AN ANALYSIS OF THE INCREASE IN RESIDENTIAL ENERGY COSTS IN OHIO, 1969 TO THE PRESENT

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TABLE OF CONTENTS

I. Introduction and Summary

The National Regulatory Research Institute (NRRI) has undertaken this study to assess the extent of increases in Ohio residential energy prices and costs since 1969. The NRRI was requested by the Ohio Department of Public Welfare to collect data on the increase in residential energy prices and energy costs, particularly heating season costs in Ohio. The Department intends to use such data to argue before the Ohio legislature and the U.S. Department of Agriculture (USDA) that energy assistance payments should be exempted from the USDA's calculation of a food stamp recipient's income for the purpose of determining the level of benefits due to the recipient.

This report tracks the increases in residential fuel prices and annual bills and in estimated heating season bills. The data in this report show, perhaps not surprisingly, that residential energy costs have risen enormously since 1969. The average Ohio residential energy price increased from $1.57 per million Btu (a unit of energy) in 1969 to $9.07 in 1983. This is an increase of 478 percent, representing an annual rate of increase of 13.3 percent. The Ohio 1984 average energy price, while precise data are not yet available, is estimated to be some eight percent above the 1983 average price.

The type of data reported here is summarized in figure 1. U.S. and Ohio residential prices for 1969 to 1983 are reported in tables 1 through 5 for natural gas, electricity, fuel oil, coal, and kerosene, respectively. The fuels are listed in order of declining Ohio residential use, with natural gas supplying more of Ohio's at-home energy needs than any other fuel.

Prices for bottled gas, tank gas, liquified petroleum gas, wood, and other fuels are not available for this time period, and no reasonable method for estimating their prices is known. However, omitting these fuels does not seriously affect the results because these fuels each represent less than three percent of Ohio's residential energy use, depending on the

	U.S. & Ohio Residential Prices 1969-1983	U.S. & Ohio Annual Residential Bills, 1969-1983	Ohio Monthly Residential Heating Season Bills, 1969-1983
Natural Gas	Table 1	Table 7	Table 9
Electricity	Table 2	Table 8	Table 10
Fuel Oil	Table 3		Table 11
Coal	Table 4		
Kerosene	Table 5		
Weighted Average	Table 6		

Fig. 1 Summary of data in tables 1 through 11 of this report

year; altogether they represent no more than about five percent in any year. The weighted average prices reported in table 6 are the average of the prices we report, with prices for certain other fuels included when these are available. When these other fuels are included, the effect is to raise very slightly the weighted price because use of the expensive gaseous fuels is about twice that of (often) inexpensive wood. Omission of these fuels has little effect on the percentage increase in average price, not only because of their small contribution to the average, but also because price trends for these other fuels tend to follow the price trends of the reported major fuels.

Energy bills depend both on energy prices and energy use. Clearly, if energy consumption for every Ohio household remained the same over the last fifteen years, percentage changes in bills would exactly equal percentage changes in energy prices. However, usage patterns have shifted significantly with the natural gas shortages of the mid-1970s and the consequent temporary ban on new gas residential hook-ups. Also, the skyrocketing price of fuel oil caused homeowners to switch to other fuels as it came time to replace older furnaces. In the main, electricity filled the void where and when gas was not available. Residential usage patterns resulted from a balance between the penetration of new appliances (microwave ovens, kerosene space heaters, and so on), which tends to increase usage, and the development of an energy conservation ethic (particularly for residential insulation), which tends to decrease usage.

Firm data on annual U.S. and Ohio energy bills are available (or able to be estimated reliably) only for natural gas and electricity. These are contained in tables 7 and 8. These two energy sources together represent well over 90 percent of Ohio residential energy use; about 84 percent of Ohio housing units use one of these fuels for residential heating. However, Ohio residential heating season monthly bills are available or can be reliably estimated not only for natural gas and electricity, but also for fuel oil. These are reported in tables 9, 10, and 11. Note that table 8 gives <u>annual</u> bills for <u>all</u> residential electric customers, averaging

together those who heat with electricity and those (the majority) who do not. Table 10, on the other hand, presents monthly bills only for those with electric heat.

Table 12 contains a summary of the data in tables 1 through 11.

It is important to note that most Ohioans, those who do not have electric heat, receive more than one fuel bill. For example, the typical Ohioan pays both a gas bill and an electric bill. As a result annual home energy costs are higher than reported in either table 7 or table 8, but less than the sum of the bills reported in these two tables.

The focus here is on only the residential sector. This makes certain data hard to obtain. For example, coal prices at the mine mouth are readily attainable for Ohio coal (usually bituminous coal), but prices for coal delivered to the home (usually anthracite coal, probably from Pennsylvania) are hard to obtain and had to be estimated for some years. Typically, the home price is several times the mine-mouth price. The last section of this report, "Data Sources," contains a discussion of the reports and documents we used to obtain these data and the difficulties in obtaining a full data set. Where data were unavailable, we estimated the energy price or usage if it was possible to do so with confidence in the result. Each estimate is noted and explained in the table footnotes.

The residential sector, of course, includes homeowners and apartment dwellers--individuals of all income classifications. Our approach is, thus, broad in that it is not limited to persons of low income. Low income energy users could have lower than average consumption (and therefore bills) because their use is probably limited to essential energy use. On the other hand, they may have higher than average use if they occupy older, draftier, more poorly insulated dwellings. The poor may be homeowners who cannot afford insulation or apartment dwellers whose landlords have no incentive to insulate in order to lower their tenants' heating bills.

II. Ohio Residential Energy Cost Trends, 1969-1983

Tables 1 through 12 form the core of this report. Three main types of data are contained in the tables: average annual residential fuel prices, average annual residential bills, and estimated monthly average heating season bills. The following discussion is organized according to these main classifications.

Residential Fuel Prices

Tables 1 through 5 show U.S. and Ohio average annual residential prices for natural gas, electricity, heating oil, coal, and kerosene for 1969 to 1983. According to 1980 census data, these fuels are used for home heating by over 95 percent of the homes in Ohio.[1]

Tables 1 through 5 show also the price increase experienced each year over this period. The total price increase over the entire period and the average annual rate of increase for the period are reported for all fuels in table 12.

Fuel prices from various sources may be reported in different ways, according to the unit of measure. For example, natural gas prices for various years may be reported in cents per hundred cubic feet or dollars per thousand cubic feet. Other typical units are cents per kilowatt-hour (electricity), dollars per barrel (oil), dollars per ton (coal), and cents per gallon (kerosene). Sometimes, instead of these physical units of measure, prices are reported in thermal units, i.e., in terms of the energy content of the fuel. These prices are in such units as cents per therm or dollars per million British thermal units (Btu). We decided to convert all prices to a common unit (dollars per million Btu) so that comparison for

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[1]See Roger F. Dreyer, "Ohio's Residential Fuel Oil Market Disappearing," Ohio Petroleum Marketer, July/August 1984, p. 4. The breakdown by fuel given in the article is natural gas--71 percent of the homes, electricity--13 percent, fuel oil, kerosene--10.8 percent, bottled or LP gas--2.7 percent, wood--1.4 percent, coal or coke--0.8 percent, other--0.3 percent.

various fuel prices is easy and so that calculation of an Ohio weighted average price is possible.

Table 1 presents the natural gas prices. Because 71 percent of Ohioans use natural gas as a heating fuel, the prices in this table are particularly important for determining the extent to which Ohioans have been affected by energy price increases.

Table 1 shows that the average annual Ohio residential natural gas price rose from 84 cents per million Btu in 1969 to $5.64 per million Btu in 1983. This represents an increase of 571 percent in the price of natural gas paid by Ohioans over the period. For the U.S. as a whole, the price of natural gas rose from $1.01 per million Btu in 1969 to $5.84 per million Btu in 1983. This is an increase of 478 percent in the U.S. price of natural gas during this time. In both Ohio and the U.S., the major price increases occurred during the 1974-to-1977 and 1979-to-1983 periods.

Two points should be made about the data in table 1. First, Ohio residential natural gas prices were lower than the national average throughout the period. However, as noted above, Ohio prices have risen at a somewhat higher rate than have U.S. average prices.

Table 2 presents the average annual residential electricity prices for the U.S. and Ohio. Ohio prices have risen from a 1969 level of $6.66 per million Btu to a 1983 price of $21.78 per million Btu. U.S. residential prices have risen from $6.48 per million Btu in 1969 to $21.04 per million Btu in 1983. Major increases in Ohio average residential prices came in 1974-1975 and 1977-1983. The pattern is similar for the entire United States.

Electricity prices in Ohio are close to the national average, although they are slightly above that average. In addition, residential prices in Ohio rose during this period at a rate very slightly greater than that for the entire United States. For Ohio, the absolute increase in price was 227

TABLE 1

U.S. AND OHIO AVERAGE ANNUAL RESIDENTIAL
NATURAL GAS PRICES, 1969 TO 1983
(Dollars Per Million Btu)

(1) Year	(2) Average Annual U.S. Residential Natural Gas Price	(3) Percentage Change in U.S. Price from Previous Year	(4) Average Annual Ohio Residential Natural Gas Price	(5) Percentage Change in Ohio Price from Previous Year
1969	1.01	—	.84	—
1970	1.06	4.9	.88	4.8
1971	1.12	5.7	.96	9.1
1972	1.19	6.2	1.03	7.3
1973	1.26	5.9	1.08	4.9
1974	1.42	12.7	1.21	12.0
1975	1.67	17.6	1.47	21.5
1976	1.94	16.2	1.73	17.7
1977	2.31	19.1	2.16	24.9
1978	2.50	8.2	2.37	9.7
1979	2.91	16.4	2.74	15.6
1980	3.60	23.7	3.49	27.4
1981	4.19	16.4	3.88	11.2
1982	5.04[a]	20.3	4.52[b]	16.5
1983	5.84[a]	15.9	5.64[b]	24.8

Sources: The 1969 U.S. average residential natural gas price was taken from American Gas Association, Gas Facts, 1975 Data (Arlington, VA: American Gas Association, 1976), p. 111. The U.S. and Ohio average annual residential natural gas prices for 1970 to 1981 were taken from U.S. Department of Energy, Energy Information Administration, State Energy Price and Expenditure Report 1970-1981 (Washington, D.C.:

Table 1 footnotes, continued

1984), pp. 3, 151. The U.S. average residential natural gas prices for 1982 and 1983 were computed from data contained in the April 1984 issue (published in July 1984) of U.S. Department of Energy, Energy Information Administration, Monthly Energy Review, p. 98. The 1982 Ohio residential average price was computed from data contained in Ohio Department of Development, Division of Energy, 1983 Ohio Energy Status Report (Columbus, OH: 1984), p. 74. The 1969, and 1983 Ohio average annual prices were obtained from the Ohio Division of Energy. All percentages were computed by the authors.

[a]The Energy Information Administration's Monthly Energy Review reports natural gas prices in dollars per thousand cubic feet (mcf). The 1983 price was converted to dollars per million Btu by use of a conversion factor found on p. 122 of the April 1984 issue of the Review. For non-utility consumption in 1983 the Btu content of dry natural gas was 1,026 Btu per cubic foot. Thus, one thousand cubic feet of natural gas contained 1,026,000 Btu, slightly more than the 1,000,000 Btu content for the prices reported in the table. To convert the price per mcf to a price per million Btu, the proportion 1,000,000 Btu divided by 1,026,000 Btu was multiplied by the dollar per mcf price to produce a dollar per million Btu price for 1983. For the 1982 U.S. average price, the conversion factor was taken from American Gas Association, Gas Facts, 1982 Data (Arlington, VA: American Gas Association, 1983), p. 205. In 1982, one thousand cubic feet of gas contained 1,025,800 Btu. The proportion was derived in the same manner as described above for the 1983 data and was then used to convert the 1982 price reported in the Monthly Energy Review to dollars per million Btu.

[b]The Ohio Division of Energy's 1983 Ohio Energy Status Report reports natural gas prices in dollars per thousand cubic feet. The 1982 Ohio average residential price was converted to dollars per million Btu in a manner similar to that described in footnote a above for U.S. residential prices. A conversion factor of 1,028,400 Btu per 1 mcf of Ohio natural gas in 1982 was obtained from American Gas Association, Gas Facts, 1982 Data, p. 76. The resulting proportion was .9724 and this was used to calculate the price reported in the table.

TABLE 2

U.S. AND OHIO AVERAGE ANNUAL RESIDENTIAL
ELECTRICITY PRICES, 1969 TO 1983
(Dollars Per Million Btu)

(1) Year	(2) Average Annual U.S. Residential Electricity Price	(3) Percentage Change in U.S. Price from Previous Year	(4) Average Annual Ohio Residential Electricity Price	(5) Percentage Change in Ohio Price from Previous Year
1969	6.48[a]	—	6.66	—
1970	6.54	0.9	7.03	5.5
1971	6.82	4.3	7.24	3.0
1972	7.12	4.4	7.36	1.7
1973	7.45	4.6	7.58	3.0
1974	9.08	21.9	9.33	23.1
1975	10.30	13.4	10.93	17.1
1976	10.97	6.5	11.29	3.3
1977	11.91	8.6	12.59	11.5
1978	12.66	6.3	13.72	9.0
1979	13.62	7.6	14.87	8.4
1980	15.73	15.5	16.35	10.0
1981	18.06	14.8	18.51	13.2
1982	20.11[a]	11.4	19.78[a]	6.9
1983	21.04[a]	4.6	21.78[a]	10.1

Sources: The data in this table cover only privately-owned utilities and were obtained from the following sources. The 1969 U.S. average residential electricity price was computed from data contained in U.S. Department of Energy, Energy Information Administration, Annual Energy Review 1983 (Washington, D.C.: 1984), p. 207. The 1969

Table 2 footnotes, continued

Ohio average residential price was obtained through the Ohio Division of Energy from the U.S. Department of Energy's State Energy Price System. The average annual residential electricity prices for both the U.S. and Ohio from 1970 to 1981 were taken from U.S. Department of Energy, Energy Information Administration, State Energy Price and Expenditure Report 1970-1981 (Washington, D.C.: 1984), pp. 3 and 151. The average annual U.S. residential prices for 1982 and 1983 were computed from data in the Energy Information Administration's Monthly Energy Review, April 1984, p. 99. The 1982 and 1983 Ohio average residential prices were computed from data contained in Ohio Department of Development, Division of Energy, 1983 Ohio Energy Status Report (Columbus, OH: 1984), p. 70. The percentages in the table were calculated by the authors.

[a]The Energy Information Administration's Annual Energy Review 1983, and Monthly Energy Review, and the Ohio Division of Energy's 1983 Ohio Energy Status Report report electricity prices in cents per kilowatt-hour (kWh). These prices were converted to dollars per million Btu by use of a conversion factor found in the Monthly Energy Review, April 1984, p. 122. The Review notes that the energy content of one kWh is 3,412 Btu. Dividing 1,000,000 Btu (the basis for the prices reported in the table) by 3,412 yields the number of kilowatt-hours equivalent to 1,000,000 Btu: 293.08324. That number was then multiplied by the cents per kWh prices to derive the cents per million Btu prices.

percent from 1969 to 1983, while the increase was 225 percent for the country as a whole.

Table 3 shows the U.S. and Ohio average annual residential heating oil prices. In Ohio, prices rose from $1.15 per million Btu in 1969 to $7.30 per million Btu in 1983. For the U.S., the increase was from $1.28 per million Btu in 1969 to $7.77 per million Btu in 1983. Major price increases in Ohio were in 1974, 1976-77 and 1979-81 with decreases in 1982 and 1983. The largest price increases for the entire country were in 1973-74, 1977, and 1979-81. The U.S. prices also decrease in 1982 and 1983.

Ohio residential heating oil prices were consistently a little lower than national residential average prices throughout this period. However, as in the case of natural gas and electricity, the prices in Ohio have risen at a higher rate. The absolute percentage increase in residential heating oil price in Ohio during this time was 535 percent. For the U.S. the corresponding figure is 507 percent.

Table 4 presents U.S. and Ohio residential coal prices. From 1969 to 1983, the Ohio residential average coal price rose from 70 cents per million Btu to $3.30 per million Btu. The average residential price of coal in the entire U.S. rose from 68 cents per million Btu in 1969 to $4.01 per million Btu in 1983. Major increases in both the Ohio and U.S. prices occurred in 1974.

The Ohio residential average coal price was sometimes a little higher and sometimes a little lower than the U.S. residential average price, but in most years of this period it was close to the national average. Over these years, the increase in the Ohio price was 371 percent while the increase in the U.S. price was 490 percent.

Table 5 contains the U.S. and Ohio annual average kerosene prices for residential sales. For Ohio, the price rose from $1.38 per million Btu in

TABLE 3

U.S. AND OHIO AVERAGE ANNUAL RESIDENTIAL
HEATING OIL PRICES, 1969 TO 1983
(Dollars Per Million Btu)

(1) Year	(2) Average Annual U.S. Residential Heating Oil Price[a]	(3) Percentage Change in U.S. Price from Previous Year	(4) Average Annual Ohio Residential Heating Oil Price[a]	(5) Percentage Change in Ohio Price from Previous Year
1969	1.28[b]	—	1.15[c]	—
1970	1.33	3.9	1.20	4.3
1971	1.41	6.0	1.28	6.7
1972	1.41	0.0	1.29	0.8
1973	1.64	16.3	1.36	5.4
1974	2.61	59.1	2.35	72.8
1975	2.74	5.0	2.51	6.8
1976	2.94	7.3	2.77	10.4
1977	3.32	12.9	3.20	15.5
1978	3.56	7.2	3.42	6.9
1979	4.83	35.7	4.80	40.4
1980	7.04	45.8	6.66	38.8
1981	8.72	23.9	8.51	27.8
1982	8.36[b]	-4.1	7.95[b]	-6.6
1983	7.77[b]	-7.1	7.30[b]	-8.2

Sources: The 1969 U.S. average residential heating oil price was computed from data contained in U.S. Department of Energy, Energy Information Administration, Annual Energy Review 1983 (Washington, D.C.: 1984), p. 135. The U.S. and Ohio average annual residential prices for 1970 to 1981 were taken from U.S. Department of Energy, Energy Information Administration, State Energy Price and Expenditure Report 1970-1981 (Washington, D.C.: 1984), pp. 3 and 151. The U.S.

Table 3 footnotes, continued

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and Ohio average annual residential prices for 1982 and 1983 were computed from data in U.S. Department of Energy, Energy Information Administration, Monthly Energy Review, April 1984, p. 97. All percentages are authors' calculations.

[a]The U.S. Department of Energy sources for this table vary as to whether or not they include state or local sales taxes in their reports of residential heating oil prices. The Annual Energy Review includes such taxes up to 1977 and then excludes them. The Monthly Energy Review also excludes taxes from 1978 on. The introduction to the State Energy Price and Expenditure Report (p. xiv) states however that taxes paid by the customers at the time of purchase are generally included in the price listings. Thus, the prices listed in this table will for the most part include state or local sales and excise taxes. The exceptions are the 1982 and 1983 U.S. and Ohio average prices.

[b]The U.S. DOE's Annual Energy Review 1983 and Monthly Energy Review report heating oil prices in cents per gallon. These prices were converted to dollars per million Btu by using conversion data found on page 123 of the April 1984 issue of the Monthly Energy Review. It is noted that there are 5,825,000 Btu per barrel of distillate fuel oil (which is home heating oil). It is also noted that there are 42 gallons in each barrel of oil. Dividing the Btu content of one barrel by the number of gallons in that barrel yields the Btu content of one gallon of oil. That number is 138,690.48 Btu, roughly one-seventh of the 1,000,000 Btu basis for the prices reported in this table. By dividing 1,000,000 Btu by 138,690.48 Btu, the authors derived a factor of 7.21, representing the number of gallons needed to obtain 1,000,000 Btu. This factor was then multiplied by the cents per gallon prices to obtain dollars per million Btu.

[c]The 1969 Ohio average residential heating oil price was estimated by the authors in the following manner. From 1969 to 1970, as seen in column 3 of the table, the average annual U.S. residential heating oil price rose by 3.9 percent, from $1.28 to $1.33 per million Btu. The authors assumed that the Ohio price rose by the same percentage and estimated the 1969 price by use of the following equation.

$1.20 (1970 Ohio average annual residential heating oil price)	÷	1.039 (increase from 1969 to 1970 in U.S. avg. annual residential price)	=	$1.15 (estimated 1969 Ohio avg. residential heating oil price)

TABLE 4

U.S. AND OHIO AVERAGE ANNUAL RESIDENTIAL
COAL PRICES, 1969 TO 1983
(Dollars per Million Btu)

(1) Year	(2) Average Annual U.S. Residential Coal Price	(3) Percentage Change in U.S. Price from Previous Year	(4) Average Annual Ohio Residential Coal Price	(5) Percentage Change in Ohio Price from Previous Year
1969	0.68[a]	—	0.70[a]	—
1970	0.85[a]	25.0	0.81[a]	15.7
1971	0.96	12.9	0.89	9.9
1972	1.05	9.4	1.07	20.2
1973	1.17	11.4	1.15	7.5
1974	2.15	83.8	2.57	123.5
1975	2.38	10.7	2.62	1.9
1976	2.32	-2.5	2.61	-0.4
1977	2.48	6.9	2.85	9.2
1978	2.54	2.4	2.73	-4.2
1979	2.45	-3.5	2.72	-0.4
1980	2.71	10.6	2.94	8.1
1981	3.35	23.6	3.19	8.5
1982	3.77[a]	12.5	3.22	1.0
1983	4.01[a]	6.4	3.30	2.5

Source: The 1969 and 1970 U.S. and Ohio average annual prices were estimated on the basis of data in U.S. Bureau of Mines, Minerals Yearbook (Washington, D.C.: 1969-71). The U.S. and Ohio average prices for 1971 to 1981 were taken from U.S. Department of Energy, Energy

Table 4 footnotes, continued

Information Administration, State Energy Price and Expenditure Report 1970-1981 (Washington, D.C.: 1984), pp. 3 and 151. The 1982 and 1983 U.S. annual prices were calculated on the basis of data in U.S. Department of Energy, Energy Information Administration, Annual Energy Review 1983 (Washington, D.C.: 1984), p. 185. The 1982 and 1983 Ohio annual prices were obtained from the Ohio Division of Energy and are based on a limited survey conducted by the Division. The percentages were calculated by the authors.

[a]The authors estimated the 1969 and 1970 U.S. and Ohio coal prices on the basis of prices at the mine-mouth, obtained from the Bureau of Mines' Minerals Yearbook. The authors also estimated the 1982 and 1983 U.S. average prices because no published prices were available. The latter prices were estimated on the basis of prices of anthracite coal at preparation plants obtained from the U.S. Department of Energy's Annual Energy Review 1983. For the 1970 U.S. and Ohio estimated prices, the 1971 U.S. and Ohio annual average residential prices from the State Energy Price and Expenditure Report were multiplied by the ratio of the 1970 mine-mouth price to the 1971 mine-mouth price (one ratio for the U.S., one for Ohio) to derive the 1970 prices reported in the table. For 1969, the 1970 estimated prices were multiplied by the ratio of the 1969 mine-mouth price to the 1970 mine-mouth price (again, one ratio for the U.S. and a separate one for Ohio). For the 1982 U.S. estimate, the 1981 price reported in the table was multiplied by the ratio of the 1982 U.S. anthracite price to the 1981 anthracite price. This 1982 estimate was then multiplied by the ratio of the 1983 anthracite price to the 1982 anthracite price to obtain the 1983 estimate reported in the table. Estimating the 1970 prices was necessary because, based on a variety of other energy data sources, the authors decided to reject as erroneous the 1970 U.S. and Ohio average residential coal prices reported in the U.S. Department of Energy's State Energy Price and Expenditure Report. Those prices, 35 cents per million Btu for the U.S. and 32 cents per million Btu for Ohio, resulted in calculated changes between 1970 and 1971 of 174 percent in the U.S. price (35 cents to 96 cents per million Btu) and 178 percent in the Ohio price (32 cents to 89 cents per million Btu). Such dramatic increases at that particular time are unfounded although major increases did occur later (1973 to 1974).

TABLE 5

U.S. AND OHIO AVERAGE ANNUAL RESIDENTIAL KEROSENE PRICES, 1969 TO 1983
(Dollars per Million Btu)

(1) Year	(2) Average Annual U.S. Residential Kerosene Price	(3) Percentage Change in U.S. Price from Previous Year	(4) Average Annual Ohio Residential Kerosene Price	(5) Percentage Change in Ohio Price from Previous Year
1969	1.50[a]	—	1.38[a]	—
1970	1.54	2.7	1.42	2.9
1971	1.59	3.2	1.49	4.9
1972	1.59	0.0	1.48	-0.7
1973	1.87	17.6	1.75	18.2
1974	2.93	56.7	2.80	60.0
1975	3.14	7.2	2.90	3.6
1976	3.32	5.7	3.11	7.2
1977	3.79	14.2	3.62	16.4
1978	4.05	6.9	3.79	4.7
1979	5.63	39.0	5.41	42.7
1980	8.35	48.3	8.09	49.5
1981	10.59	26.8	8.76	8.3
1982	10.27[b]	-3.0	8.50	-3.0
1983	9.06[b]	-11.8	8.41	-1.1

Source: The 1969 U.S. average annual price was estimated on the basis of data in U.S. Department of Energy, Energy Information Administration, Annual Energy Review 1983 (Washington, D.C.: 1984), p. 135. U.S. average prices for 1970 to 1981 and Ohio average prices for 1970 to 1980 were taken from U.S. Department of Energy, Energy Information

Table 5 footnotes, continued

Administration, State Energy Price and Expenditure Report 1970-1981 (Washington, D.C.: 1984), pp. 3 and 151. The 1981 to 1983 Ohio annual residential prices were obtained from the Ohio Division of Energy. The 1982 and 1983 U.S. average prices were estimated from data contained in U.S. Department of Energy, Energy Information Administration, Monthly Energy Review, April 1984, p. 95. The percentages were calculated by the authors.

[a]The 1969 U.S. and Ohio average residential kerosene prices were estimated by the authors on the basis of the change from 1969 to 1970 in the price of gasoline in Ohio, and in the U.S., because kerosene and gasoline prices are known generally to move in tandem.

[b]The 1982 and 1983 U.S. average prices were estimated by the authors on the basis of price data in the EIA's Monthly Energy Review. The Review reports prices for sales of petroleum products including kerosene by refiners and gas plant operators to end users. The percentage changes in the price of kerosene from 1981 to 1982 and from 1982 to 1983 were computed and these percentages, the last two entries in column 3 of the table, were then used to estimate the U.S. average residential kerosene prices for 1982 and 1983.

1969 to $8.41 per million Btu in 1983, an increase of 509 percent. For the U.S., the price rose from $1.50 per million Btu in 1969 to $9.06 per million Btu in 1983, an increase of 504 percent. Major increases in both the U.S. and Ohio prices occurred in 1973, 1974, 1977, 1979, 1980, and 1981. There have been price decreases in 1982 and 1983. Ohio prices have been lower than the national average prices throughout the period, but the rate of increase in Ohio was slightly higher.

Thus, tables 1 through 5 show dramatic increases in Ohio and U.S. residential energy prices from 1969 to 1983. Ohio prices have sometimes been higher than the U.S. prices and sometimes lower, but an important point is that, with the exception of coal consumed in the home, the absolute percentage price increases for the common residential energy sources have been higher in Ohio than in the U.S. as a whole.

Table 6 displays weighted average residential energy prices for Ohio. In 1969 the weighted average price was $1.57 per million Btu. Since then, the price has climbed steadily. In 1983 the weighted average price was $9.07 per million Btu. The absolute increase in this price is 478 percent, an average annual increase of 13.3 percent. Further, while precise data are not yet available, preliminary data suggest that the 1984 Ohio weighted average price will be some eight percent above that of 1983. These statistics are perhaps the best overall indicator of how hard Ohioans have been hit by residential energy price increases since 1969. They show how much more individuals must pay to purchase a certain set amount of energy regardless of type.

Annual Residential Bills

The prices just presented are the principal measure of the extent and impact of the changing energy scene on Ohioans. Further insights can be gained from residential bills. Here we report annual average residential bills for natural gas and electricity, the two major Ohio residential energy sources. Again, U.S. and Ohio data are reported for 1969 through 1983.

TABLE 6

OHIO WEIGHTED AVERAGE RESIDENTIAL
ENERGY PRICE, 1969 TO 1983
(Dollars per million Btu)

(1) Year	(2) Ohio Weighted Average Residential Energy Price	(3) Percentage Change in Weighted Average Price from Previous Year
1969	1.57[a]	--
1970	1.64[a]	4.5
1971	1.79	9.1
1972	1.89	5.6
1973	2.13	12.7
1974	2.65	24.4
1975	3.12	17.7
1976	3.37	8.0
1977	4.12	22.2
1978	4.46	8.3
1979	5.36	20.2
1980	6.36	18.7
1981	7.23[a]	13.7
1982	7.90[a]	9.3
1983	9.07[a]	14.8

Sources: The 1971 through 1980 Ohio weighted average residential energy prices were taken from U.S. Department of Energy, Energy Information Administration, State Energy Price and Expenditure Report 1970-1981 (Washington, D.C.: 1984), p. 151. The 1970, and 1981 through 1983 weighted average prices were calculated by the authors using data from tables 1 through 5 of this report. All percentages were also calculated by the authors.

Table 6 footnotes, continued

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[a]These weighted average prices were calculated by the authors in the following manner. For 1970 and 1981, residential price and total residential sector expenditure data for each of the five energy sources (coal, natural gas, heating oil, kerosene and electricity) were taken from the Energy Information Administration's State Energy Price and Expenditure Report. A total use amount (in million Btu) was calculated for each type of energy by dividing the expenditure for that type by its price. The use amounts were then summed to derive a grand total use amount. The expenditures for each energy source were also summed to obtain a total residential sector expenditure. The total expenditure was then divided by the grand total use amount to obtain the residential average price. The authors did not include LPG and Ethane in their calculations although the Energy Information Administration did include these fuels in its calculations. The result is that the authors' calculated prices may be slightly lower than prices including LPG and Ethane. For example, for 1970, the authors computed a weighted average residential price of $1.64 per million Btu as seen in the table. The Energy Information Administration's price for that same year was $1.65. For 1981, the price calculated by the authors was $7.23 per million Btu while the Energy Information Administration's price was $7.25.

For the 1982 and 1983 residential weighted average prices, the authors first calculated a 1981 fractional use for each energy type. This fraction represented the proportion of the total residential sector fuel use accounted for by each fuel and was obtained by dividing the amount of consumption of each fuel by the total consumption of all the energy types. The weighted average prices for 1982 and 1983 were then obtained by multiplying the 1981 fractional use of each fuel by its 1982 or 1983 price and then summing these products for each year. The equation for 1982 appears below. The 1983 equation contains 1983 prices and 1981 usage fractions.

1982 Ohio weighted average residential energy price =

(1982 natural gas price)(1981 natural gas fractional use) + (1982 electricity price)(1981 electricity fractional use) + (1982 heating oil price)(1981 heating oil fractional use) + (1982 coal price)(1981 coal fractional use) + (1982 kerosene price)(1981 kerosene fractional use) The above procedure was repeated for 1969, using 1970 fractional uses and 1969 price data.

Table 7 displays U.S. and Ohio average annual residential natural gas bills. The average annual Ohio residential natural gas bill was $169.02 in 1969 and rose throughout the period except for a decrease in 1973. By 1983, the average annual Ohio residential natural gas bill had climbed to $785, an increase of 364 percent over the 1969 level.

The corresponding U.S. figures are not quite as dramatic, although still substantial. In 1969, the average annual U.S. residential natural gas bill was $130.08, rising to $583 by 1983. This increase was 348 percent.

As seen in table 7, Ohio's average annual residential natural gas bills are consistently higher than the national average bills. In 1969, the Ohio average bill was about 30 percent higher than the U.S. bill. In 1983, the difference was 34.6 percent. The fact that Ohio's average bills are substantially higher and that Ohio's absolute increase over the period is also higher indicates that Ohio's residential natural gas customers have been disproportionately burdened by the rising cost of natural gas.

A somewhat different pattern is seen in considering the U.S. and Ohio average annual residential electric bills reported in table 8. Ohio average residential bills are usually lower than the national average bills, although Ohio bills have risen substantially since 1969. In 1969, the average annual Ohio residential electric bill was $136.15; in 1983, it was $571.64. This represents an increase of 320 percent. U.S. average annual residential bills, however, rose from $137.45 in 1969 to $610.43 in 1983, an increase of 344 percent.

Thus, Ohio's residential electric customers would appear to be better off compared to the rest of the country than were Ohio's residential natural gas customers. However, as an energy source, electricity is more expensive than natural gas.

TABLE 7

U.S. AND OHIO AVERAGE ANNUAL RESIDENTIAL
NATURAL GAS BILLS,
1969 to 1983

(1) Year	(2) Average Annual U.S. Residential Natural Gas Bill	(3) Percentage Change in U.S. Residential Gas Bills from Previous Year	(4) Average Annual Ohio Residential Natural Gas Bill	(5) Percentage Change in Ohio Residential Gas Bills from Previous Year
1969	$ 130.08	--	$ 169.02[a]	--
1970	136.69	5.1	172.00	1.8
1971	145.28	6.3	187.31[a]	8.9
1972	154.56	6.4	203.04[a]	8.4
1973	155.73	0.8	188.92[a]	-6.9
1974	169.82	9.0	215.14[a]	13.9
1975	206.24	21.4	259.00	20.4
1976	240.48	16.6	315.00	21.6
1977	276.87	15.1	379.00	20.3
1978	307.40	11.0	421.00	11.1
1979	346.39	12.7	465.00	10.5
1980	400.84	15.7	547.00	17.6
1981	434.43	8.4	583.00	6.6
1982	531.95	22.4	709.00	21.6
1983	583.00	9.6	785.00	10.7

Sources: The average annual U.S. residential bills for 1969 to 1982 were taken from American Gas Association, Gas Facts, 1982 Data (Arlington, VA: American Gas Association, 1983), p. 116. The 1983 U.S. average bill was obtained from a telephone call to the American

Table 7 footnotes, continued

Gas Association. The 1970, 1975, and 1980 to 1982 average annual Ohio residential gas bills were obtained from American Gas Association, Gas Facts, 1982 Data, p. 115. The 1976 Ohio average residential bill was taken from American Gas Association, Gas Facts, 1976 Data (Arlington, VA: American Gas Association, 1977), p. 119. The 1977 and 1978 Ohio average residential gas bills were taken from American Gas Association, Gas Facts, 1978 Data (Arlington, VA: American Gas Association, 1979), p. 125. The 1979 Ohio average residential gas bill was taken from American Gas Association, Gas Facts, 1980 Data (Arlington, VA: American Gas Association, 1981), p. 125. The 1969, 1971, 1972, and 1973 Ohio average residential gas bills were calculated with data taken from the following sources: American Gas Association, 1970 Gas Facts, 1969 Data (Arlington, VA: American Gas Association, 1971), pp. 83, 93; American Gas Association, Gas Facts, 1971 Data (Arlington, VA: American Gas Association, 1972), pp. 69, 79; American Gas Association, Gas Facts, 1972 Data (Arlington, VA: American Gas Association, 1973), pp. 69, 79; and American Gas Association, Gas Facts, 1973 Data (Arlington, VA: American Gas Association, 1974), pp. 69, 79. The 1983 Ohio average bill and the data used to calculate the 1974 Ohio average residential gas bill were obtained in a telephone call to the American Gas Association. All percentages are authors' calculations.

[a]The 1969, and 1971 to 1974 Ohio average annual residential gas bills were calculated by the authors in the following manner. Data on the total amount of gas utility industry sales to Ohio residential customers and on the total number of residential customers in Ohio for each year were obtained from Gas Facts. For each of the years, the dollar amount of residential sales was divided by the total number of residential customers to obtain the average annual consumption per customer. This consumption was multiplied by the average annual residential natural gas price in Ohio for the corresponding year to obtain the results reported in the table.

TABLE 8

U.S. AND OHIO AVERAGE ANNUAL RESIDENTIAL ELECTRIC BILLS, 1969 to 1983

(1) Year	(2) Average Annual U.S. Residential Electric Bill	(3) Percentage Change in U.S. Residential Electric Bills from Previous Year	(4) Average Annual Ohio Residential Electric Bill	(5) Percentage Change in Ohio Residential Electric Bills from Previous Year
1969	$ 137.45	—	$ 136.15	—
1970	148.58	8.1	145.48	6.8
1971	161.49	8.7	155.99	7.2
1972	176.39	9.2	166.31	6.6
1973	192.35	9.0	180.09	8.3
1974	223.73	16.3	217.99	21.0
1975	262.26	17.2	264.39	21.3
1976	288.39	10.0	281.39	6.4
1977	328.99	14.1	335.19	19.1
1978	356.74	8.4	369.76	10.3
1979	391.30	9.7	403.51	9.1
1980	461.81	18.0	464.35	15.1
1981	517.39	12.0	508.48	9.5
1982	560.85	8.4	535.09	5.2
1983	610.43	8.8	571.64[a]	6.8

Sources: The average annual U.S. residential electric bills for 1969 to 1978 were taken from Edison Electric Institute, Statistical Year Book of the Electric Utility Industry/1979 (Washington, D.C.: Edison Electric Institute, 1980), p. 50. The 1979 to 1982 average U.S. bills

Table 8 footnotes, continued

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were taken from Edison Electric Institute, Statistical Year Book of the Electric Utility Industry/1982 (Washington, D.C.: Edison Electric Institute, 1983), p. 72, and Errata Sheet. The 1983 average U.S. residential electric bill was taken from Mary C. Going, "1984 Annual Statistical Report: Sales," Electrical World, April 1984, p. 66. The 1969 through 1979 Ohio average annual residential electric bills were calculated by the authors on the basis of electric utility industry residential sector total revenues by state and the average number of electric utility customers in each state. These data were taken from Edison Electric Institute, Statistical Year Book of the Electric Utility Industry for 1969 (New York: Edison Electric Institute, 1970), pp. 40, 45; Edison Electric Institute, Statistical Year Book of the Electric Utility Industry for 1970 (New York: Edison Electric Institute, 1971), pp. 40, 45; Edison Electric Institute, Statistical Year Book of the Electric Utility Industry for 1971 (New York: Edison Electric Institute, 1972), pp. 40, 45; Edison Electric Institute, Statistical Year Book of the Electric Utility Industry for 1972 (New York: Edison Electric Institute, 1973), pp. 40, 45; Edison Electric Institute, Statistical Year Book of the Electric Utility Industry for 1973 (New York: Edison Electric Institute, 1974), pp. 40, 45; Edison Electric Institute, Statistical Year Book of the Electric Utility Industry for 1974 (New York: Edison Electric Institute, 1975), pp. 40, 45; Edison Electric Institute, Statistical Year Book of the Electric Utility Industry for 1975 (New York: Edison Electric Institute, 1976), pp. 40, 45; Edison Electric Institute, Statistical Year Book of the Electric Utility Industry for 1976 (New York: Edison Electric Institute, 1977), pp. 40, 45; Edison Electric Institute, Statistical Year Book of the Electric Utility Industry for 1977 (Washington, D.C.: Edison Electric Institute, 1978), pp. 40, 45; Edison Electric Institute, Statistical Year Book of the Electric Utility Industry for 1978 (Washington, D.C.: Edison Electric Institute, 1979), pp. 40, 45; and Edison Electric Institute, Statistical Year Book of the Electric Utility Industry/1979 (Washington, D.C.: Edison Electric Institute, 1980) pp. 38, 43. The 1980 Ohio average residential electric bill was taken from Edison Electric Institute, Statistical Year Book of the Electric Utility Industry/1981 (Washington, D.C.: Edison Electric Institute, 1982), p. 74. The 1981 and 1982 Ohio average electric bills were taken from Edison Electric Institute, Statistical Yearbook of the Electric Utility Industry/1982 (Washington, D.C.: Edison Electric Institute, 1983), pp. 73-74. The 1983 Ohio average electric bill was estimated from data in Ohio Department of Development, Division of Energy, Ohio Energy Data, Fourth Quarter Review 1983 (Columbus, OH: 1984), p. 4. Percentages were calculated by the authors.

[a]The 1983 Ohio average electric bill was estimated by taking an average of the increase from 1982 to 1983 in the residential electric bills of customers of electric companies serving four Ohio cities: Cincinnati, Cleveland, Columbus, and Toledo. The increases were: Cincinnati-8%; Cleveland-8.7%; Columbus-10.5%; Toledo-0.1%. The average of these four percentages, 6.83%, was applied to the 1982 Ohio average bill to estimate the 1983 bill.

Estimated Monthly Heating Season Bills

The USDA regulations suggest that the energy assistance payments eligible for exclusion from food stamp income calculations may be based on seasonal home energy needs of typical households. Therefore, we have obtained or estimated heating season bills for three energy sources. Actual heating season bills are reported, if available. For example, most of the entries in table 9, monthly average residential natural gas bills for heating seasons, are from reports published by the American Gas Association. However, because data on average monthly household consumption and bills for Ohio for the entire period (and, in some cases, for any part of it) were not available, the authors estimated the heating season bills, as the footnotes to the tables describe in detail.

Table 9, as noted, presents the Ohio residential monthly average heating season natural gas bills. The table shows that the bills have risen from an estimated $22 per month in the 1969-70 heating season to $94 per month in the 1982-83 heating season. This represents an increase of 327 percent during the period.

Table 10 shows the estimated Ohio monthly average residential electric heating season bills for those with electric heat. These bills have risen from an estimated $58.76 per month during the 1969-70 heating season to $178.39 per month during the 1982-83 heating season. This is an absolute increase of 204 percent in residential electric heating season bills during this time.

Table 11 contains the estimated Ohio monthly average residential heating oil bills for the heating season. These estimated bills increase from $28.82 per month in the 1969-70 heating season to $187.01 in the 1982-83 heating season. This is an increase of 549 percent during the period under study.

TABLE 9

OHIO REGIONAL MONTHLY AVERAGE RESIDENTIAL NATURAL GAS BILLS FOR HEATING SEASONS, 1969 to 1983

(1) Heating Season	(2) Ohio Regional[a] Heating Season Monthly Average Residential Natural Gas Bill[b]	(3) Percentage Change in Natural Gas Bill from Previous Heating Season
1969-1970	$ 22[c]	--
1970-1971	23[c]	4.5
1971-1972	25[c]	8.7
1972-1973	27[c]	8.0
1973-1974	29[c]	7.4
1974-1975	34[c]	17.2
1975-1976	38	11.8
1976-1977	53	39.5
1977-1978	57	7.5
1978-1979	62	8.8
1979-1980	71	14.5
1980-1981	81	14.1
1981-1982	96	18.5
1982-1983	94	-2.1

Sources: Bill data for the 1975-76 heating season through the 1982-83 heating season were computed from data in American Gas Association, Gas Facts, 1982 Data (Arlington, VA: American Gas Association, 1983), p. 118; and American Gas Association, Gas Facts, 1978 Data (Arlington, VA: American Gas Association, 1979), p. 126. Bills for the 1969-1970 through the 1974-1975 heating seasons were estimated, as described below in footnote c, on the basis of the natural gas prices in table 1 of this report. Percentages were calculated by the authors.

Table 9 footnotes, continued

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[a]The bill data obtained from Gas Facts and reported here are for the East North Central region of the country which includes not only Ohio but also Illinois, Indiana, Michigan, and Wisconsin. Hence, we call these "Ohio regional bills," i.e., bills for the region of which Ohio is a part. Because a few major interstate pipelines serve all of this region, not much state-to-state variation in prices occurs. Usage, and therefore bills, vary with weather and temperature. Ohio temperatures are about the same as those in Illinois and Indiana, but perhaps higher than those in Michigan and Wisconsin. Hence, Ohio bills, if data were available, might prove to be a little less than reported here.

[b]Gas Facts reported average gas bills for a five month (November to March) heating season. Monthly averages were obtained by dividing the seasonal average by five.

[c]Average monthly residential natural gas bills for heating seasons from 1969-1970 to 1974-1975 were estimated by the authors. The Ohio Division of Energy has estimated the average residential consumption of natural gas to be 150 thousand cubic feet (mcf) during a six month (October to March) heating season. After converting from mcf to Btu, half of this consumption total was multiplied by the average annual Ohio residential natural gas price for the year which included the first part of the heating season, and half was multiplied by the average price for the year which included the second part of the heating season. The two products were then added, and this sum was divided by six to obtain the average monthly bill estimate.

TABLE 10

ESTIMATED OHIO MONTHLY AVERAGE ALL-ELECTRIC RESIDENTIAL BILLS FOR HEATING SEASONS, 1969 to 1983

(1) Heating Season	(2) Estimated Ohio Heating Season Monthly Average Residential Electric Bill[a]	(3) Percentage Change in Electric Bill from Previous Heating Season
1969-1970	$ 58.76	--
1970-1971	61.25	4.2
1971-1972	62.67	2.3
1972-1973	64.13	2.3
1973-1974	72.58	13.2
1974-1975	86.96	19.8
1975-1976	95.37	9.7
1976-1977	102.50	7.5
1977-1978	112.93	10.2
1978-1979	122.72	8.7
1979-1980	134.00	9.2
1980-1981	149.63	11.7
1981-1982	164.35	9.8
1982-1983	178.39	8.5

Source: The estimates were based on the Ohio annual average electricity prices in table 2 of this report. The percentages, in addition to the bill estimates, are authors' calculations.

[a]The bills in this table were estimated in the following manner. An estimate of average all-electric residential electricity consumption of 2,516 kWh per month during a heating season was obtained from an official at the Ohio Data Users' Center of the Ohio Department of

Table 10 footnotes, continued

Development. It was based on a survey of nine major Ohio electric companies. After converting the kWh total to Btu, the price data in table 2 of this report were used to estimate the bills. The monthly consumption amount was multiplied by the annual average prices for the two years which include the heating season. The two products were then added and the sum was divided by two to obtain the estimates reported in the table. The reader should be aware of a possible difficulty with this estimation procedure, namely, that all-electric homes may have lower electric rates than the average customer. Hence, bills may be lower than reported here.

TABLE 11

ESTIMATED OHIO MONTHLY AVERAGE RESIDENTIAL HEATING OIL BILLS FOR HEATING SEASONS, 1969 to 1983

(1) Heating Season	(2) Estimated Ohio Heating Season Monthly Average Residential Heating Oil Bill[a]	(3) Percentage Change in Heating Oil Bill from Previous Heating Season
1969-1970	$ 28.82	—
1970-1971	30.41	5.5
1971-1972	31.52	3.6
1972-1973	32.50	3.1
1973-1974	45.50	40.0
1974-1975	59.60	31.0
1975-1976	64.75	8.6
1976-1977	73.21	13.1
1977-1978	81.18	10.9
1978-1979	100.80	24.2
1979-1980	140.53	39.4
1980-1981	186.03	32.4
1981-1982	201.85	8.5
1982-1983	187.01	-7.4

Sources: The fuel consumption level upon which these estimated prices are based was taken from Ohio Department of Development, Community Development Division, Office of Energy Conservation, Home Energy Audit (Columbus, OH: 1984). The fuel prices used in the calculations are from table 3 of this report. The percentages were also calculated by the authors.

[a]These estimates were made in the following manner. An average Ohio residential heating oil consumption level during a six month

Table 11 footnotes, continued

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heating season (October to March) was obtained from an official at the Ohio Division of Energy. That level was 1,061 gallons of heating oil for the entire heating season. Using the data reported in footnote b of table 3 of this report (i.e., that 7.21 gallons of heating oil were needed to obtain 1,000,000 Btu), the Btu content of the 1,061 gallons of oil (147.156 million Btu) was calculated. For each heating season, half of the Btu content of the total heating oil consumption was multiplied by the average price per million Btu (as reported in table 3) in Ohio for the year which included the first part of the heating season and half of the Btu content was multiplied by the average price per million Btu for the year which included the second part. The two products were then added, resulting in an estimate of the total expenditure for heating oil for the heating season. This total estimate was then divided by six (the number of months) to obtain the monthly average bill. For example, the calculations for the 1982-1983 heating season are as follows:

Btu content of 530.5 gallons of oil (1/2 of total heating season consumption) = 73.578 million Btu.

1982 Ohio average residential heating oil price = $7.95/million Btu.

1983 Ohio average residential heating oil price = $7.30/million Btu.

(73.578 million Btu)($7.95/million Btu) = $584.95, estimated average Ohio residential expenditure for heating oil during October through December, 1982.

(73.578 million Btu)($7.30/million Btu) = $537.12 estimated average Ohio residential expenditure for heating oil during January through March 1983.

$584.95 + $537.12 = $1,122.07; estimated average Ohio residential expenditure for 1982-1983 heating season.

$\frac{\$1,122.07}{6}$ = $187.01, estimated average Ohio monthly residential heating oil bill during 1982-1983 heating season.

Taken together, these three tables reinforce the picture of rapidly rising energy prices and bills producing a significant impact on residential energy costs in Ohio.

Summary and Comment

Ohioans have had to cope with major price increases in their residential energy sources. The result has been major increases in residential annual and heating season bills, and presumably major problems for those who lack the wherewithal to keep up with the cost increases.

Table 12 summarizes these increases in percentage terms. It also shows the average annual increases in fuel prices, annual bills, and monthly heating season bills. The weighted average energy price increase faced by Ohioans from 1969 to 1983 was 478 percent, an average annual increase of 13.3 percent. During this same period, the consumer price index increased by only 272 percent, an average annual increase of 7.4 percent. Hence, Ohio residential energy prices and costs have increased at a rate substantially above the rate of inflation.

This report presented the residential energy price increases experienced in Ohio since 1969 without so far commenting on the reasons for those increases. A thorough analysis of these reasons would be far beyond the intent or needs of this study, although many of these trends are undoubtedly already familiar to the reader. However, it may be appropriate to comment on a few of the major events that affected energy prices during the study period.

In the last ten years, during which the major price and bill increases displayed in the tables of this report occurred, Ohioans had to contend with several major energy events jolts. These include the 1973-74 Arab oil embargo, which tripled the world price of crude oil and doubled the price of consumer petroleum products; the 1975-79 natural gas shortages, which resulted in a ban on new gas hook-ups in Ohio; the 1979 OPEC doubling of

TABLE 12

ABSOLUTE PERCENTAGE AND AVERAGE ANNUAL PERCENTAGE INCREASES IN U.S. AND OHIO RESIDENTIAL FUEL PRICES AND ANNUAL BILLS AND IN OHIO MONTHLY HEATING SEASON BILLS, 1969 to 1983

	United States		Ohio	
	Absolute Increase	Average Annual Increase	Absolute Increase	Average Annual Increase
A. Fuel Prices				
Natural Gas	478%	13.4%	571%	14.6%
Electricity	225	8.8	227	8.8
Heating Oil	507	13.7	535	14.1
Coal	490	13.5	371	11.7
Kerosene	504	13.7	509	13.8
Weighted Avg.	—	—	478	13.3
B. Annual Bills				
Natural Gas	348%	11.3%	364%	11.6%
Electricity	344	11.2	320	10.8
C. Monthly Heating Season Bills				
Natural Gas	—	—	327%	11.8%
Electricity	—	—	204	8.9
Heating Oil	—	—	549	15.5

Source: Calculations by the authors, based on prices and bills reported in tables 1 through 11 of this report.

crude oil prices; the 1979-83 tripling of natural gas prices attributed to the partial deregulation mandated by the Natural Gas Policy Act of 1978; and the 1981-83 decontrol of oil prices.

III. Sources

This report utilizes data from a variety of sources. These include government agencies such as the U.S. Department of Energy, and the Ohio Division of Energy. Other sources were utility industry associations including the American Gas Association and the Edison Electric Institute. In addition, other useful data on Ohio utilities were collected from the Public Utilities Commission of Ohio, the National Association of Regulatory Utility Commissioners, and the Ohio Consumer's Counsel, as well as the miscellaneous sources mentioned in the table footnotes.

For prices, the main source was the U.S. Department of Energy's State Energy Price and Expenditure Report 1970-1981 (Washington, D.C.: 1984), which contains data based on a state energy price model and reporting system developed by the Pacific Northwest Laboratory. It presents a mix of actual prices and econometric estimates of average energy prices for all of the energy types we have covered. Also, it estimates energy expenditures in dollars in the United States and each of the fifty states for the period 1970 to 1981.

We developed U.S. average prices before and after this period from several sources, principally two Department of Energy publications: the Annual Energy Review 1983 (Washington, D.C.: 1984), and the Monthly Energy Review. Both of these sources reported prices by economic sector for a variety of energy sources. Residential coal and kerosene prices for 1969, 1982, or 1983 were not included, however, and had to be estimated.

Some Ohio average energy prices before and after the period covered in the State Energy Price and Expenditure Report were obtained from the Ohio Division of Energy. The Division issues an annual Ohio Energy Status

Report which contains a variety of annual average energy prices and consumption statistics. It also publishes quarterly Ohio Energy Data reports that contain monthly statistics.

For state and national average annual bills, we relied on yearly publications of the American Gas Association (AGA) and the Edison Electric Institute (EEI). The AGA's Gas Facts reports average annual residential gas bills by state, although there were gaps in the early years of the period which the authors filled using calculations based on total state residential sales and customer data that were reported in Gas Facts.

The EEI's Statistical Year Book of the Electric Utility Industry reports national and state data for both the total electric utility industry and for investor-owned utilities. The total industry average annual residential bill or the average annual revenue per residential customer was obtained for the U.S. for the entire period. For Ohio, total industry revenue and customer data for the state were used to calculate the bills for most of the period. In the later years of the period (1980-82), the EEI had calculated average annual revenue per residential customer on the state level in addition to its national-level calculations.