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SHARES OF HEATING FUELS

IN U.S. HOUSING

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Introduction and Summary

This report presents a compilation and analysis of data from the U.S. Department of Commerce on shares of heating fuels in new housing completed last year as well as in the total U.S. housing stock in existence in 1976. A cost comparison of the major heating fuels in selected cities is also included in the report.

The principal findings are as follows:

Of the nearly 1.3 million single family homes completed in 1977, electric heating for the first time was installed in half of all homes*. While this was an increase over the previous year, electric heat's share in new homes has been close to 50% since 1974. Thus, last year's figure is further evidence of the stability of electric heat in this market, following the rapid growth it experienced in the period 1970-1974.

Gas heat's share continued its slow annual decline of the past several years, dropping to 38% of total new single family homes last year. The trend reflects the decline in U.S. gas supplies and resultant regulatory restrictions (which however, are now being relaxed) on new residential gas connections in some areas.

Oil heat's share declined to 9% last year, a modest drop from the previous year's high number but about in line with oil's average share over the last several years.

*See Appendix Table A.

Since the total number of new single family homes completed last year was substantially higher than in the year before (or in any other year in the 1970's), the number of oil-heated homes built in 1977 was about the same as in 1976, the number of gas-heated homes increased by 20% and that of electrically heated homes by 28%.

New housing units in multiple dwelling structures amounted to 400,000 last year, a relatively low number. Electric heat dominated this market, registering a sharp increase to two-thirds of the total. By contrast, gas' share declined significantly from 33% to 29% and oil's from 7% to 5%*.

In the total U.S. housing stock of 73.5 million dwelling units in place in 1976 (the latest available data) gas maintained its dominant role of nearly 62% of the total which was virtually unchanged from 1970, indicating that such factors as conversions from other fuels and demolitions of gas-heated vs oil-heated dwelling units had worked to offset the decline of gas' share in newly built homes.

Oil's share of 22.4% of the U.S. housing stock represented a moderate drop from the 1970 share but the actual number of oil heated households was about the same in both years--16.5 million units. While electricity's share of about 14% was much smaller than either of the two other fuels', it had nearly doubled since 1970, reflecting the fuel's large share in newly built homes over the last 6-7 years.

*See Appendix Table B.

It should be pointed out that the national shares of the three fuels in residential heating do not coincide with the amount of heat content supplied by each because of regional weather differences. Thus, among one-family homes completed last year, 85% of those heated with oil and 75% of those heated with gas are located in the high heating Northeast and North Central regions, compared to 26% of the electrically heated homes. Over half of the latter are located in the South, the rest in the West.

A comparison of prices to residential customers for the three fuels in selected cities in each of the four regions reveals that, in general, the price per million Btu of electric heat was substantially higher than either that of oil or gas heat in all four regions in January 1978, although the differential varied sharply within and between regions. The exception to this relationship is Seattle, where dependence on hydroelectricity keeps electric rates extraordinarily low. Among the cities for which gas prices are calculated, the range was from a low of \$1.71 per million Btu in San Francisco-Oakland to a high of \$4.05 in the New York area. In all-electric homes, heating rates ranged from \$3.52 in Seattle* to \$17.79 in New York. For distillate (No. 2) heating oil the price range was much narrower: from \$3.48 in Minneapolis-St. Paul to \$3.71 in the New York area. The comparison does not take into account efficiency variations between the three fuels at the point of consumption. If these

*The next lowest electric price is Chicago's, which at \$8.55 is approximately 2 1/2 times higher than Seattle's.

were taken into account the cost differential between electricity and the two fossil fuels would be lower but still significant in all areas but Seattle.

Regional Shares of Housing Construction

The size of the home building market in each region will obviously affect national heating fuel shares. Although oil heat captures roughly one-half of the new single family home market in the North East, for instance, this region accounted for only 11% of one-family home completions in 1977. In contrast, electricity's high national share is due in large part to its dominance in the South, the most important area of new one-family home construction, where the fuel accounted for over two-thirds of the new home heating market in 1977. (See Table 1.)

Although the South had the largest share of both the single family and multifamily housing completions throughout most of the period covered, the West surpassed the South with a slightly higher percentage of multifamily completions in 1976 and 1977. (The South continued to hold the dominant share of the total new housing market). The South's share of housing construction, however, has fallen, as has the North East's, while the shares of both the North Central and the West have risen.

Housing Inventory

According to Department of Commerce data, the total number of occupied, heated housing units rose by 17% between 1970 and 1977. The West registered the most rapid growth in housing inventory (26%) over the period. The slowest growth was in the North East, where the housing stock rose only 7%.

TABLE 1

REGIONAL SHARES OF HOUSING CONSTRUCTION,
1971, 1974 AND 1977

	<u>Units Completed</u> (000)	<u>North East</u> (%)	<u>North Central</u> (%)	<u>South</u> (%)	<u>West</u> (%)
<u>Single Family</u>					
1971	1,014	13.2	20.5	46.1	20.1
1974	932	14.0	23.3	42.3	20.4
1977	1,258	10.7	23.8	40.7	24.7
<u>Multifamily</u>					
1971	NA	NA	NA	NA	NA
1974	760	12.5	20.0	45.2	22.3
1977	399	10.3	24.9	31.4	33.4
<u>Total Housing</u>					
1971	NA	NA	NA	NA	NA
1974	1,692	13.3	21.8	43.6	21.3
1977	1,657	10.6	24.1	38.4	26.8

Notes: NA: not available
Percentages may not add to 100 due to rounding.

Source: Department of Commerce. (See Appendix Tables A and B.)

The data following illustrate the rapid growth of both gas and electricity as a house heating fuel since 1950. It is interesting to note that the oil heat share rose between 1950 and 1960, but in 1976 was approximately at the 1950 level. As expected, there was a precipitous decline in the share of homes heated with coal (or other fuels, such as wood) over the period.

TABLE 2

U.S. SHARES OF HEATING FUELS IN THE HOUSING INVENTORY, 1950, 1960, 1970 and 1976

	<u>Total Units* (000)</u>	<u>Gas (%)</u>	<u>Electricity (%)</u>	<u>Oil (%)</u>	<u>Other (%)</u>
1950	41,827	29.1	0.7	23.2	47.0
1960	52,546	48.6	1.8	32.7	17.0
1970	63,051	61.6	7.7	26.1	4.6
1976	73,542	61.8	13.8	22.4	2.0

*All occupied, heated units. Figures include removals from inventory, fuel conversions, and new homes.

Source: U.S. Department of Commerce

Characteristics of the housing inventory since 1970, of course, reflect the trends shown in the housing completion data: the housing stock in the North East and North Central regions fell between 1970 and 1976 as a share of the national inventory; the share of homes heated by electricity rose substantially; only the North East showed an increase in the share of homes using oil heat.

Nationally, the oil heat shares are higher, and the electric heat shares significantly lower, than the fuels' respective shares of the new home market. This difference is due to the earlier availability of oil heat and the late popularity of electric heat. While fewer than 8% of the homes built before 1971 had electric heat, between 1970 and 1976 the number of electrically heated homes more than doubled. The total housing inventory rose about 17% over the period. (See Tables 3 and 4).

The figures in Table 4 disaggregate net additions to the housing inventory between 1970 and 1976 by region and fuel. The North Central region had the largest absolute increase in gas-heated housing--35% of the national gas additions. The largest percentage increase in gas heat (24%), however, came in the West. Similarly, the South accounted for 56% of the nationwide increase in electrically heated units, whereas the North Central region's use of electric heat grew most rapidly (150%). There was a sizable increase in oil-heated housing in the North East, but decreases in each of the other regions more than offset this increase, leading to a net decline nationwide.

Prices

In Tables 5 and 6 we report consumer prices and price increases since 1971 for the three major heating fuels. The oil and gas figures are taken from the Bureau of Labor Statistics for selected Standard Metropolitan Statistical Areas (SMSA's) and the electricity prices are taken from "All Electric Homes", published by the Department of Energy (formerly by the Federal Power Commission), for comparable cities. The highest gas price increase between January 1971 and January 1978 was registered in Houston, where the price more than

TABLE 3
SHARES OF HEATING FUELS IN THE
 HOUSING INVENTORY, 1970 AND 1976

	Total Units* (000)	Gas (%)	Electricity (%)	Oil (%)	Other (%)
<u>U.S.</u>					
1976	73,542	61.8	13.8	22.4	2.0
1970	63,051	61.6	7.7	26.1	4.6
<u>North East</u>					
1976	16,535	37.9	5.1	55.4	1.6
1970	15,466	38.2	3.1	54.4	4.3
<u>North Central</u>					
1976	19,718	76.8	6.9	15.2	1.0
1970	17,528	73.1	3.1	19.6	4.2
<u>South</u>					
1976	23,582	58.6	23.3	14.8	3.3
1970	19,134	61.3	13.3	19.0	6.3
<u>West</u>					
1976	13,707	74.7	17.8	5.8	1.7
1970	10,920	76.6	12.0	9.0	2.4

*All occupied, heated units.

Source: U.S. Department of Commerce.

TABLE 4

NET ADDITIONS TO THE HOUSING INVENTORY
BETWEEN 1970 AND 1976

<u>Units* (000)</u>	<u>U.S.</u>	<u>North East</u>	<u>North Central</u>	<u>South</u>	<u>West</u>
Gas	6,637	356	2,326	2,084	1,872
Electricity	5,275	372	820	2,954	1,129
Oil	(22)	747	(427)	(157)	(186)
Other	<u>(1,399)</u>	<u>(406)</u>	<u>(530)</u>	<u>(433)</u>	<u>(29)</u>
Total	10,491	1,069	2,190	4,448	2,787
 <u>Shares (%)</u>					
Gas	63.3	33.3	106.3	46.9	67.2
Electricity	50.3	34.8	37.5	66.4	40.5
Oil	(0.2)	69.9	(19.5)	(3.5)	(6.7)
Other	<u>(13.3)</u>	<u>(38.0)</u>	<u>(24.2)</u>	<u>(9.7)</u>	<u>(1.0)</u>
Total	100.0	100.0	100.0	100.0	100.0
 Region as Share of U.S. (Total)					
	100.0	10.2	20.9	42.4	26.6

*All occupied, heated units.

Source: Derived from Department of Commerce data.

tripled. For electricity, the New York area showed the highest increase over the period, a tripling in price. Minneapolis-St. Paul had the most rapid increase in oil price, which rose by a factor of 2.7 over the period. The oil price in Minneapolis-St. Paul, however, remains the lowest of the areas for which we report oil figures.

The unit prices reported in Table 6 are not adjusted for the efficiency of utilization. This limitation, however, does not prevent a comparison of the general pricing pattern. In most areas for which we report prices, electricity costs more than gas or oil on an equivalent heat value basis. Any reasonable adjustment for oil and gas boiler efficiencies will result in a smaller but still significant price differential. As noted previously, the price of electricity in Seattle makes the price relationship among the three fuels in that city exceptional. The prices for electricity fall into a wide range. The lowest price that we have recorded for 1978 is Seattle's, where electricity is generated largely by hydropower, and the highest price is New York's, where electricity is generated largely by low sulfur residual fuel oil. Of the four areas for which both oil and gas prices are shown, only New York-N.E. New Jersey has a higher gas than oil price as of January 1978. This is due partly to the fact that the gas must be transported over relatively longer distances to the Northeastern market. The rolling-in of high-priced synthetic

natural gas (SNG) for Brooklyn Union Gas and Public Service Gas and Electric, the two principle utilities serving this area, also tends to raise the average gas price. In the other areas, the gas price is lower than oil and varies substantially among the regions. The differences are of course the result of many factors, including the proximity to producing areas, whether the gas is produced and consumed in the same state, and the mix of gas supplied under old (lower-priced) and new (higher-priced) contracts.

The nationwide variability of oil prices has narrowed considerably since 1971. In that year, the highest price we have reported was 22% above the lowest price, while in 1978 the comparable spread was 7%. Gas and electricity prices, however, followed the opposite trend, showing increasing regional differentials. These movements would not be unexpected, given federal measures which equalize the cost of oil and the factors discussed above which have influenced the prices of other fuels.

TABLE 5

INDEX OF THE PRICE OF FUELS IN SELECTED
CITIES, JANUARY, 1971-1978

(1971 = 100)

		Indexes						
		1972	1973	1974	1975	1976	1977	1978
<u>GAS (for Residential Heating)</u> (¢/Therm) 100=								
North East								
Boston	15.7	115	116	134	162	201	230	218
New York-N.E. New Jersey	13.6	115	122	138	168	221	267	297
Philadelphia	14.3	102	107	120	140	166	178	213
North Central								
Chicago-N.W. Indiana	10.2	108	111	118	140	159	213	224
Minneapolis-St. Paul	9.1	109	118	123	148	158	212	281
Detroit	8.7	109	114	132	155	223	263	301
South								
Atlanta	8.2	122	134	136	148	171	204	239
Houston	9.3	103	108	112	162	240	305	321
Washington, D.C.	13.6	111	115	118	150	183	236	267
West								
San Francisco-Oakland	7.1	107	118	129	181	214	237	239
Seattle	11.6	108	110	132	163	209	246	260
<u>ELECTRICITY</u> (¢/Kilowatt Hour) 100=								
North East								
Boston	2.08	107	101	133	171	180	179	227
New York	2.02	115	129	180	253	279	313	300
Philadelphia	1.79	120	123	135	220	196	208	220
North Central								
Chicago	1.54	110	111	117	142	157	168	190
Minneapolis	1.56	113	115	121	157	168	181	214
Detroit	1.58	106	125	137	195	182	236	235
South								
Atlanta	1.47	108	114	129	175	194	227	237
Houston	1.63	104	106	116	132	169	167	184
Washington, D.C.	1.64	101	112	143	201	198	201	196
West								
Los Angeles	1.51	107	131	170	185	232	237	288
San Francisco	1.52	113	113	128	152	170	189	213
Seattle	0.78	108	108	108	123	123	123	154

(continued)

TABLE 5 (Cont'd)

INDEX OF THE PRICE OF FUELS IN SELECTED
CITIES, JANUARY, 1971-1978

(1971 = 100)

		Indexes						
		1972	1973	1974	1975	1976	1977	1978
<u>HEATING OIL (No. 2)</u>	(¢/Gallon) 100=							
North East								
Boston	19.8	104	105	166	203	215	228	255
New York-N.E. New Jersey	19.7	103	106	187	203	221	242	261
Philadelphia	19.8	96	98	158	192	207	228	251
North Central								
Chicago-N.W. Indiana	18.1	102	103	175	187	219	240	268
Minneapolis-St. Paul	17.8	101	102	195	200	223	252	271
Detroit	18.6	100	103	163	192	215	240	266
South								
Washington, D.C.	19.6	100	101	170	195	214	240	261
West								
Seattle	22.0	101	101	152	186	204	215	231

Notes: Prices are unadjusted for different efficiencies of use.

Original units of measure:

Gas: \$/100 Therms (Therm = 100,000 BTU)

Electricity: \$/25,000 KWH annual use for Boston, New York, Philadelphia, Chicago, Minneapolis, Detroit, Washington, D.C. and Seattle.

\$/15,000 KWH annual use for Atlanta, Houston, Los Angeles and San Francisco.

Oil: \$/100 gallons.

Gas data unavailable for Los Angeles. Oil data unavailable for Atlanta, Houston, Los Angeles, and San Francisco-Oakland.

Sources: Oil and gas data derived from Bureau of Labor Statistics, "Retail Prices and Indexes of Fuels and Utilities." Electricity data from Federal Power Commission/Department of Energy, "All Electric Homes," for 1971-1977; direct communication with the major utility serving each city or with Department of Energy for 1978 figures, which are computed on a comparable basis.

TABLE 6

PRICES OF FUELS IN SELECTED CITIES,
JANUARY 1971, 1974 AND 1978

(\$/million BTU)

	<u>1971</u>	<u>1974</u>	<u>1978</u>
<u>GAS (for Residential Heating)</u>			
North East			
Boston	1.57	2.10	3.42
New York-N.E. New Jersey	1.36	1.89	4.05
Philadelphia	1.43	1.71	3.05
North Central			
Chicago-N.W. Indiana	1.02	1.21	2.31
Minneapolis-St. Paul	.91	1.12	2.56
Detroit	.87	1.16	2.63
South			
Atlanta	.82	1.12	1.97
Houston	.93	1.04	2.98
Washington, D.C.	1.36	1.60	3.64
West			
San Francisco-Oakland	.71	.92	1.71
Seattle	1.16	1.53	3.02
<u>ELECTRICITY</u>			
North East			
Boston	6.10	8.12	13.83
New York	5.92	10.67	17.79
Philadelphia	5.25	7.09	11.55
North Central			
Chicago	4.51	5.27	8.55
Minneapolis	4.63	5.56	9.79
Detroit	4.63	6.33	10.87
South			
Atlanta	4.31	5.54	10.23
Houston	4.78	5.54	8.76
Washington, D.C.	4.81	6.86	9.44
West			
Los Angeles	4.42	7.53	12.74
San Francisco	4.45	5.68	9.50
Seattle	2.29	2.46	3.52
<u>HEATING OIL (No. 2)</u>			
North East			
Boston	1.42	2.37	3.63
New York-N.E. New Jersey	1.42	2.66	3.71
Philadelphia	1.43	2.26	3.58
North Central			
Chicago-N.W. Indiana	1.31	2.28	3.50
Minneapolis-St. Paul	1.29	2.50	3.48
Detroit	1.34	2.18	3.54
South			
Washington, D.C.	1.41	2.40	3.70
West			
Seattle	1.58	2.42	3.66

Note: See Notes and Sources for Table 5.

APPENDIX TABLE A

SHARES OF HEATING FUELS IN ONE-FAMILY
HOMES COMPLETED, BY REGION, 1971-1977

		Number of Homes Completed (000)	Gas %	Electricity %	Oil %	Other %
<u>U.S.</u>	1971	1,014	60	31	8	1
	1972	1,143	54	36	8	1
	1973	1,174	47	42	10	1
	1974	932	41	49	9	1
	1975	866	40	49	9	2
	1976	1,026	39	48	11	2
	1977(P)	1,258	38	50	9	2
	<u>North East*</u>	1971	134	42	25	31
1972		149	37	30	32	1
1973		155	34	29	35	3
1974		131	29	39	32	1
1975		113	24	33	41	3
1976		120	15	31	51	3
1977(P)		135	17	31	49	3
<u>North Central*</u>		1971	208	78	12	9
	1972	231	74	16	10	1
	1973	255	61	26	13	1
	1974	217	51	36	12	1
	1975	215	49	38	9	4
	1976	270	48	40	10	2
	1977(P)	300	46	40	10	4
	<u>South*</u>	1971	467	49	45	5
1972		524	42	52	4	1
1973		514	33	59	7	1
1974		394	28	67	4	1
1975		358	29	66	4	1
1976		404	29	64	5	2
1977(P)		512	27	67	4	2
<u>West*</u>		1971	204	78	21	1
	1972	239	72	26	-	1
	1973	251	70	29	1	1
	1974	190	65	33	1	1
	1975	181	59	39	-	2
	1976	231	60	40	-	-
	1977(P)	311	57	42	-	1

Notes: Percentages may not add to 100 due to rounding. (P): Preliminary

*North East: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, and Pennsylvania.

North Central: Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas.

South: Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma and Texas.

West: Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Washington, Oregon, California, Alaska, and Hawaii.

APPENDIX TABLE B

SHARES OF HEATING FUELS IN UNITS OF MULTIFAMILY BUILDINGS COMPLETED, BY REGION, 1974-1977

		<u>Number Of Units Completed</u> (000)	<u>Gas</u> (%)	<u>Electricity</u> (%)	<u>Oil</u> (%)	<u>Other</u> (%)
<u>U.S.</u>	1974	760	35	60	4	1
	1975	430	33	59	7	2
	1976	336	33	59	7	1
	1977(P)	399	29	66	5	1
<u>North East</u>	1974	95	28	44	22	6
	1975	69	24	35	34	8
	1976	49	22	42	32	4
	1977(P)	41	22	48	24	6
<u>North Central</u>	1974	152	59	39	1	1
	1975	93	50	49	-	1
	1976	83	46	52	2	-
	1977(P)	99	39	55	6	-
<u>South</u>	1974	344	21	76	2	-
	1975	164	18	78	3	-
	1976	101	18	76	6	1
	1977(P)	125	13	85	2	-
<u>West</u>	1974	170	47	53	-	-
	1975	103	46	53	-	-
	1976	103	42	57	-	-
	1977(P)	133	39	61	-	-

Note: Percentages may not add to 100 due to rounding.
(P): Preliminary

* See Appendix Table A for states included in each region.