
	OIL	0.5702	0.5493	0.5205	0.5331	0.5470	0.5606
	OTHR	0.0063	0.0053	0.0042	0.0034	0.0028	0.0021
	TOTAL	1.2411	1.2971	1.3482	1.4549	1.5417	1.6328

Table C.3. Projected commercial sector energy demand for region 3 by building type, fuel and end use: 1975-2000

(10^{15} Btu)

Building type		1975	1980	1985	1990	1995	2000
Retail/ wholesale	ELEC	0.1080	0.1240	0.1418	0.1603	0.1771	0.1957
	GAS	0.0427	0.0419	0.0448	0.0484	0.0514	0.0547
	OIL	0.0433	0.0434	0.0418	0.0433	0.0455	0.0478
	OTHR	0.0035	0.0030	0.0024	0.0020	0.0017	0.0013
	TOTAL	0.1975	0.2123	0.2309	0.2540	0.2757	0.2996
Office	ELEC	0.0863	0.1117	0.1471	0.1924	0.2368	0.2914
	GAS	0.0271	0.0305	0.0388	0.0495	0.0592	0.0707
	OIL	0.0418	0.0479	0.0532	0.0638	0.0749	0.0888
	OTHR	0.0033	0.0032	0.0030	0.0027	0.0025	0.0022
	TOTAL	0.1584	0.1932	0.2421	0.3084	0.3734	0.4531
Auto repair	ELEC	0.0038	0.0040	0.0042	0.0044	0.0046	0.0048
	GAS	0.0014	0.0013	0.0013	0.0013	0.0013	0.0013
	OIL	0.0021	0.0020	0.0018	0.0017	0.0017	0.0016
	OTHR	0.0002	0.0001	0.0001	0.0001	0.0001	0.0000
	TOTAL	0.0075	0.0074	0.0073	0.0075	0.0076	0.0078
Warehouse	ELEC	0.0136	0.0150	0.0167	0.0186	0.0203	0.0221
	GAS	0.0051	0.0050	0.0053	0.0057	0.0060	0.0062
	OIL	0.0079	0.0077	0.0071	0.0072	0.0074	0.0076
	OTHR	0.0007	0.0005	0.0004	0.0003	0.0003	0.0002
	TOTAL	0.0273	0.0283	0.0296	0.0318	0.0339	0.0362
Educational	ELEC	0.1006	0.1103	0.1239	0.1382	0.1512	0.1653
	GAS	0.0390	0.0357	0.0392	0.0429	0.0455	0.0480
	OIL	0.0604	0.0560	0.0539	0.0556	0.0579	0.0604
	OTHR	0.0047	0.0037	0.0030	0.0025	0.0020	0.0015
	TOTAL	0.2048	0.2056	0.2202	0.2392	0.2567	0.2752
Health	ELEC	0.0596	0.0689	0.0810	0.0932	0.1042	0.1166
	GAS	0.0227	0.0215	0.0245	0.0278	0.0303	0.0329
	OIL	0.0360	0.0343	0.0341	0.0363	0.0390	0.0419
	OTHR	0.0026	0.0021	0.0017	0.0014	0.0012	0.0010
	TOTAL	0.1208	0.1267	0.1413	0.1587	0.1747	0.1923
Public administration	ELEC	0.0236	0.0248	0.0259	0.0270	0.0282	0.0293
	GAS	0.0080	0.0075	0.0076	0.0077	0.0076	0.0076
	OIL	0.0123	0.0116	0.0103	0.0098	0.0097	0.0095
	OTHR	0.0010	0.0008	0.0006	0.0004	0.0003	0.0002
	TOTAL	0.0450	0.0446	0.0443	0.0450	0.0458	0.0467
Religious	ELEC	0.0130	0.0144	0.0160	0.0179	0.0197	0.0216
	GAS	0.0063	0.0063	0.0067	0.0072	0.0075	0.0078
	OIL	0.0098	0.0097	0.0092	0.0093	0.0095	0.0098
	OTHR	0.0008	0.0007	0.0005	0.0004	0.0004	0.0003
	TOTAL	0.0300	0.0311	0.0324	0.0349	0.0371	0.0395
Hotel/motel	ELEC	0.0212	0.0241	0.0275	0.0315	0.0351	0.0390
	GAS	0.0145	0.0142	0.0152	0.0165	0.0175	0.0186
	OIL	0.0227	0.0220	0.0205	0.0209	0.0218	0.0227
	OTHR	0.0018	0.0015	0.0012	0.0009	0.0008	0.0006
	TOTAL	0.0602	0.0617	0.0644	0.0699	0.0752	0.0809
Miscellaneous	ELEC	0.0603	0.0669	0.0748	0.0836	0.0915	0.1000
	GAS	0.0181	0.0178	0.0191	0.0208	0.0219	0.0230
	OIL	0.0280	0.0277	0.0264	0.0268	0.0277	0.0289
	OTHR	0.0022	0.0018	0.0015	0.0012	0.0010	0.0008
	TOTAL	0.1086	0.1143	0.1218	0.1323	0.1420	0.1526
Total	ELEC	0.4847	0.5639	0.6590	0.7671	0.8687	0.9859
	GAS	0.1775	0.1815	0.2025	0.2277	0.2482	0.2708
	OIL	0.2665	0.2623	0.2581	0.2747	0.2952	0.3190
	OTHR	0.0199	0.0174	0.0145	0.0120	0.0102	0.0081
	TOTAL	0.9485	1.0251	1.1342	1.2816	1.4222	1.5839

Table C.4. Projected commercial sector energy demand for region 4 by building type, fuel and end use: 1975-2000

(10^{15} Btu)

Building type		1975	1980	1985	1990	1995	2000
Retail/ wholesale	ELEC	0.1895	0.2665	0.3429	0.4270	0.5150	0.6203
	GAS	0.0666	0.0761	0.0900	0.1074	0.1248	0.1450
	OIL	0.0237	0.0285	0.0318	0.0372	0.0434	0.0507
	OTHR	0.0062	0.0062	0.0060	0.0056	0.0052	0.0044
	TOTAL	0.2861	0.3773	0.4707	0.5772	0.6884	0.8204
Office	ELEC	0.1347	0.2161	0.3107	0.4341	0.5766	0.7649
	GAS	0.0393	0.0532	0.0720	0.0973	0.1249	0.1597
	OIL	0.0212	0.0293	0.0364	0.0475	0.0610	0.0789
	OTHR	0.0053	0.0062	0.0065	0.0068	0.0068	0.0066
	TOTAL	0.2005	0.3048	0.4256	0.5857	0.7693	1.0101
Auto repair	ELEC	0.0051	0.0057	0.0063	0.0067	0.0072	0.0077
	GAS	0.0017	0.0016	0.0016	0.0017	0.0017	0.0018
	OIL	0.0009	0.0009	0.0008	0.0008	0.0008	0.0009
	OTHR	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001
	TOTAL	0.0078	0.0084	0.0089	0.0094	0.0099	0.0103
Warehouse	ELEC	0.0288	0.0399	0.0510	0.0638	0.0771	0.0931
	GAS	0.0096	0.0111	0.0132	0.0159	0.0184	0.0213
	OIL	0.0053	0.0061	0.0066	0.0075	0.0087	0.0102
	OTHR	0.0014	0.0014	0.0013	0.0012	0.0011	0.0009
	TOTAL	0.0451	0.0584	0.0721	0.0883	0.1053	0.1255
Educational	ELEC	0.1444	0.1661	0.1880	0.2075	0.2264	0.2464
	GAS	0.0510	0.0476	0.0511	0.0548	0.0578	0.0602
	OIL	0.0266	0.0254	0.0253	0.0264	0.0281	0.0297
	OTHR	0.0068	0.0055	0.0048	0.0040	0.0034	0.0026
	TOTAL	0.2288	0.2446	0.2691	0.2928	0.3156	0.3388
Health	ELEC	0.0861	0.1063	0.1269	0.1455	0.1635	0.1836
	GAS	0.0298	0.0294	0.0328	0.0366	0.0399	0.0432
	OIL	0.0160	0.0160	0.0166	0.0180	0.0197	0.0216
	OTHR	0.0037	0.0032	0.0028	0.0024	0.0021	0.0017
	TOTAL	0.1356	0.1549	0.1791	0.2025	0.2253	0.2501
Public administration	ELEC	0.0315	0.0352	0.0380	0.0402	0.0425	0.0447
	GAS	0.0098	0.0093	0.0094	0.0096	0.0096	0.0096
	OIL	0.0051	0.0050	0.0047	0.0046	0.0047	0.0047
	OTHR	0.0013	0.0011	0.0009	0.0007	0.0006	0.0004
	TOTAL	0.0477	0.0506	0.0530	0.0552	0.0573	0.0594
Religious	ELEC	0.0209	0.0242	0.0270	0.0297	0.0324	0.0352
	GAS	0.0091	0.0090	0.0094	0.0100	0.0103	0.0106
	OIL	0.0047	0.0048	0.0046	0.0048	0.0050	0.0052
	OTHR	0.0013	0.0011	0.0009	0.0008	0.0006	0.0005
	TOTAL	0.0359	0.0391	0.0420	0.0452	0.0483	0.0515
Hotel/motel	ELEC	0.0509	0.0689	0.0867	0.1072	0.1285	0.1535
	GAS	0.0283	0.0315	0.0365	0.0430	0.0493	0.0561
	OIL	0.0154	0.0169	0.0178	0.0200	0.0228	0.0262
	OTHR	0.0039	0.0036	0.0033	0.0030	0.0027	0.0023
	TOTAL	0.0986	0.1209	0.1443	0.1732	0.2033	0.2382
Miscellaneous	ELEC	0.1070	0.1422	0.1760	0.2135	0.2519	0.2964
	GAS	0.0295	0.0333	0.0388	0.0453	0.0514	0.0581
	OIL	0.0155	0.0180	0.0195	0.0221	0.0251	0.0287
	OTHR	0.0040	0.0039	0.0036	0.0033	0.0029	0.0025
	TOTAL	0.1560	0.1973	0.2379	0.2842	0.3313	0.3857
Total	ELEC	0.8175	1.0710	1.3536	1.6752	2.0210	2.4457
	GAS	0.2769	0.3021	0.3548	0.4215	0.4882	0.5657
	OIL	0.1345	0.1508	0.1639	0.1890	0.2194	0.2567
	OTHR	0.0331	0.0324	0.0303	0.0280	0.0255	0.0220
	TOTAL	1.2620	1.5563	1.9027	2.3137	2.7541	3.2900

Table C.5. Projected commercial sector energy demand for region 5 by building type, fuel and end use: 1975-2000

(10^{15} Btu)

Building type		1975	1980	1985	1990	1995	2000
Retail/ wholesale	ELEC	0.2324	0.2779	0.3176	0.3567	0.3899	0.4258
	GAS	0.1534	0.1500	0.1554	0.1638	0.1711	0.1788
	OIL	0.0625	0.0639	0.0631	0.0659	0.0686	0.0716
	OTHR	0.0171	0.0147	0.0123	0.0100	0.0084	0.0061
	TOTAL	0.4654	0.5065	0.5484	0.5964	0.6380	0.6823
Office	ELEC	0.1337	0.1562	0.1766	0.1984	0.2169	0.2365
	GAS	0.0869	0.0859	0.0890	0.0939	0.0980	0.1021
	OIL	0.0448	0.0458	0.0447	0.0463	0.0481	0.0501
	OTHR	0.0121	0.0106	0.0087	0.0069	0.0057	0.0043
	TOTAL	0.2776	0.2986	0.3190	0.3456	0.3686	0.3930
Auto repair	ELEC	0.0067	0.0071	0.0074	0.0078	0.0081	0.0084
	GAS	0.0049	0.0045	0.0043	0.0042	0.0041	0.0041
	OIL	0.0025	0.0024	0.0021	0.0020	0.0020	0.0020
	OTHR	0.0007	0.0006	0.0004	0.0003	0.0002	0.0002
	TOTAL	0.0148	0.0145	0.0143	0.0143	0.0145	0.0146
Warehouse	ELEC	0.0309	0.0335	0.0357	0.0379	0.0398	0.0419
	GAS	0.0243	0.0222	0.0215	0.0213	0.0212	0.0211
	OIL	0.0123	0.0116	0.0105	0.0102	0.0102	0.0101
	OTHR	0.0034	0.0028	0.0021	0.0016	0.0013	0.0009
	TOTAL	0.0709	0.0700	0.0698	0.0710	0.0725	0.0740
Educational	ELEC	0.1875	0.2068	0.2266	0.2456	0.2625	0.2799
	GAS	0.1440	0.1275	0.1306	0.1346	0.1377	0.1402
	OIL	0.0738	0.0679	0.0656	0.0665	0.0678	0.0690
	OTHR	0.0199	0.0155	0.0127	0.0100	0.0081	0.0058
	TOTAL	0.4252	0.4177	0.4355	0.4567	0.4761	0.4949
Health	ELEC	0.1051	0.1193	0.1326	0.1439	0.1538	0.1641
	GAS	0.0776	0.0693	0.0711	0.0735	0.0755	0.0772
	OIL	0.0402	0.0371	0.0359	0.0365	0.0373	0.0382
	OTHR	0.0104	0.0082	0.0066	0.0051	0.0042	0.0031
	TOTAL	0.2333	0.2339	0.2461	0.2590	0.2709	0.2827
Public administration	ELEC	0.0369	0.0389	0.0404	0.0417	0.0431	0.0444
	GAS	0.0248	0.0223	0.0215	0.0208	0.0204	0.0199
	OIL	0.0125	0.0117	0.0106	0.0102	0.0100	0.0097
	OTHR	0.0034	0.0027	0.0021	0.0016	0.0012	0.0008
	TOTAL	0.0776	0.0757	0.0746	0.0744	0.0747	0.0749
Religious	ELEC	0.0255	0.0285	0.0311	0.0341	0.0367	0.0395
	GAS	0.0251	0.0239	0.0241	0.0246	0.0249	0.0252
	OIL	0.0128	0.0127	0.0121	0.0122	0.0123	0.0125
	OTHR	0.0036	0.0029	0.0024	0.0019	0.0015	0.0011
	TOTAL	0.0669	0.0680	0.0697	0.0728	0.0755	0.0783
Hotel/motel	ELEC	0.0368	0.0416	0.0458	0.0503	0.0543	0.0585
	GAS	0.0513	0.0473	0.0466	0.0472	0.0477	0.0482
	OIL	0.0261	0.0247	0.0228	0.0226	0.0228	0.0230
	OTHR	0.0071	0.0057	0.0044	0.0035	0.0028	0.0020
	TOTAL	0.1213	0.1192	0.1196	0.1235	0.1277	0.1317
Miscellaneous	ELEC	0.1122	0.1220	0.1305	0.1394	0.1472	0.1550
	GAS	0.0678	0.0628	0.0621	0.0621	0.0622	0.0623
	OIL	0.0345	0.0332	0.0311	0.0306	0.0307	0.0307
	OTHR	0.0094	0.0076	0.0061	0.0046	0.0036	0.0026
	TOTAL	0.2239	0.2256	0.2297	0.2368	0.2437	0.2507
Total	ELEC	0.9053	1.0318	1.1444	1.2559	1.3524	1.4540
	GAS	0.6515	0.6158	0.6260	0.6460	0.6628	0.6792
	OIL	0.3222	0.3109	0.2986	0.3031	0.3100	0.3170
	OTHR	0.0848	0.0712	0.0577	0.0455	0.0370	0.0269
	TOTAL	1.9639	2.0297	2.1268	2.2505	2.3621	2.4770

Table C.6. Projected commercial sector energy demand for region 6 by building type, fuel and end use: 1975-2000

(10^{15} Btu)

Building type		1975	1980	1985	1990	1995	2000
Retail/ wholesale	ELEC	0.1500	0.1756	0.1986	0.2290	0.2648	0.3069
	GAS	0.0666	0.0646	0.0709	0.0777	0.0869	0.0975
	OIL	0.0056	0.0066	0.0073	0.0087	0.0101	0.0115
	OTHR	0.0029	0.0027	0.0025	0.0022	0.0019	0.0016
	TOTAL	0.2251	0.2495	0.2793	0.3176	0.3637	0.4175
Office	ELEC	0.1010	0.1237	0.1469	0.1799	0.2187	0.2663
	GAS	0.0437	0.0457	0.0531	0.0616	0.0720	0.0847
	OIL	0.0048	0.0058	0.0069	0.0085	0.0104	0.0124
	OTHR	0.0024	0.0024	0.0023	0.0021	0.0019	0.0017
	TOTAL	0.1519	0.1776	0.2091	0.2522	0.3030	0.3651
Auto repair	ELEC	0.0053	0.0055	0.0056	0.0060	0.0064	0.0068
	GAS	0.0025	0.0023	0.0022	0.0022	0.0023	0.0024
	OIL	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003
	OTHR	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000
	TOTAL	0.0082	0.0081	0.0083	0.0086	0.0091	0.0095
Warehouse	ELEC	0.0231	0.0281	0.0332	0.0405	0.0490	0.0594
	GAS	0.0113	0.0116	0.0132	0.0152	0.0176	0.0206
	OIL	0.0013	0.0015	0.0017	0.0021	0.0025	0.0030
	OTHR	0.0006	0.0006	0.0006	0.0005	0.0005	0.0004
	TOTAL	0.0363	0.0418	0.0487	0.0582	0.0696	0.0834
Educational	ELEC	0.1218	0.1320	0.1440	0.1594	0.1775	0.1980
	GAS	0.0611	0.0539	0.0580	0.0617	0.0668	0.0721
	OIL	0.0065	0.0068	0.0074	0.0085	0.0096	0.0106
	OTHR	0.0034	0.0028	0.0025	0.0022	0.0018	0.0014
	TOTAL	0.1928	0.1955	0.2118	0.2317	0.2559	0.2822
Health	ELEC	0.0660	0.0718	0.0782	0.0854	0.0943	0.1042
	GAS	0.0326	0.0285	0.0302	0.0316	0.0340	0.0365
	OIL	0.0035	0.0036	0.0039	0.0044	0.0049	0.0054
	OTHR	0.0017	0.0014	0.0012	0.0010	0.0009	0.0007
	TOTAL	0.1039	0.1054	0.1135	0.1225	0.1341	0.1467
Public administration	ELEC	0.0243	0.0250	0.0252	0.0258	0.0270	0.0283
	GAS	0.0109	0.0096	0.0094	0.0091	0.0091	0.0091
	OIL	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013
	OTHR	0.0006	0.0005	0.0004	0.0003	0.0003	0.0002
	TOTAL	0.0370	0.0363	0.0362	0.0365	0.0377	0.0389
Religious	ELEC	0.0174	0.0189	0.0202	0.0222	0.0247	0.0274
	GAS	0.0106	0.0100	0.0105	0.0110	0.0116	0.0124
	OIL	0.0011	0.0013	0.0013	0.0015	0.0017	0.0018
	OTHR	0.0006	0.0005	0.0005	0.0004	0.0003	0.0002
	TOTAL	0.0297	0.0307	0.0325	0.0351	0.0383	0.0419
Hotel/motel	ELEC	0.0341	0.0398	0.0448	0.0522	0.0609	0.0712
	GAS	0.0266	0.0256	0.0277	0.0303	0.0340	0.0383
	OIL	0.0030	0.0033	0.0035	0.0040	0.0047	0.0054
	OTHR	0.0015	0.0013	0.0012	0.0011	0.0009	0.0007
	TOTAL	0.0653	0.0700	0.0772	0.0877	0.1005	0.1156
Miscellaneous	ELEC	0.0775	0.0864	0.0940	0.1052	0.1184	0.1333
	GAS	0.0314	0.0300	0.0320	0.0338	0.0366	0.0398
	OIL	0.0034	0.0038	0.0041	0.0047	0.0053	0.0058
	OTHR	0.0017	0.0016	0.0014	0.0012	0.0010	0.0008
	TOTAL	0.1141	0.1217	0.1314	0.1449	0.1612	0.1797
Total	ELEC	0.6297	0.7068	0.7908	0.9057	1.0419	1.2018
	GAS	0.2979	0.2817	0.3070	0.3342	0.3709	0.4134
	OIL	0.0307	0.0341	0.0375	0.0439	0.0508	0.0575
	OTHR	0.0153	0.0140	0.0125	0.0111	0.0095	0.0078
	TOTAL	0.9735	1.0367	1.1478	1.2949	1.4730	1.6805

Table C.7. Projected commercial sector energy demand for region 7 by building type, fuel and end use: 1975-2000

(10^{15} Btu)

Building type		1975	1980	1985	1990	1995	2000
Retail/ wholesale	ELEC	0.0674	0.0777	0.0883	0.1029	0.1148	0.1409
	GAS	0.0426	0.0404	0.0420	0.0442	0.0463	0.0531
	OIL	0.0114	0.0119	0.0122	0.0133	0.0142	0.0168
	OTHR	0.0023	0.0020	0.0017	0.0014	0.0012	0.0010
	TOTAL	0.1237	0.1320	0.1443	0.1618	0.1765	0.2117
Office	ELEC	0.0403	0.0475	0.0562	0.0687	0.0793	0.1039
	GAS	0.0250	0.0250	0.0272	0.0299	0.0324	0.0396
	OIL	0.0085	0.0091	0.0097	0.0109	0.0120	0.0152
	OTHR	0.0016	0.0015	0.0013	0.0011	0.0010	0.0009
	TOTAL	0.0754	0.0832	0.0944	0.1107	0.1246	0.1596
Auto repair	ELEC	0.0014	0.0014	0.0014	0.0015	0.0015	0.0016
	GAS	0.0010	0.0009	0.0008	0.0007	0.0007	0.0007
	OIL	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003
	OTHR	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000
	TOTAL	0.0027	0.0026	0.0025	0.0025	0.0025	0.0025
Warehouse	ELEC	0.0094	0.0107	0.0122	0.0143	0.0160	0.0198
	GAS	0.0068	0.0065	0.0067	0.0070	0.0074	0.0084
	OIL	0.0022	0.0023	0.0023	0.0025	0.0027	0.0032
	OTHR	0.0005	0.0004	0.0003	0.0003	0.0002	0.0002
	TOTAL	0.0189	0.0199	0.0215	0.0241	0.0263	0.0316
Educational	ELEC	0.0545	0.0578	0.0619	0.0682	0.0731	0.0820
	GAS	0.0409	0.0347	0.0347	0.0348	0.0351	0.0367
	OIL	0.0132	0.0123	0.0121	0.0125	0.0130	0.0141
	OTHR	0.0026	0.0021	0.0017	0.0013	0.0011	0.0008
	TOTAL	0.1112	0.1068	0.1104	0.1169	0.1223	0.1336
Health	ELEC	0.0313	0.0339	0.0367	0.0404	0.0433	0.0485
	GAS	0.0228	0.0193	0.0193	0.0193	0.0195	0.0205
	OIL	0.0074	0.0069	0.0068	0.0070	0.0073	0.0079
	OTHR	0.0014	0.0012	0.0009	0.0007	0.0005	0.0004
	TOTAL	0.0630	0.0613	0.0637	0.0674	0.0705	0.0774
Public administration	ELEC	0.0125	0.0139	0.0153	0.0173	0.0189	0.0222
	GAS	0.0080	0.0075	0.0076	0.0077	0.0079	0.0086
	OIL	0.0026	0.0027	0.0027	0.0028	0.0029	0.0033
	OTHR	0.0005	0.0005	0.0004	0.0003	0.0002	0.0002
	TOTAL	0.0235	0.0245	0.0259	0.0281	0.0300	0.0343
Religious	ELEC	0.0077	0.0082	0.0087	0.0097	0.0104	0.0117
	GAS	0.0072	0.0066	0.0065	0.0064	0.0054	0.0056
	OIL	0.0023	0.0023	0.0023	0.0023	0.0024	0.0025
	OTHR	0.0005	0.0004	0.0003	0.0003	0.0002	0.0001
	TOTAL	0.0176	0.0176	0.0178	0.0186	0.0193	0.0210
Hotel/motel	ELEC	0.0106	0.0115	0.0121	0.0133	0.0143	0.0159
	GAS	0.0135	0.0119	0.0113	0.0109	0.0108	0.0110
	OIL	0.0043	0.0041	0.0038	0.0038	0.0039	0.0041
	OTHR	0.0009	0.0007	0.0005	0.0004	0.0003	0.0002
	TOTAL	0.0293	0.0282	0.0277	0.0285	0.0293	0.0312
Miscellaneous	ELEC	0.0341	0.0368	0.0392	0.0435	0.0467	0.0528
	GAS	0.0203	0.0186	0.0183	0.0182	0.0181	0.0191
	OIL	0.0066	0.0066	0.0064	0.0066	0.0068	0.0073
	OTHR	0.0013	0.0011	0.0009	0.0007	0.0005	0.0004
	TOTAL	0.0623	0.0631	0.0649	0.0689	0.0722	0.0796
Total	ELEC	0.2583	0.2993	0.3319	0.3798	0.4184	0.4992
	GAS	0.1855	0.1714	0.1743	0.1792	0.1845	0.2043
	OIL	0.0585	0.0585	0.0585	0.0619	0.0653	0.0746
	OTHR	0.0114	0.0100	0.0082	0.0066	0.0053	0.0043
	TOTAL	0.6237	0.5391	0.5729	0.6274	0.6735	0.7824

Table C.8. Projected commercial sector energy demand for region 8 by building type, fuel and end use: 1975-2000

(10^{15} Btu)

Building type		1975	1980	1985	1990	1995	2000
Retail/ wholesale	ELEC	0.0410	0.0470	0.0507	0.0600	0.0709	0.0814
	GAS	0.0243	0.0229	0.0227	0.0237	0.0252	0.0269
	OIL	0.0055	0.0060	0.0062	0.0069	0.0077	0.0084
	OTHR	0.0018	0.0017	0.0014	0.0011	0.0010	0.0007
	TOTAL	0.0727	0.0775	0.0810	0.0917	0.1047	0.1175
Office	ELEC	0.0299	0.0351	0.0398	0.0500	0.0618	0.0741
	GAS	0.0174	0.0172	0.0181	0.0200	0.0221	0.0247
	OIL	0.0047	0.0053	0.0058	0.0068	0.0080	0.0091
	OTHR	0.0015	0.0015	0.0013	0.0011	0.0009	0.0008
	TOTAL	0.0536	0.0592	0.0650	0.0779	0.0928	0.1088
Auto repair	ELEC	0.0011	0.0011	0.0011	0.0012	0.0014	0.0015
	GAS	0.0007	0.0007	0.0006	0.0006	0.0006	0.0006
	OIL	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
	OTHR	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000
	TOTAL	0.0021	0.0021	0.0020	0.0020	0.0022	0.0023
Warehouse	ELEC	0.0068	0.0083	0.0098	0.0129	0.0166	0.0207
	GAS	0.0043	0.0043	0.0047	0.0055	0.0063	0.0074
	OIL	0.0011	0.0013	0.0015	0.0018	0.0022	0.0027
	OTHR	0.0004	0.0004	0.0003	0.0003	0.0003	0.0002
	TOTAL	0.0125	0.0142	0.0163	0.0205	0.0254	0.0310
Educational	ELEC	0.0382	0.0415	0.0438	0.0502	0.0578	0.0648
	GAS	0.0263	0.0227	0.0223	0.0228	0.0238	0.0247
	OIL	0.0072	0.0071	0.0072	0.0078	0.0085	0.0090
	OTHR	0.0023	0.0019	0.0016	0.0013	0.0010	0.0008
	TOTAL	0.0740	0.0733	0.0750	0.0821	0.0911	0.0993
Health	ELEC	0.0200	0.0221	0.0236	0.0271	0.0314	0.0353
	GAS	0.0133	0.0116	0.0114	0.0117	0.0122	0.0128
	OIL	0.0036	0.0036	0.0037	0.0040	0.0044	0.0047
	OTHR	0.0012	0.0010	0.0008	0.0006	0.0005	0.0004
	TOTAL	0.0380	0.0383	0.0394	0.0434	0.0485	0.0532
Public administration	ELEC	0.0092	0.0099	0.0099	0.0108	0.0119	0.0129
	GAS	0.0058	0.0052	0.0048	0.0046	0.0046	0.0045
	OIL	0.0016	0.0016	0.0015	0.0016	0.0016	0.0017
	OTHR	0.0005	0.0004	0.0003	0.0003	0.0002	0.0001
	TOTAL	0.0170	0.0172	0.0166	0.0172	0.0183	0.0192
Religious	ELEC	0.0051	0.0055	0.0055	0.0060	0.0068	0.0074
	GAS	0.0043	0.0040	0.0036	0.0035	0.0035	0.0035
	OIL	0.0012	0.0012	0.0012	0.0012	0.0012	0.0013
	OTHR	0.0004	0.0003	0.0003	0.0002	0.0002	0.0001
	TOTAL	0.0111	0.0110	0.0106	0.0110	0.0117	0.0123
Hotel/motel	ELEC	0.0103	0.0114	0.0119	0.0138	0.0161	0.0182
	GAS	0.0104	0.0094	0.0089	0.0090	0.0092	0.0095
	OIL	0.0028	0.0028	0.0027	0.0029	0.0032	0.0034
	OTHR	0.0009	0.0008	0.0006	0.0005	0.0004	0.0003
	TOTAL	0.0244	0.0245	0.0242	0.0262	0.0289	0.0314
Miscellaneous	ELEC	0.0294	0.0349	0.0404	0.0519	0.0653	0.0795
	GAS	0.0158	0.0157	0.0171	0.0193	0.0217	0.0247
	OIL	0.0043	0.0049	0.0055	0.0066	0.0079	0.0092
	OTHR	0.0014	0.0013	0.0012	0.0011	0.0009	0.0008
	TOTAL	0.0510	0.0569	0.0641	0.0789	0.0957	0.1142
Total	ELEC	0.1895	0.2169	0.2365	0.2840	0.3398	0.3959
	GAS	0.1214	0.1136	0.1142	0.1207	0.1291	0.1393
	OIL	0.0321	0.0341	0.0354	0.0398	0.0449	0.0496
	OTHR	0.0102	0.0094	0.0079	0.0065	0.0054	0.0043
	TOTAL	0.3534	0.3740	0.3941	0.4510	0.5193	0.5891

Table C.9. Projected commercial sector energy demand for region 9 by building type, fuel and end use: 1975-2000

(10^{15} Btu)

Building type		1975	1980	1985	1990	1995	2000
Retail/ wholesale	ELEC	0.1703	0.1807	0.1991	0.2207	0.2482	0.2737
	GAS	0.0678	0.0645	0.0674	0.0724	0.0797	0.0868
	OIL	0.0043	0.0049	0.0052	0.0058	0.0063	0.0066
	OTHR	0.0011	0.0010	0.0009	0.0008	0.0007	0.0005
	TOTAL	0.2436	0.2512	0.2727	0.2997	0.3349	0.3676
Office	ELEC	0.1174	0.1240	0.1365	0.1526	0.1722	0.1906
	GAS	0.0433	0.0425	0.0446	0.0482	0.0530	0.0578
	OIL	0.0038	0.0044	0.0046	0.0051	0.0056	0.0058
	OTHR	0.0010	0.0009	0.0008	0.0007	0.0006	0.0004
	TOTAL	0.1655	0.1717	0.1865	0.2066	0.2314	0.2545
Auto repair	ELEC	0.0076	0.0075	0.0076	0.0079	0.0083	0.0087
	GAS	0.0030	0.0028	0.0027	0.0027	0.0027	0.0028
	OIL	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003
	OTHR	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000
	TOTAL	0.0109	0.0107	0.0106	0.0109	0.0114	0.0118
Warehouse	ELEC	0.0209	0.0219	0.0241	0.0270	0.0305	0.0338
	GAS	0.0088	0.0084	0.0087	0.0094	0.0103	0.0112
	OIL	0.0008	0.0009	0.0009	0.0010	0.0011	0.0011
	OTHR	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001
	TOTAL	0.0306	0.0314	0.0339	0.0375	0.0420	0.0462
Educational	ELEC	0.1258	0.1247	0.1302	0.1371	0.1476	0.1565
	GAS	0.0532	0.0471	0.0475	0.0491	0.0521	0.0545
	OIL	0.0047	0.0048	0.0049	0.0052	0.0055	0.0055
	OTHR	0.0012	0.0010	0.0008	0.0007	0.0006	0.0004
	TOTAL	0.1849	0.1775	0.1834	0.1921	0.2057	0.2168
Health	ELEC	0.0733	0.0738	0.0778	0.0819	0.0882	0.0937
	GAS	0.0307	0.0272	0.0274	0.0283	0.0300	0.0314
	OIL	0.0027	0.0028	0.0029	0.0030	0.0032	0.0032
	OTHR	0.0006	0.0005	0.0004	0.0004	0.0003	0.0002
	TOTAL	0.1074	0.1043	0.1085	0.1135	0.1217	0.1285
Public administration	ELEC	0.0344	0.0364	0.0405	0.0455	0.0516	0.0573
	GAS	0.0127	0.0125	0.0133	0.0145	0.0160	0.0174
	OIL	0.0011	0.0013	0.0014	0.0015	0.0017	0.0017
	OTHR	0.0003	0.0003	0.0002	0.0002	0.0002	0.0001
	TOTAL	0.0484	0.0505	0.0554	0.0617	0.0695	0.0766
Religious	ELEC	0.0173	0.0170	0.0172	0.0176	0.0186	0.0194
	GAS	0.0090	0.0083	0.0080	0.0081	0.0083	0.0085
	OIL	0.0008	0.0008	0.0008	0.0008	0.0009	0.0008
	OTHR	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001
	TOTAL	0.0272	0.0263	0.0262	0.0267	0.0279	0.0289
Hotel/motel	ELEC	0.0466	0.0499	0.0577	0.0679	0.0805	0.0929
	GAS	0.0317	0.0308	0.0337	0.0382	0.0438	0.0494
	OIL	0.0029	0.0032	0.0035	0.0040	0.0045	0.0048
	OTHR	0.0007	0.0006	0.0006	0.0005	0.0005	0.0004
	TOTAL	0.0819	0.0845	0.0954	0.1106	0.1293	0.1475
Miscellaneous	ELEC	0.1256	0.1362	0.1584	0.1868	0.2206	0.2537
	GAS	0.0422	0.0426	0.0479	0.0549	0.0633	0.0718
	OIL	0.0037	0.0044	0.0050	0.0058	0.0067	0.0072
	OTHR	0.0009	0.0009	0.0008	0.0008	0.0007	0.0005
	TOTAL	0.1724	0.1841	0.2122	0.2483	0.2912	0.3333
Total	ELEC	0.7397	0.7722	0.8492	0.9449	1.0662	1.1804
	GAS	0.2991	0.2866	0.3012	0.3258	0.3594	0.3916
	OIL	0.0254	0.0279	0.0295	0.0326	0.0356	0.0370
	OTHR	0.0061	0.0056	0.0049	0.0043	0.0037	0.0028
	TOTAL	1.0703	1.0921	1.1848	1.3076	1.4650	1.6119

Table C.10. Projected commercial sector energy demand for region 10 by building type, fuel and end use: 1975-2000

(10^{15} Btu)

Building type		1975	1980	1985	1990	1995	2000
Retail/ wholesale	ELEC	0.0574	0.0665	0.0797	0.0910	0.1019	0.1137
	GAS	0.0139	0.0129	0.0130	0.0142	0.0153	0.0167
	OIL	0.0114	0.0119	0.0119	0.0128	0.0140	0.0152
	OTHR	0.0008	0.0007	0.0006	0.0005	0.0005	0.0004
	TOTAL	0.0835	0.0920	0.1053	0.1186	0.1317	0.1460
Office	ELEC	0.0378	0.0432	0.0519	0.0598	0.0675	0.0758
	GAS	0.0071	0.0067	0.0068	0.0075	0.0080	0.0088
	OIL	0.0089	0.0094	0.0094	0.0102	0.0111	0.0121
	OTHR	0.0006	0.0006	0.0005	0.0004	0.0004	0.0003
	TOTAL	0.0544	0.0599	0.0686	0.0779	0.0871	0.0970
Auto repair	ELEC	0.0018	0.0020	0.0022	0.0023	0.0025	0.0026
	GAS	0.0004	0.0003	0.0003	0.0003	0.0003	0.0003
	OIL	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004
	OTHR	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	TOTAL	0.0027	0.0028	0.0030	0.0031	0.0032	0.0033
Warehouse	ELEC	0.0079	0.0090	0.0109	0.0126	0.0142	0.0160
	GAS	0.0016	0.0015	0.0015	0.0017	0.0018	0.0019
	OIL	0.0020	0.0021	0.0021	0.0022	0.0024	0.0027
	OTHR	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
	TOTAL	0.0117	0.0128	0.0146	0.0166	0.0185	0.0207
Educational	ELEC	0.0512	0.0555	0.0630	0.0679	0.0728	0.0776
	GAS	0.0107	0.0092	0.0089	0.0092	0.0095	0.0099
	OIL	0.0135	0.0128	0.0123	0.0126	0.0132	0.0136
	OTHR	0.0009	0.0007	0.0006	0.0005	0.0004	0.0003
	TOTAL	0.0763	0.0782	0.0849	0.0902	0.0959	0.1015
Health	ELEC	0.0279	0.0307	0.0353	0.0380	0.0407	0.0434
	GAS	0.0058	0.0051	0.0049	0.0051	0.0053	0.0055
	OIL	0.0075	0.0072	0.0069	0.0070	0.0074	0.0077
	OTHR	0.0005	0.0004	0.0003	0.0003	0.0002	0.0002
	TOTAL	0.0417	0.0433	0.0473	0.0504	0.0535	0.0567
Public administration	ELEC	0.0153	0.0179	0.0220	0.0258	0.0296	0.0338
	GAS	0.0029	0.0027	0.0029	0.0032	0.0035	0.0039
	OIL	0.0036	0.0038	0.0040	0.0044	0.0049	0.0054
	OTHR	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001
	TOTAL	0.0220	0.0246	0.0290	0.0336	0.0382	0.0433
Religious	ELEC	0.0072	0.0078	0.0085	0.0089	0.0093	0.0097
	GAS	0.0017	0.0015	0.0014	0.0014	0.0014	0.0014
	OIL	0.0021	0.0021	0.0019	0.0019	0.0019	0.0019
	OTHR	0.0002	0.0001	0.0001	0.0001	0.0001	0.0000
	TOTAL	0.0112	0.0116	0.0120	0.0123	0.0127	0.0131
Hotel/motel	ELEC	0.0164	0.0188	0.0232	0.0277	0.0321	0.0368
	GAS	0.0046	0.0043	0.0044	0.0049	0.0053	0.0059
	OIL	0.0058	0.0059	0.0060	0.0066	0.0073	0.0081
	OTHR	0.0004	0.0003	0.0003	0.0003	0.0002	0.0002
	TOTAL	0.0272	0.0293	0.0339	0.0395	0.0450	0.0511
Miscellaneous	ELEC	0.0369	0.0432	0.0548	0.0671	0.0791	0.0928
	GAS	0.0064	0.0062	0.0067	0.0079	0.0089	0.0102
	OIL	0.0081	0.0087	0.0093	0.0107	0.0123	0.0141
	OTHR	0.0005	0.0005	0.0005	0.0004	0.0004	0.0003
	TOTAL	0.0519	0.0586	0.0713	0.0861	0.1006	0.1174
Total	ELEC	0.2582	0.2947	0.3515	0.4012	0.4498	0.5023
	GAS	0.0542	0.0504	0.0507	0.0554	0.0594	0.0646
	OIL	0.0648	0.0643	0.0644	0.0689	0.0749	0.0812
	OTHR	0.0042	0.0037	0.0033	0.0028	0.0024	0.0019
	TOTAL	0.3813	0.4131	0.4699	0.5283	0.5865	0.6501

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