Energy Use Patterns And Regionalized Energy Use Coefficients For State And Local Governments#

Gaines H. Liner*

1. INTRODUCTION

The use of energy by the various segments of society is taking on progressively increasing importance in natural resource planning. Although much emphasis is given to reducing wastes in the private sector, conservation measures necessarily apply to the public sector as well. Perhaps more emphasis should be given to reducing natural resource waste in the public sector to compensate for the absence of the "forces of the market place."

Hopefully, the following discussion will adequately identify the areas of intense energy use by state and local governments disaggregated to the state level. No attempt will be made, however, to suggest conservation measures needed to accomplish more equitable energy resource utilization. Although, such a study would be a logical continuation of this discussion.

In the areas of energy utilization, state and local governments (henceforth referred to as S & L) account for about 44 percent of the total energy used by the public administration sector.[1] Though these uses account for a relatively small percentage of the total energy consumed in the United States each year, they are, nevertheless, important to those individual S & L authorities making purchases. Congress had recognized the importance of public energy use through Public Law 93-275, May 7, 1974,[6] by giving the Federal Energy Administration (now a part of the Department of Energy) the responsibility for evaluating the probable impacts of proposed federal energy price changes on S & L.

The objectives of this paper are threefold: first, to construct an algorithm to disaggregate national level energy use per dollar of purchases coefficients to the state level; second, to compare the relative energy intensities of the S & L by six types of energy; and, third, to suggest a procedure to estimate fiscal impacts of assumed energy price changes on S & L by states.

#The initial work on this study commenced while the author was on leave with the Federal Energy Administration (now Department of Energy). Additional financial support was made available at the University of North Carolina at Charlotte through Wachovia Grant Funds. Any findings, views, and conclusions presented herein are those of the author and do not necessarily reflect the views of the Department of Energy, The University of North Carolina at Charlotte, or Wachovia Bank and Trust Company.

*Associate Professor, Department of Economics, University of North Carolina at Charlotte.

Studies of energy use involving S & L have been presented by a number of people.* Most of these and other studies have dealt with energy uses by S & L using input-output analysis. To appreciate the impacts of proposed federal energy policy changes on S & L by states and regions, it is *sine qua non* that state level energy use coefficients be used. They are also useful in looking at the distributional aspects of income changes due to energy policy changes.

The importance of this study stems from the fact that it is probably the only study which provides estimates of energy use by S & L in all states. Additionally, these estimates are all based on a consistent set of assumptions, and a procedure is given to estimate the energy coefficients (intensities per dollar of purchases) for S & L in each state. These coefficients allow comparisons of relative energy intensities of S & L in states and by regions. From these coefficients one can readily study the probable fiscal impacts of proposed federal energy policy changes on S & L in the regions.

2. METHODOLOGY

This study regionalizes national level energy use coefficients (btu's per dollar of purchases) computed by Lee and Bingham[5] using a revised form of the Department of Commerce's 1967 input-output table of the United States. Input-output coefficients from other studies could probably be used, but the ones used here are compatible with other energy data that are available and used in this algorithm.

Energy use per dollar of purchases coefficients for six categories of fuels are disaggregated by first estimating energy deliveries directly to S & L at the state level.

2.1 Estimates of Direct Energy Use

Since primary and secondary data relating to direct and indirect energy use by S & L at the state level are not available in a compatible and useable format, this approach uses proxy variables to produce estimates of direct energy use. A "bridge" is first constructed to estimate direct energy use, D'_{ij}, from state level commercial energy use estimates compiled by the Federal Energy Administration.[2] The commercial sector energy use estimates, D^{c}_{ij}, include those uses by S & L, but unfortunately the S & L uses are not reported separately. The commercial sector estimates represent the following industries at the two-digit SIC code level: Division F, wholesale trade (50, 51); Division G, retail trade (52-59); Division H, finance, insurance, and real estate (60-67); Division I, services (70-89), excluding private households (88); and Division J, public administration (91-96).

Data for 1967 is used to insure compatibility with the national coefficients. More recent data are desirable, but compatible national level input-output energy data were not available.

Direct energy use estimates are produced by the following equation:

*For example, Bingham,[1] and Lee and Bingham,[5] at the national level; and Hite and Mulkey,[3] and Knox,[4] at the state level.

$$(1)\quad D'_{ij} = D^{c}_{ij} \left\{ \left(\frac{e_i}{e_i + E_i + G_i} \right) \Big/ \left(\frac{\Sigma e_i}{\Sigma (e_i + E_i + G_i)} \right) \right\} W_j$$

where D'_{ij} = unadjusted estimates of direct energy use by S & L for state i and fuel j,

D^{c}_{ij} = energy j used directly in state i by the commercial sector including public administration,

e_i = employment in S & L in state i,

E_i = employment in the commercial sector not including any of public administration,

G_i = employment in public administration not including S & L,

W_j = fraction of directly used energy in the commercial sector accounted for by S & L only, at the national level.

If S & L in state i represents a higher (lower) proportion of the total employment in the commercial sector in state i than is true for the total United States, then more (less) fuel is allocated to S & L on the basis of the ratio of the two percentages. The W_j is taken from the input-output study for the total economy by Bingham,[1] which is methodologically compatible with the Lee and Bingham study. The employment data are taken from the *Compendium of Public Employment*[7] and *County Business Patterns.*[9] The employment ratios are used to allocate fuels to S & L on the basis of the assumption that most of these fuels except for the Gasoline and Other Oils category are used primarily for space heating or water heating by both S & L and the other users in the commercial sector.

The estimates for D'_{ij} are again adjusted upward or downward according to how the estimated sum, $D'_j = \sum_i D'_{ij}$, compares with the control total, C^t_j, taken from the input-output study by Lee and Bingham. The adjusted direct energy use estimate, D_{ij}, is computed as

$$(2)\quad A_j = D'_j \Big/ C^t_j$$

$$(3)\quad D_{ij} = D'_{ij} * A_j$$

This procedure adjusts all estimates of direct energy use upward or downward by the same percentage for each category of fuel. This procedure is based on the assumption that errors in estimates produced in (1) are shared equally on a percent basis among the i states.

2.2 Direct Energy Use Coefficients

The values in (3) are converted to coefficients (btu's/dollar of purchases) by dividing by P_i, the level of purchases for goods and services including energy, thus

$$(4) \quad N_{ij}^1 = D_{ij} \,/\, P_i \,.$$

The N_{ij} represents btu's per dollar of purchases for fuel j by S & L in state i. Since the P_i data are not compiled directly, proxies are computed by the following technique. Aggregated purchases data, P^{Δ}, from the *Survey of Current Business*[10] are used as a control. To produce estimates of purchases by the "i"th state, the dollar value of expenditures, P', from the *Compendium of Public Finances,*[8] for all states is divided into the aggregate value of purchases, P^{Δ}, and then multiplies by the state level expenditures, P_i'.

$$(5) \quad P_i = \frac{P^{\Delta}}{P'} * P_i' = \frac{\Sigma P_i}{\Sigma P_i'} * P_i'$$

This procedure adjusts expenditures for S & L in the "i"th state upward or downward by the same percentage as the aggregated purchases value for all states differs from the aggregated expenditures value for all states.

2.3 Indirect Coefficient of Energy Use

Since indirect energy use data are not available on a state-by-state basis, estimates are computed using total and direct data. Obviously, state-by-state indirect energy use differs from state-to-state, but since such data are not available, average values are used. The indirect coefficient is expressed as the difference between the total coefficient, N_j, and the aggregate direct coefficient, N_j^1, computed from aggregated energy use and purchases data. From (4) summing over i, the aggregated direct coefficient is computed

$$(6) \quad N_j^1 = \Sigma_i D_{ij} \,/\, \Sigma_i P_i = D_j \,/ P$$

where P represents the total value of purchases from all states. Now the indirect coefficient, N_j^2, can be computed

$$(7) \quad N_j^2 = N_j - N_j^1$$

where N_j represents the total coefficient calculated in the study by Lee and Bingham.[5]

2.4 State Level Energy Use Coefficient

This coefficient is composed of the sum of (4) and (7) or

$$(8) \quad N_{ij} = N_{ij}^1 + N_j^2$$

which is expressed in btu's per dollar of purchases. Now with (8) it is

possible to estimate the relative energy intensity of each dollar of purchases made by S & L in each state.

2.5 Impacts of Energy Price Changes

To express the impacts of energy price changes on S & L, the values in (8) are converted from btu's per dollar to standard units of volume per dollar. The conversion ratios for the respective fuels are

Symbol	*Volume Measure*	*Btu Measure*
$j = 1$	one ton of coal	24.97×10^6
$j = 2$	one KWH of electricity	3,413
$j = 3$	1000 ft^3 of natural gas	$1,032 \times 10^3$
$j = 4$	one bbl of distillate oil	5.825×10^6
$j = 5$	one bbl of residual oil	6.287×10^6
$j = 6$	one bbl of gasoline and other oils	5.488×10^6

The conversion from btu to volume measures is expressed in (9) as

$$(9) \quad V_{ij} = (N_{ij}^1 + N_j^2)/C_j = V_{ij}^1 + V_j^2$$

where C_j represents the ratio of btu to standard volume measure for fuel j.

The impact on S & L resulting from a change in the price of fuel j can be expressed as a percentage in dollar value of purchases required to maintain a given level of services. This procedure is based on the assumption that all energy price changes are passed through to the ultimate user and that the elasticity of demand for energy in the short run is zero. To the extent that the elasticity of demand for energy is greater than zero, the estimates of impacts of energy price changes computed by this procedure are overstated. If a longer range period is considered, perhaps the elasticity of demand for energy should be considered.

The symbol j is now expressed in parentheses to denote that the "j"th fuel has undergone a price change. The percentage change in dollars of outlays for purchases is thus expressed as $\Delta P_{i(j)}$ for state i when the price of fuel j is changed.

$$(10) \quad \Delta P_{i(j)} = \left[V_{ij}^1 * pr_{i(j)} + V_j^2 * pr_{i(j)}^{\propto}\right] \quad *100$$

where $pr_{i(j)}$ represents the change in price of fuel j used directly in state i and $pr_{i(j)}^{\propto}$ represents the change in price of fuel used indirectly.

3. RESULTS

Estimates of direct purchases of energy in the six categories are produced in (1) and listed in Table 1. These estimates in btu's give some idea of

the value of energy consumed through direct purchases by S & L in individual states. Blanks in the columns represent either no energy consumption or that the total quantity consumed in one year was less than .05 x 10^{12} btu's (the rough equivalent of 2,000 tons of coal). These estimates are useful for making comparisons of raw purchases, but they fail to give one an appreciation for the relative energy purchases per total dollar outlay for all purchases, expenditures, labor time, etc. Direct energy use per dollar of total purchases of goods and services is computed in (4) and listed in Table 2. These estimates produce more useful comparisons of energy consumption relative to S & L budgets or ability to purchase. They do give some idea of the relative efficiency with which S & L use energy directly.

Indirect energy consumption per dollar of outlays for purchases are produced in (7) and listed below. These values represent average values of indirect energy used per dollar of purchases of all goods and services by all S & L in all states and the District of Columbia. They give some idea of the embodied energy in goods and services purchased by S & L. When expressed in btu's/$, the coefficients for the six fuels are: Coal, 4036.79; Electricity, 1950.43; Natural Gas, 7187.12; Distillate Oils, 2948.91; Residual Oils, 1002.80; and Gasoline and Other Oils, 8648.26. The importance of coal and natural gas in the manufacturing of goods is reflected in the high btu value of these fuels embodied in products purchased. The Gasoline and Other Oils category is a catchall category and the importance of gasoline is confounded by the inclusion of the other oils.

The estimates of total energy use by S & L on a state-by-state basis is produced in (8) and listed in Table 3. These values make it possible to analyze the regional intensities of the total energy use by S & L. Energy use per dollar of purchases is ranked by states for each fuel and for all fuels combined. From the ranks it is apparent that the coefficients reflect the effects of the differing efficiencies of energy use, regional climatic differences, and energy use relative to dollar outlays. It is interesting that the intensity of energy use is more related to the degree of urbanization or concentration of population than to regional location. Energy use intensity for all fuels combined seems to be inversely related to urbanization and population concentration in much the same way that gasoline use per capita is greater in rural areas as opposed to urban areas. The ranking of states in overall energy use does not reflect the ranks associated with the individual fuels due, perhaps, to the relative prices of the fuels and to interfuel competition.

In the interest of energy conservation, it is significant that if the intensity of directly used energy in the 10 highest energy using states had been reduced to that of the median, 12, 978 btu's/$, a total of 51.91 trillion btu's (or approximately 2.08 million tons of coal) could have been saved in direct energy purchases. The energy intensity ratios used here for directly used and for indirectly used energy are reasonable good proxies for efficiency in use since purchases are usually directly related to expenditures, tax revenue collections, and incomes generated in the state by those being served.

For policy planning purposes the impacts of proposed energy price changes, measured as the percentage change required in purchases to maintain services, assuming an energy price elasticity of demand of zero in the short run, can be estimated in equation (10). For example, the estimated percentage change in required outlays (impacts) for 1967 for each state is produced in (10) for the respective fuels. The estimated impacts on the S & L when energy prices are assumed to be increased everywhere by, say, \$2.22/ton of coal, \$.0032/KWH of electricity, \$.135/1000 ft^3 of natural gas, \$1.51/bbl of distillate oils, \$1.34/bbl of residual oils, and \$2.77/bbl of gasoline and other oils, are given in Table 4. From the ranks of impacts given in parentheses, it is apparent that an energy policy that produced across-the-board price changes for each fuel would not produce equal impacts on S & L in the states. For some fuels the most heavily impacted S & L are in one region and in other cases they are not. From this it is apparent that energy policy makers should be cautious when suggesting programs which have an impact of energy prices.

From Table 4 it is obvious that if energy policy is directed at producing the same percentage impact on all states, then different price changes are called for in different states. To maintain equal impacts, price changes for some states or regions should possibly be several times greater in one state than in another. For example, a price change of \$.135/1000 ft^3 for natural gas imposed on all states has about three times the impact on Wyoming, Nebraska, Arkansas, New Mexico, and Montana as it does on Hawaii, Maine, Vermont, New Hampshire, and Connecticut. Similarly, differential price changes for other fuels would be called for to produce equal impacts on all states. Consider the high and low ranked impacts in parentheses for other fuels.

From the differential impacts produced by across-the-board price changes it is abundantly clear that policy makers have a responsibility to be aware of and be concerned with the regional and state level impacts of energy policy changes. Since some states rely more on one fuel than another, due to interfuel competition and fuel availability, any disregard of different energy use patterns by policy makers could make the burden of energy costs more disparate than they now are.

TABLE 1

Direct Energy Use By State & Local Governments
(Trillions Of BTU's Per Year, 1967)

States	Coal	Electricity	N. Gas
Alabama	.407	1.552	8.166
Alaska	.149	.171	.801
Arizona	*	2.066	7.415
Arkansas	*	1.145	10.216
California	.039	15.570	42.784
Colorado	1.027	1.432	9.727
Connecticut	.108	1.168	1.731
Delaware	.042	.298	.479
Dist. of Columbia	.143	.326	.730
Florida	*	4.020	5.137
Georgia	.711	2.320	7.503
Hawaii	*	.204	*
Idaho	.947	.940	1.321
Illinois	12.018	5.907	34.994
Indiana	4.096	2.195	14.734
Iowa	1.344	1.314	11.611
Kansas	.049	1.610	10.689
Kentucky	2.066	1.417	8.784
Louisiana	*	2.774	14.996
Maine	.256	.390	.074
Maryland	.698	1.553	4.262
Massachusetts	.523	1.709	4.789
Michigan	6.767	4.194	28.079
Minnesota	2.458	1.148	14.752
Mississippi	*	1.492	5.639
Missouri	.547	1.757	16.723
Montana	.047	.528	4.353

Dist. Oils	Residual Oils	Gasoline & Other	Total
.025	.156	5.594	15.901
.135	.248	1.118	2.622
.012	.021	4.240	13.753
.027	*	4.338	15.725
.051	2.026	18.591	79.061
.092	.489	3.319	16.087
.888	4.171	1.669	9.735
.025	.464	1.003	2.310
.008	2.745	.031	3.982
.036	.503	7.773	17.469
.023	1.382	7.210	19.150
.004	.110	.382	.700
.489	.087	1.206	4.990
1.133	11.400	15.094	80.547
1.052	1.900	8.332	32.309
.595	.233	5.267	20.364
.069	.056	5.249	17.721
.150	.018	4.790	17.224
.030	*	5.193	22.992
.495	1.213	1.325	3.752
.102	4.709	4.499	15.823
2.267	25.384	3.690	38.362
1.701	.894	6.607	48.242
.956	.210	5.887	25.410
.025	*	3.869	11.026
.365	1.548	6.854	27.793
.083	.473	2.204	7.688

TABLE 1 continued

Direct Energy Use By State & Local Governments
(Trillions Of BTU's Per Year, 1967)

States	Coal	Electricity	N. Gas
Nebraska	.124	1.051	10.163
Nevada	.097	.516	1.185
New Hampshire	.040	.216	.319
New Jersey	1.322	2.876	6.248
New Mexico	*	.888	7.325
New York	2.946	9.497	27.005
N. Carolina	2.900	2.856	4.512
N. Dakota	.786	.383	1.674
Ohio	7.977	4.538	34.229
Oklahoma	.085	1.781	9.671
Oregon	.475	1.952	1.788
Pennsylvania	12.325	3.782	17.115
Rhode Island	*	.218	.638
S. Carolina	1.276	1.499	2.472
S. Dakota	.245	.364	3.038
Tennessee	2.348	1.393	9.037
Texas	*	7.574	31.600
Utah	.711	.546	1.528
Vermont	.079	.180	.068
Virginia	3.077	2.737	5.194
Washington	.345	3.380	3.870
W. Virginia	1.954	.815	5.797
Wisconsin	7.849	1.867	8.461
Wyoming	.114	.540	3.683
Total	81.517	110.649	467.109

*Blanks represent energy use of less than .05 x 10^{12} btu's

Dist. Oils	Residual Oils	Gasoline & Other	Total
.153	.095	1.371	12.957
.033	.025	1.000	2.856
.337	.579	.680	2.170
1.400	12.059	7.882	31.788
.017	.017	2.266	10.513
2.732	53.387	9.180	104.746
.114	1.233	6.683	18.298
.297	.071	2.697	5.909
.865	.433	11.053	59.096
.081	.016	5.988	17.622
.339	2.821	3.307	10.683
1.126	10.136	11.135	55.619
.299	1.066	.984	3.205
.039	.436	3.946	9.667
.213	.019	1.546	5.425
.147	.051	6.305	19.282
.085	.102	15.018	54.381
.080	.446	1.783	5.093
.241	.182	.485	1.235
.103	2.067	4.054	17.232
.543	3.414	3.880	15.433
.009	.284	1.130	9.989
1.368	.863	5.562	25.971
.062	.374	1.470	6.242
21.517	150.616	244.739	1076.147

TABLE 2

Direct Energy Use In BTU's Per Dollar Of Purchases
(Ranks In Parentheses)

States	Coal	Electricity	Natural Gas
Alabama	318.28	1213.68	6385.88
Alaska	481.11	552.14	2586.36
Arizona	0.00*	2488.06	8929.79
Arkansas	0.00	1717.29	15322.15
California	3.32	1323.67	3637.23
Colorado	1013.06	1412.56	9594.97
Connecticut	82.80	895.51	1327.17
Delaware	136.36	967.51	1555.16
Dist. of Columbia	311.86	710.96	1592.03
Florida	0.00	1663.34	2125.52
Georgia	434.91	1419.13	4589.54
Hawaii	0.00	434.72	0.00
Idaho	3134.94	3111.76	4373.02
Illinois	2789.25	1370.95	8121.75
Indiana	2086.67	1118.22	7506.11
Iowa	1039.11	1015.91	8976.98
Kansas	50.25	1651.10	10961.89
Kentucky	1690.45	1159.43	7187.29
Louisiana	0.00	1626.53	8792.86
Maine	688.23	1048.47	198.94
Maryland	431.96	961.08	2637.56
Massachusetts	215.54	704.33	1973.69
Michigan	1636.84	1014.47	6791.92
Minnesota	1329.14	620.77	7977.00
Mississippi	0.00	1862.41	7038.98
Missouri	312.46	1003.65	9552.63
Montana	137.58	1545.60	12742.42

Dist. Oils	Residual Oils	Gasoline & Other	Total
19.55	121.99	4374.55	12,433.9 (28)
435.90	800.77	3609.93	8,466.2 (43)
14.45	14.45	5106.18	16,552.7 (10)
40.50	0.00	6506.22	23,586.1 (2)
4.34	172.24	1580.49	6,721.3 (49)
90.75	482.36	3273.95	15,867.4 (15)
680.83	3197.93	1279.63	7,463.9 (47)
81.17	1506.46	3256.42	7,503.1 (46)
17.45	5986.48	67.61	8,686.4 (42)
14.90	208.12	3216.20	7,228.1 (48)
14.07	845.36	4410.31	11,713.3 (30)
8.52	234.41	814.03	1,491.7 (51)
1618.78	288.00	3992.33	16,518.7 (11)
262.96	2645.82	3503.16	18,693.7 (6)
535.93	967.94	4244.67	16,459.4 (12)
460.02	180.14	4072.15	15,744.2 (17)
70.76	57.43	5383.01	18,174.2 (7)
122.73	14.73	3919.30	14,093.8 (20)
17.59	0.00	3044.90	13,481.7 (24)
1330.75	3261.01	3562.11	10,089.5 (36)
63.12	2914.18	2784.22	9,792.1 (38)
934.30	10461.51	1520.76	15,810.0 (16)
411.45	216.25	1598.14	11,669.0 (31)
516.95	113.56	3183.34	13,740.6 (22)
31.21	0.00	4829.54	13,762.1 (21)
208.50	884.26	3915.19	15,876.5 (14)
242.96	1384.60	6451.71	22,504.7 (3)

TABLE 2 continued

Direct Energy Use In BTU's Per Dollar Of Purchases
(Ranks In Parentheses)

States	Coal	Electricity	Natural Gas
Nebraska	199.99	1695.07	16391.05
Nevada	327.43	1741.79	4000.03
New Hampshire	144.46	780.10	1152.10
New Jersey	477.17	1038.08	2255.20
New Mexico	0.00	1683.51	13887.06
New York	273.54	881.82	2507.49
N. Carolina	1754.96	1728.33	2730.48
N. Dakota	2284.17	1113.02	4864.76
Ohio	2052.16	1167.45	8805.75
Oklahoma	76.85	1610.21	8743.58
Oregon	452.38	1859.05	1702.86
Pennsylvania	2773.40	851.03	3851.26
Rhode Island	0.00	517.92	1515.74
S. Carolina	1677.23	1970.35	3249.30
S. Dakota	760.87	1130.44	9434.79
Tennessee	1613.31	957.13	6209.31
Texas	0.00	1902.73	7938.50
Utah	1391.99	1068.95	2991.50
Vermont	349.84	797.11	301.13
Virginia	1893.35	1684.14	3195.99
Washington	206.56	2023.66	2317.04
West Virginia	2846.60	1187.30	8445.12
Wisconsin	3695.97	879.14	3984.15
Wyoming	511.18	2421.38	16514.68

*Zeros represent total direct purchases of less than .05 x 10^{12} btu's

Dist. Oils	Residual Oils	Gasoline & Other	Total
246.76	153.22	2211.17	20,897.0 (4)
111.39	84.39	3375.56	9,640.6 (40)
1217.10	2091.11	2455.88	7,840.7 (44)
505.33	4352.66	2844.99	11,473.4 (32)
32.23	32.23	4295.98	19,930.8 (5)
253.67	4957.14	852.39	9,726.1 (39)
68.99	746.16	4044.28	11,073.2 (33)
863.10	206.33	7837.66	17,169.0 (8)
222.53	111.39	2843.49	15,202.5 (18)
73.23	14.47	5413.77	15,931.9 (13)
322.86	2686.67	3149.52	10,173.3 (35)
253.38	2280.86	2505.62	12,515.5 (27)
710.36	2532.57	2337.76	7,614.4 (45)
51.26	573.10	5186.79	12,708.0 (26)
661.49	59.01	4801.25	16,847.7 (9)
101.00	35.04	4332.16	13,247.9 (25)
21.35	25.62	3772.80	13,661.0 (23)
156.62	873.17	3490.74	9,972.9 (37)
1067.25	805.97	2147.78	5,469.1 (50)
63.38	1271.87	2494.52	10,603.2 (34)
325.10	2044.02	2323.02	9,239.4 (41)
13.11	413.73	1646.19	14,551.9 (19)
644.17	406.37	2619.06	12,228.8 (29)
278.01	1677.03	6591.52	27,993.6 (1)

TABLE 3

Total Coefficient Of Energy Use In BTU's Per Dollar Of Purchases
(Ranks In Parentheses)

States	Coal	Electricity	Natural Gas
Alabama	4355.07(29)	3164.11(24)	13572.99(23)
Alaska	4517.90(22)	2502.58(49)	9773.48(37)
Arizona	4036.79(51)	4438.49(2)	16116.91(11)
Arkansas	4036.79(50)	3667.73(11)	22509.27(3)
California	4040.11(42)	3274.10(23)	10824.35(31)
Colorado	5049.85(18)	3363.00(21)	16782.09(7)
Connecticut	4119.59(39)	2845.94(40)	8514.29(47)
Delaware	4173.15(38)	2917.94(37)	8742.28(45)
Dist. of Columbia	4348.65(31)	2661.40(46)	8779.15(44)
Florida	4036.79(49)	3613.77(15)	9312.63(41)
Georgia	4471.70(25)	3369.56(20)	1176.66(26)
Hawaii	4036.79(48)	2385.15(51)	7187.12(51)
Idaho	7171.73(2)	5062.20(1)	11560.14(27)
Illinois	6826.04(4)	3321.39(22)	15308.87(16)
Indiana	6123.46(7)	3068.66(29)	14693.23(19)
Iowa	5075.90(17)	2966.34(34)	16164.10(10)
Kansas	4087.04(41)	3601.54(16)	18149.01(6)
Kentucky	5727.24(11)	3109.86(27)	14374.41(20)
Louisiana	4036.79(47)	3576.96(17)	15979.98(13)
Maine	4725.02(20)	2998.90(32)	7386.06(50)
Maryland	4468.75(26)	2911.51(38)	9824.67(36)
Massachusetts	4252.33(33)	2654.76(47)	9160.81(42)
Michigan	5673.63(13)	2964.90(35)	13979.03(22)
Minnesota	5365.93(16)	2571.20(48)	15164.11(17)
Mississippi	4036.79(46)	3812.85(7)	14226.10(21)
Missouri	4349.25(30)	2954.08(36)	16739.75(8)
Montana	4174.37(37)	3496.03(19)	19929.54(5)

Dist. Oils	Residual Oils	Gasoline & Other	Total
2968.46(43)	1124.79(37)	13022.81(12)	38,208(28)
3384.81(15)	1803.57(23)	12258.19(22)	34,241(43)
2963.36(47)	1017.25(48)	13754.44(8)	42,327(10)
2989.40(39)	1002.80(51)	15154.48(3)	49,360(2)
2953.24(51)	1175.03(35)	10228.76(46)	32,496(49)
3039.66(31)	1485.16(25)	11922.21(27)	41,642(15)
3629.74(8)	4200.72(6)	9927.89(48)	33,238(47)
3030.07(32)	2509.25(15)	11904.68(28)	33,277(46)
2966.35(45)	6989.28(2)	8715.87(51)	34,461(42)
2963.80(46)	1210.92(32)	11864.47(29)	33,002(48)
2962.98(48)	1848.16(21)	13058.58(11)	37,488(30)
2957.43(50)	1237.20(30)	9462.29(50)	27,266(51)
4567.69(1)	1290.80(29)	12640.59(18)	42,293(11)
3211.86(20)	3648.62(9)	12151.43(24)	44,468(6)
3484.84(11)	1970.73(18)	12892.93(15)	42,234(12)
3408.93(14)	1182.94(34)	12720.41(16)	41,519(17)
3019.67(34)	1060.22(42)	14031.27(6)	43,949(7)
3071.64(28)	1017.52(46)	12567.56(19)	39,868(20)
2966.50(44)	1002.80(50)	11693.16(32)	39,256,(24)
4279.66(2)	4263.81(5)	12210.38(23)	35,864(36)
3012.03(37)	3916.98(7)	11432.49(35)	35,566(38)
3883.21(5)	1464.31(1)	10169.02(47)	41,584(16)
3360.35(16)	1219.04(31)	10246.40(45)	37,443(31)
3465.85(12)	1116.35(38)	11831.60(30)	39,515(22)
2980.11(41)	1002.80(49)	13477.81(9)	39,536(21)
3157.40(26)	1887.05(19)	12563.45(20)	41,651(14)
3191.87(24)	2387.40(16)	15099.97(4)	48,279(3)

TABLE 3 continued

Total Coefficient Of Energy Use In BTU's Per Dollar Of Purchases
(Ranks In Parentheses)

States	Coal	Electricity	Natural Gas
Nebraska	4236.78(35)	3645.50(12)	23578.17(2)
Nevada	4364.22(28)	3692.22(9)	11187.15(28)
New Hampshire	4181.25(36)	2730.54(45)	8339.21(48)
New Jersey	4513.96(23)	2988.52(33)	9442.32(40)
New Mexico	4036.79(45)	3633.94(14)	21074.18(4)
New York	4310.33(32)	2832.26(41)	9694.61(38)
N. Carolina	5791.75(10)	3678.77(10)	9917.60(35)
N. Dakota	6320.96(6)	3063.46(30)	12051.87(25)
Ohio	6088.95(8)	3117.88(26)	15992.87(12)
Oklahoma	4113.64(40)	3560.64(18)	15930.70(14)
Oregon	4489.17(24)	3809.48(8)	8889.98(43)
Pennsylvania	6810.19(5)	2801.47(43)	11038.38(30)
Rhode Island	4036.79(44)	2468.35(50)	8702.86(46)
S. Carolina	5714.02(12)	3920.78(5)	10436.42(32)
S. Dakota	4794.66(19)	3080.87(28)	16621.91(9)
Tennessee	5650.10(14)	2907.56(37)	13396.43(24)
Texas	4036.79(43)	3853.16(6)	15125.62(18)
Utah	5428.78(15)	3019.39(31)	10178.62(34)
Vermont	4386.63(27)	2747.55(44)	7488.25(49)
Virginia	5930.14(9)	3634.57(15)	10383.11(33)
Washington	4243.35(34)	3974.10(4)	9504.15(39)
West Virginia	6883.39(3)	3137.73(25)	15632.24(15)
Wisconsin	7732.76(1)	2829.57(42)	11171.27(29)
Wyoming	4547.97(21)	4371.81(3)	23701.80(1)

Dist. Oils	Residual Oils	Gasoline & Other	Total
3195.67(23)	1156.01(36)	10859.43(42)	46,671(4)
3060.30(29)	1087.18(40)	12023.82(26)	35,415(40)
4166.01(3)	3093.90(12)	11104.14(39)	33,615(44)
3454.23(13)	5355.46(4)	11493.25(33)	37,248(32)
2981.14(40)	1035.02(44)	12944.25(14)	45,705(5)
3202.58(21)	5959.93(3)	9500.65(49)	35,500(39)
3017.89(35)	1748.96(24)	12692.54(17)	36,848(33)
3812.01(6)	1209.13(33)	16485.93(1)	42,943(8)
3171.44(25)	1114.19(39)	11491.76(34)	40,977(18)
3022.14(33)	1017.26(47)	14062.03(5)	41,706(13)
3271.76(18)	3689.46(8)	11797.79(31)	35,948(35)
3202.28(22)	3283.62(11)	11153.89(37)	38,290(27)
3659.26(7)	3535.37(10)	10986.02(40)	33,389(45)
3000.17(38)	1575.89(25)	13835.05(7)	38,482(26)
3610.40(9)	1061.80(41)	13449.51(10)	42,622(9)
3049.91(30)	1037.84(43)	12980.42(13)	39,022(25)
2970.26(42)	1028.42(45)	12421.06(21)	39,435(23)
3105.53(27)	1875.97(20)	12139.00(25)	35,747(37)
4016.15(4)	1808.77(22)	10796.04(43)	31,243(50)
3012.29(36)	2274.67(17)	11142.78(38)	36,378(34)
3274.01(17)	3046.82(13)	10971.29(41)	35,014(41)
2962.02(49)	1416.53(27)	10294.46(44)	40,326(19)
3593.08(10)	1409.17(28)	11267.32(36)	38,003(29)
3226.92(19)	2679.82(14)	15239.79(2)	53,768(1)

TABLE 4

Fiscal Impact Of Energy Price Change On Purchases (% Change)*

	Coal	Electricity	Natural Gas
Assumed Price Change	$\frac{\$2.22}{\text{ton}}$	$\frac{\$.0032}{\text{KWH}}$	$\frac{\$.135}{\text{Kft}^3}$
	(Ranks In Parentheses)		
Alabama	38.72	296.66	177.55
Alaska	40.17	234.64(49)	127.85
Arizona	35.89(51)	416.15(2)	210.83
Arkansas	35.89(50)	343.88	294.45(3)
California	35.92	306.98	141.60
Colorado	44.90	315.31	219.53
Connecticut	36.63	266.83	111.38(47)
Delaware	37.10	273.58	114.36
Dist. of Columbia	38.66	249.53	114.84
Florida	35.89(49)	338.82	121.82
Georgia	39.76	315.93	154.06
Hawaii	35.89(48)	223.63(51)	94.02(51)
Idaho	63.76(2)	474.63(1)	151.22
Illinois	60.69(4)	311.41	200.26
Indiana	54.44	287.71	192.21
Iowa	45.13	278.12	211.45
Kansas	36.34	337.68	237.41
Kentucky	50.92	291.58	188.04
Louisiana	35.89(47)	335.37	209.04
Maine	42.01	281.17	96.62(50)
Maryland	39.73	272.98	128.52
Massachusetts	37.81	248.91(47)	119.84
Michigan	50.44	277.99	182.87
Minnesota	47.71	241.07(48)	198.37
Mississippi	35.89	357.49	186.10

Dist. Oils	Residual Oils	Gasoline And Other Oils
$1.51 bbl	$1.34 bbl	$2.77 bbl
76.95	23.97	657.31
87.74	38.44	618.72
76.82(47)	21.68(47)	694.24
77.49	21.37(51)	764.90(3)
76.56(51)	25.04	516.28
78.80	31.65	601.76
94.09	89.53	501.10(49)
78.55	53.48	600.87
76.90	148.97(2)	439.92(51)
76.83	25.81	598.84
76.81(48)	39.39	659.12
76.66(50)	26.37	477.60(50)
118.41(1)	27.51	638.02
83.26	77.77	613.33
90.34	42.00	650.75
88.37	25.21	642.05
78.28	22.60	708.21(6)
79.63	21.69	634.33
76.90	21.37(50)	590.20
110.94(2)	90.88(5)	616.30
78.08	83.49	577.04
100.66(5)	244.35(1)	513.27(44)
87.11	25.98	517.17
89.84	23.79	597.19
77.25	21.37(49)	680.28

*All percentages are multiplied by 1,000 to facilitate comparisons.

TABLE 4 continued

Fiscal Impact Of Energy Price Change On Purchases (% Change)

	Coal	Electricity	Natural Gas
Assumed Price Change	$\frac{\$2.22}{\text{ton}}$	$\frac{\$.0032}{\text{KWH}}$	$\frac{\$.135}{\text{Kft}^3}$
	(Ranks In Parentheses)		
Missouri	38.67	276.97	218.98
Montana	37.11	327.79	260.71(5)
Nebraska	37.67	341.80	308.44(2)
Nevada	38.80	346.18	146.34
New Hampshire	37.17	256.01	109.09(48)
New Jersey	40.13	280.20	123.52
New Mexico	35.89	340.72	275.68(4)
New York	38.32	265.55	126.82
N. Carolina	51.49	344.92	129.74
N. Dakota	56.20	287.23	157.66
Ohio	54.13	292.33	209.21
Oklahoma	36.57	333.84	208.40
Oregon	39.91	357.17	116.29
Pennsylvania	60.55(5)	262.66	144.40
Rhode Island	35.89(44)	231.43(50)	113.85(46)
S. Carolina	50.80	367.61(5)	136.52
S. Dakota	42.65	288.86	217.44
Tennessee	50.23	272.61	175.24
Texas	35.89(43)	361.27	197.86
Utah	48.27	283.10	133.15
Vermont	39.00	257.61	97.96(49)
Virginia	52.72	340.77	135.83
Washington	37.73	372.61(4)	124.33
West Virginia	61.20(3)	294.19	204.49
Wisconsin	68.75(1)	265.30	146.14
Wyoming	40.43	409.90(3)	310.05(1)

Dist. Oils	Residual Oils	Gasoline And Other Oils
$1.51 bbl	$1.34 bbl	$2.77 bbl
81.85	40.22	634.12
82.74	50.88	762.15(4)
82.84	24.64	548.12
79.33	23.17	606.89
107.99(3)	65.94	560.47
89.54	114.15(4)	580.11
77.28	22.06	653.34
83.02	127.03(3)	579.53(35)
78.23	37.28	640.64
98.82	25.77	832.11
82.21	23.75	580.03
78.34	21.68(47)	709.76(5)
84.81	78.64	595.48
83.01	69.99	562.98
94.86	75.35	554.51
77.77	33.59	698.31
93.59	22.63	678.85
79.06	22.12	655.17
77.00	21.92	626.94
80.50	39.98	612.70
104.11(4)	38.55	544.92
78.09	48.48	562.42
84.87	64.94	553.76
76.78(49)	30.19	519.60
93.14	30.03	568.70
83.65	57.12	769.21(2)

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