Residential Energy Use Alternatives: 1976 to 2000

A vigorous conservation program could reduce energy use growth to almost zero through the year 2000.

Eric Hirst

Between the end of World War II and the early 1970's, residential energy use grew steadily and rapidly because of growth in population, households, and income; declines in retail fuel prices; and the introduction of energy-using household devices. Responses to these demographic, economic, and technological changes included growth in ownership of energy-intensive household equipment (such as food freezers and air conditioners), shifts from small energy-efficient devices to larger, less efficient units (such as replacement of small, manual defrost refrigerators with large automatic defrost models that consume 50 to 100 percent more electricity), and increasing household use of equipment (such as increased use of long, hot showers and inattention to the turning off of lights). The net result of these changes was an average annual growth rate in household energy use of 3.6 percent between 1950 and 1975, nearly double the growth rate in household formation (2.0 percent) (*1*, *2*).

During the past few years, however, a number of forces have emerged that may significantly alter these historical trends. Residential fuel prices began to increase sharply around 1970, after two decades of declines (*2*, *3*). Because of these increases, personal consumption expenditures on household fuels rose 27 percent between 1970 and 1974.

In addition to the economic force of rising prices, a number of institutional changes are under way. The Federal Energy Administration (FEA), created in July 1974, has an Office of Conservation and Environment that develops and implements federal energy conservation policies and programs. The Energy Research and Development Administration (ERDA), created in January 1975, has an Office of Conservation that manages federal RD & D programs to develop and commercialize new energy conservation technologies.

The federal Energy Policy and Conservation Act (Public Law 94-163) (*4*) requires the FEA to establish voluntary residential equipment and appliance efficiency targets so that the aggregate efficiency of appliances sold in 1980 exceeds the aggregate efficiency for 1972 by at least 20 percent. The act also requires that labels be affixed to household appliances showing their energy efficiencies and operating costs.

The Energy Conservation and Production Act (PL 94-385) (*5*) establishes a program to develop and implement building energy performance standards. The American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) developed a set of thermal standards for new buildings (ASHRAE 90-75) (*6*). Implementation of these standards would substantially reduce space heating and air-conditioning requirements for new housing units with little or no increase in initial costs (*7*). A number of issues related to energy prices—natural gas deregulation, oil price decontrol, and electricity rate reform—are hotly debated although unresolved.

In this article, I employ a detailed computer model of residential energy use developed at the Oak Ridge National Laboratory (ORNL) to evaluate the energy impacts of various energy conservation strategies. The model, details of which have been discussed (*1*), simulates household energy use at the national level for four fuels, six end uses, and three housing types. Each of these components of fuel use is computed on an annual basis in response to changes in stocks of occupied housing units and new residential construction, equipment ownership by fuel and end use, thermal integrity of housing units, average unit energy requirements for each type of residential equipment, and usage factors that reflect household style. Thus the model is sensitive to the major demographic, economic, and technological determinants of household fuel use.

The model is used to evaluate the energy impacts between 1976 and 2000 of changes in household formation, housing choices, incomes, fuel prices, efficiency of new equipment, efficiency of new structures, and efficiency of existing structures. I start with a set of input boundary conditions to the model that produces a "high" forecast of residential fuel use, as close to historical trends as is reasonably possible. I then postulate a number of changes—reduced household growth, shifts in housing choices, slower income growth, increases in fuel prices—to yield a "business as usual" forecast. Next I adjust the boundary conditions toward higher fuel prices, improvements in thermal integrity of new and existing structures, and increases in equipment efficiency. This yields "low" forecasts due to implementation of these conservation strategies. These changes in boundary conditions are applied sequentially so that the influence of each change on household fuel uses can be isolated; interactions among these strategies are also evaluated. The boundary conditions used to drive the simulation model and the energy impacts of these exogenous changes are summarized in Table 1.

High Forecast

The starting point for our exploration of alternative forecasts is a set of assumptions that yields a high growth in energy use to the year 2000 (Table 1, run 1). We assume that household formation will occur according to the Bureau of the Census series A (high) forecast (*8*), shown in Fig. 1.

We assume that the distribution of housing choices (single-family house, multifamily buildings, trailers) by the age of the household head remains constant at the 1970 distribution (*9*), also shown in Fig. 1: 69 percent single-family, 28 percent multifamily, 3 percent trailer. Real per capita income is assumed to grow at an average annual rate of 2.8 percent between 1975 and 2000. Residential fuel prices are held constant at their 1975 values. Finally, no improvements in technical efficiency of new residential equipment or thermal integrity of residential structures are postulated.

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Figure 2 shows forecasts of electricity, gas, oil, and total household fuel use produced by the simulation model (run 1) on the basis of the inputs discussed above. Total energy use grows from 17.7×10^{18} joules (10^{18} joules = 0.948×10^{15} Btu) in 1975 to 32.7×10^{18} joules in 2000, with an average annual growth rate of 2.5 percent. Electricity use grows more rapidly at 3.8 percent per year, while gas and oil grow more slowly at 1.8 and 0.4 percent, respectively. Because of differences in growth rates, the percentage of fuel provided by electricity grows from 43 percent in 1975 to 59 percent in 2000. Comparable figures for gas are 34 and 29 percent, for oil 19 and 11 percent, and for other fuels 4 and 1 percent.

The distribution of fuel by end use changes slightly over time; the percentages of total fuel used for space heating and water heating decline slightly, while the percentage used for air conditioning grows from 7 percent in 1975 to 11 percent in 2000.

The model shows a growth in fuel use of 2.5 percent per year, compared with the historical rate of 3.6 percent per year between 1950 and 1975. Table 2 shows differences in historical and forecast growth rates for several variables (*2*) used to evaluate the factors that yield lower growth in the forecast period than in the historical period. Changes in household growth account for almost one-third of the difference in fuel use growth rates.

We assumed that fuel prices remain at their 1975 levels (in constant dollars) to the year 2000. However, between 1950 and the early 1970's, overall household energy prices declined about 15 percent (*2, 3*). This change in fuel price trends (from declines to constancy) accounts for roughly one-third of the difference in fuel use growth between the two periods.

Finally, the forecast assumes that no new residential energy uses will be introduced during the next 25 years. However, during the past 25 years, energy use for air conditioning and refrigeration grew dramatically. Growth in energy use for air conditioning was primarily due to increasing market penetration; fewer than 1 percent of households had air conditioning in 1950, whereas 50 percent had air conditioning in 1974 (*9*). For refrigeration, electricity use grew because of shifts from small manual-defrost units to large automatic-defrost units. Largely because of these two growth markets, the relative growth of electricity compared with overall household fuel use was higher in the historical period (2.0 percent per year) than in the forecast period (1.5 percent per year). These

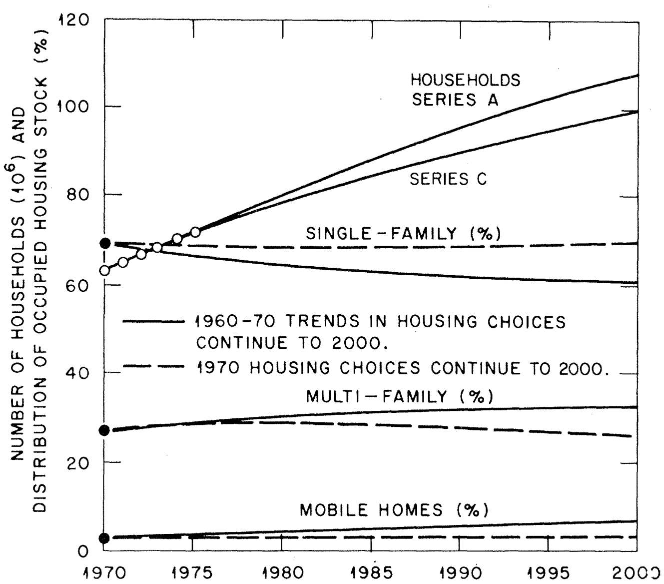
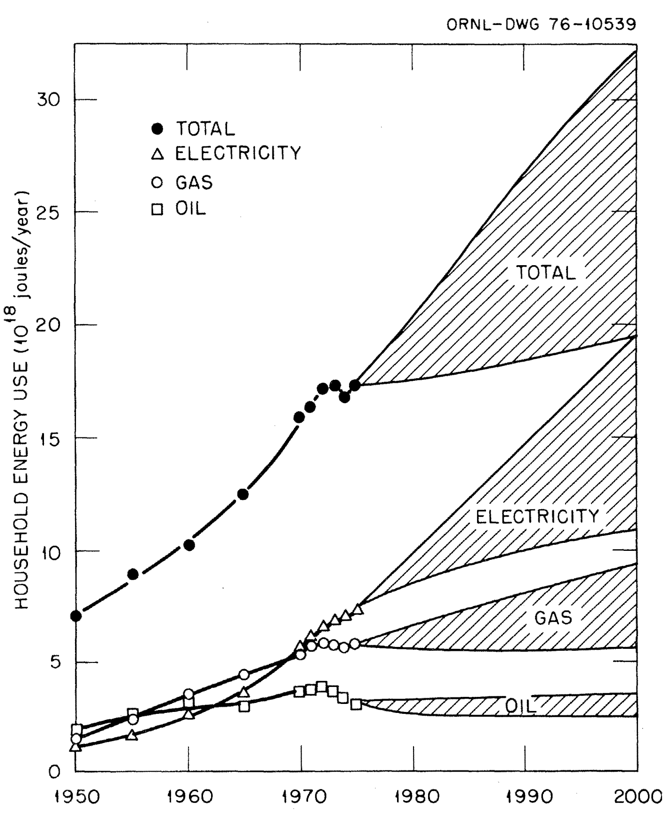


Fig. 1 (left). Forecasts of households and occupied housing stock: 1970 to 2000. Fig. 2 (bottom left). Residential energy use and forecasts: 1950 to 2000. Fig. 3 (bottom right). Assumed fuel price trajectories to 2000.



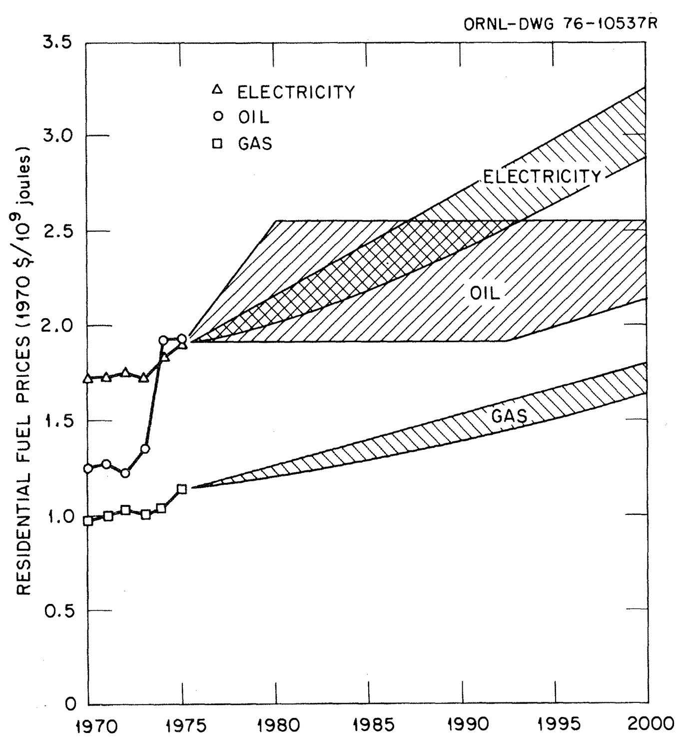


Table 1. Assumed boundary conditions and major results for residential energy use forecasts.

Run No.*	Household formation	Housing choices	Per capita income (%/year)	Fuel prices	Improved efficiency of new equipment	Increased thermal integrity of structures		Energy use† (10^{18} joules)	
						New	Existing	2000	1975 to 2000
1	Series A	1970	2.8	Constant	No	No	No	32.7	650
2	Series C	1970	2.8	Constant	No	No	No	30.3	617
3	Series A	1960–70	2.8	Constant	No	No	No	31.7	636
4	Series C	1960–70	2.8	Constant	No	No	No	29.4	604
5	Series C	1960–70	2.1	Constant	No	No	No	28.4	595
6	Series C	1960–70	2.1	Low growth	No	No	No	25.2	563
7	Series C	1960–70	2.1	High growth	No	No	No	24.1	543
8	Series C	1960–70	2.1	High growth	Yes: to 1980	No	No	21.6	507
9	Series C	1960–70	2.1	High growth	Yes: to 2000	No	No	20.1	494
10	Series C	1960–70	2.1	High growth	No	Yes	No	23.4	533
11	Series C	1960–70	2.1	High growth	No	No	Yes	23.9	535
12	Series C	1960–70	2.1	High growth	Yes: to 2000	Yes	Yes	19.3	478

*Runs 2 to 5 are discussed in (2). †All energy use figures deal with primary energy. Electricity figures include losses in generation, transmission, and distribution.

changes in equipment ownership account for the remainder of the difference between historical and forecast growth rates. Thus, the slower growth projected in the high forecast is due in roughly equal measure to reduction in household growth, increases in fuel prices, and saturation of energy-using household equipment.

Business-as-Usual Forecast

The high forecast discussed above is not a likely forecast because it assumes that fuel prices will remain constant at their 1975 values, that household formation and incomes will increase rapidly, and that recent trends in housing choices will not continue. In this section, I define a set of input conditions that yields a business-as-usual (BAU) forecast of residential energy use (run 6).

My co-workers and I assumed that household formation would grow at an average annual rate of 1.7 percent for the high forecast. In the BAU forecast we use the Bureau of Census series C (low) forecast (*8*), which has an average annual growth of 1.4 percent (Fig. 1). This lower forecast is more nearly consistent with recent declines in population growth and our assumption (below) on slower growth in income.

Between 1960 and 1970, housing choices shifted slightly from single-family to multifamily and trailer units (*9*). In the BAU forecast, we assume that these trends continue to the year 2000. The consequent distribution of households by housing type is shown in Fig. 3; the percentage of households in single-family units in 2000 declines from 69 percent in the high forecast to 61 percent in the BAU forecast.

The growth of 2.8 percent per year in per capita income assumed for the high forecast is consistent with historical growth (Table 2), but is much higher than many recent macroeconomic forecasts. For example, a recent Data Resources forecast (*10*) yields a growth in per capita income of 2.1 percent per year from 1974 to 1990, which we use for our BAU forecast.

Finally, the high forecast is based on the assumption that fuel prices remain constant from 1975 to 2000; in the BAU forecast we assume that fuel prices will increase, but at a slower rate than they did during the early 1970's. We examined fuel price projections from a number of sources and selected two sets of projections from Anderson's energy supply-demand model (*11*) (Fig. 3). The low-price series used in our BAU forecast yields fuel prices in the year 2000 that are nearly 50 percent higher for electricity and gas and 10 percent higher for oil than 1975 prices.

Changing these inputs to the model reduces residential energy use in the year 2000 23 percent, from 33×10^{18} joules in the high forecast to 25×10^{18} joules (Table 1). The average annual growth rate in energy use is reduced from 2.5 to 1.5 percent.

This BAU forecast suggests that energy use will grow at about half its historical rate if present new government programs and policies are implemented. Thus a great deal of energy will be "conserved" because of projected changes in demographic conditions and increases in fuel prices.

Fuel Price Changes

One effective means of slowing energy growth is to increase fuel prices. Proponents argue that prices are now too low because they do not include various social costs associated with energy extraction, production, and use including adverse environmental impacts such as air pollution from power plants and refineries, extreme reliance on foreign nations for energy imports, and intergenerational considerations such as energy scarcities. Proponents also feel that energy taxes are easy to administer, effective, and relatively benign because they allow consumers maximum choice in terms of equipment ownership and use.

Opponents argue that the economic burden of higher energy prices on low-income families would be excessive, that demand for energy is relatively insensitive to price changes, and that economic growth would be adversely affected by the higher cost of energy.

We use the differences between Anderson's high and low fuel price forecasts (*10*) (Fig. 3) as a proxy for the changes in prices that might occur due to federal programs to raise energy prices. The high series yields prices in 2000 that are about 10 percent higher for electricity and gas and 25 percent higher for oil than are the low price forecasts.

Raising fuel prices (Table 1, run 7) reduces energy use in the year 2000 by 4 percent, from 25×10^{18} joules (BAU, run 6) to 24×10^{18} joules. The average annual growth rate is reduced from 1.5 to 1.3 percent.

Technological Changes

Equipment efficiency improvements. The FEA administers the federal appliance efficiency program (*4, 5*); their initial targets for improvements in appliance energy efficiency form the basis for the values shown in Table 3 (*12*). In addition to the 1980 targets, continued improvements in appliance and equipment performance to the year 2000 are shown. New equipment efficiencies are higher in

1980, on average, by about 25 percent relative to 1970–1975 values. In the year 2000, the average efficiency increase is about 40 percent.

A comparison of runs 8 and 7 (Table 1) shows the impacts of improving efficiencies between 1976 and 1980 and then holding efficiencies at their 1980 levels to the year 2000. A comparison of runs 9 and 7 shows the impacts of continuing to improve efficiencies beyond 1980. The energy savings with either schedule of improvements are considerable: 10 and 17 percent in the year 2000. Continued improvement in equipment efficiencies beyond 1980 yields significant energy savings by the year 2000. The cumulative energy savings between 1975 and 2000 is increased by a third (to 49×10^{18} joules) in going from run 8 to run 9.

Thermal integrity improvements. As was noted earlier, ASHRAE recently developed a set of thermal standards for design of new residential and commercial structures (*6*). An evaluation of these standards by A. D. Little, Inc. (*6*) showed that space heating energy requirements for new single-family units would be reduced 11 percent nationwide, compared with typical 1973 construction practices. Comparable savings for low-rise apartment buildings are 46 percent. Energy savings for air conditioning are 30 percent for single-family units and 55 percent for apartment buildings. No energy savings were estimated for mobile homes.

According to the Little report (*6*), the increase in cost for tighter construction, additional insulation, and storm windows and doors was almost exactly offset by reduced cost for smaller HVAC equipment. Thus the net impact of these standards on initial cost is negligible.

Space heating energy savings much higher than those estimated with the ASHRAE standards for single-family units can be achieved in a cost-effective manner. For example, the Arkansas Power & Light Energy Saving Home Program (*13*) shows typical space heating savings relative to conventional construction of 65 percent (compared with the Little estimate of 11 percent for the ASHRAE standards). Because the ASHRAE standards are so weak for single-family units, the energy saving impacts estimated here are much lower than could be achieved with standards that minimize life-cycle costs rather than maintain initial costs.

In run 10, we assume that the ASHRAE 90-75 standards are fully implemented by 1980 (Table 3), using the unit energy reductions estimated by the Little report. The energy impacts of applying these standards to all new single-family and multifamily construction are shown in Table 1. Aggregate energy savings, relative to run 7, increase from 0.8 percent in 1980 to 3.0 percent in 2000. The energy savings are split roughly 50 : 50 between space heating and air conditioning.

Table 2. Comparison of residential energy trends and determinants.

Item	Average annual growth rate (percent) 1950 to 1975	1975 to 2000
Population	1.4	1.0
Households	2.0	1.7
Per capita income	2.3	2.8
Total income	3.7	3.8
Electricity	7.3	3.8
Gas	5.4	1.8
Oil	2.3	0.4
Total residential fuel use	3.6	2.5

At first glance, these savings are much less than one would expect from a vigorous program to improve thermal integrity of new construction. In part, the national savings are small because of the slight impact on single-family units, which account for half of new residential construction between 1980 and 2000.

Also, conventional housing units last a long time: typically less than 1 percent of the existing stock of occupied housing units is scrapped each year. The inputs on household formation and housing choices used in these runs yield an additional 17 million single-family and 11 million multifamily units between 1980 and 2000. Thus, only 28 percent of the nation's stock of occupied housing units in the year 2000 is affected by these standards.

A complementary program to adoption of new construction standards is to retrofit existing housing units with additional attic insulation, weatherstripping and caulking, and storm windows and doors. In run 11 we implement a program so that each year, from 1976 to 1985, 7 percent of the remaining stocks of single-family and multifamily units constructed before 1974 are retrofitted. The improvements due to this program are assumed to be the same as those due to adoption of ASHRAE 90-75 on new units. (The criticism of the ASHRAE standards for single-family units, discussed earlier for new construction, applies here for retrofits: the standards are much weaker than could be applied.)

This retrofit program affects approximately 20 million single-family units and 10 million multifamily units during the 1976–1985 decade. In 1985, when the program is terminated, more than a third of the occupied stock of single- and multifamily housing has been affected by the program.

A comparison of the outputs from runs 7 and 11 shows how the energy savings increase while the program is in effect and then slowly decline after the program is terminated. The energy savings increase from 1.4 percent in 1978 to 2.3 percent in 1985, and then decline slowly to 1.0 percent in 2000 (Table 1). The cumulative energy savings for this program are nearly the same as those for the new construction standards. However, the dynamics of the two programs are quite different. The retrofit program has large savings quickly, but the savings decline after the program ends and retrofitted houses are slowly scrapped. Implementation of thermal standards for new construction, on the other hand, yields only small energy savings initially. However, by the year 2000, when a significant fraction of the stock of housing units has been affected by the standards, the energy savings are substantial.

Equipment and structural improvements. Run 12 (Table 1 and Fig. 2) shows the impacts of raising energy prices of run 7, of implementing the equipment efficiency schedule of run 9, the new construction standards of run 10, and the retrofit program of run 11. Implementing these four conservation programs reduces energy use growth to 0.4 percent per year. Energy use in the year 2000 is cut 23 percent relative to run 6, a savings of 5.9×10^{18} joules.

Interpretation of Results

Several computer runs have been discussed in this article (see Table 1). Growth rates in residential energy use between 1975 and 2000 range from 2.5 percent per year (run 1) to 0.4 percent per year (run 12); cumulative energy use for the period 1975 to 2000 is 650×10^{18} joules in run 1 and 478×10^{18} joules in run 12 (Fig. 2).

Table 4 shows the impacts on energy use of the four specific conservation strategies discussed here—higher fuel prices, improvements in efficiencies for new residential equipment, adoption of thermal standards for new construction, and implementation of a retrofit program.

Increasing fuel prices from Anderson's low- to his high-price series (increases in real prices in 2000 of 10 to 25 percent) accounts for 20 to 25 percent of the decline in fuel use. The dynamics of response to fuel price changes is faster than for the other measures considered; this is shown by the larger impact of fuel prices on cumulative energy use than on energy use in the year 2000. This is so because much of the energy use reduction in response to a fuel price increase involves changes in household style (usage of existing capital stocks) and is therefore not limited by equipment lifetimes.

The present version of our model cannot be used to evaluate changes in equipment efficiencies or structural thermal integrities induced by higher fuel prices. Therefore, the contribution of higher fuel prices to energy conservation is understated in Table 4; correspondingly, the impacts of efficiency standards are overstated.

The improvements in equipment efficiencies shown in Table 3 are responsible for about two-thirds of the energy reduction in 2000, and for almost 60 percent of the cumulative energy savings. Implementation of the ASHRAE 90-75 standards (Table 3) accounts for slightly more than 10 percent of the cumulative energy savings and those of the year 2000. For both new equipment efficiency standards and new construction thermal standards, energy savings increase over time. This is due to the dynamics of capital stock ownership. Improvements in efficiency occur slowly as old equipment and structures are gradually scrapped and replaced with more efficient units.

The dynamics of energy savings due to implementation of the retrofit program (retrofitting 20 million single-family and 10 million multifamily units between 1976 and 1985) are just the opposite. As Table 4 shows, this program produces larger savings in the short term than in the long term. Energy savings peak in the early 1980's; after 1985, when the program is stopped, the savings gradually decline. Overall, the retrofit program accounts for 5 to 10 percent of the energy reduction.

Together, these four measures reduce energy use in the year 2000 by 23 percent and cut cumulative energy use by 15 percent. Fuel price increases and new equipment efficiency standards account for most of these savings.

Conclusions

A comprehensive engineering-economic model of residential energy use developed at ORNL was used to evaluate the energy impacts from 1975 to 2000 of changes in household formation, housing choices, per capita income, fuel prices, equipment efficiencies, and thermal integrities of new and existing residential buildings. Several cases were run with the model to determine the impacts on energy use of each factor, in isolation and in combination with other determinants of fuel use.

My conclusions concerning future trends in residential energy use, based on these computer runs, are as follows.

1) Residential energy use will grow more slowly during the fourth quarter of the 20th century than it did during the third quarter. The highest forecast shows a growth of 2.5 percent per year, compared with a growth of 3.6 percent per year from 1950 to 1975 (Fig. 2). Thus, energy use in the year 2000 is almost certain to be less than 33×10^{18} joules, about double the 1975 value of residential energy use. Energy growth will be slower than in the past because of slower growth in population and household formation, changes in fuel price trends, and near saturation of equipment ownership for the major residential energy end uses.

2) The high forecast discussed above is not a likely forecast because it assumes that fuel prices will remain constant at their 1975 values, that household formation and personal income will increase rapidly, and that the 1960–1970 trend in housing choices (away from single-family units) will not continue. A more likely forecast is one that assumes slower growth in household formation and incomes, rising fuel prices, and a continuation of the 1960–1970 trend in housing choices. Under these "business-as-usual" assumptions, energy use grows at 1.5 percent per year (run 6), reaching a level of 25×10^{18} joules in 2000, roughly 45 percent higher than the 1975 level

Table 3. Assumed improvements in energy requirements for new equipment and thermal loads for new structures (1970 = 1.0). The data are based on those of ASHRAE (*6, 7*), FEA (*12*), and an ORNL report (*2*) assumptions.

Item*	1975	1980	1990	2000
Space heating equipment				
Electric	1.0	0.95	0.90	0.85
Gas	1.0	0.80	0.70	0.65
Oil	1.0	0.80	0.70	0.65
Water heating equipment				
Electric	1.0	0.89	0.80	0.75
Gas	1.0	0.74	0.66	0.60
Oil	1.0	0.74	0.66	0.60
Refrigerators	1.0	0.68	0.60	0.50
Cooking equipment				
Electric	1.0	0.83	0.75	0.70
Gas	1.0	0.67	0.60	0.50
Air-conditioning equipment	1.0	0.80	0.70	0.65
Other equipment	1.0	0.90	0.80	0.75
Single-family units				
Space heating	1.0	0.89	0.89	0.89
Air conditioning	1.0	0.70	0.70	0.70
Apartments				
Space heating	1.0	0.54	0.54	0.54
Air conditioning	1.0	0.45	0.45	0.45
Trailers				
Space heating	1.0	1.0	1.0	1.0
Air conditioning	1.0	1.0	1.0	1.0

*The efficiency changes shown generally have cost, as well as energy efficiency, impacts. Design changes in equipment, appliances, and structures to improve energy efficiency will generally increase capital costs. These cost impacts are not evaluated here because the present version of our energy model cannot deal explicitly with capital costs. It is assumed, implicitly, that the equipment efficiency and thermal performance standards evaluated in this article are cost-effective.

Table 4. Energy impacts of residential conservation measures. The percentages are based on contributions of each factor to energy use reductions achieved in going from run 6 to run 12.

Item	Change in energy use (percent): 2000	Change in energy use (percent): Cumulative 1975 to 2000
Higher fuel prices	18	23
Improved equipment efficiencies	66	57
New construction thermal standards	12	11
Retrofit existing structures	4	9
Overall energy savings (10^{18} joules)	5.9	85
Overall energy savings as percent of run 6	23	15

of residential energy use. This forecast suggests that energy use will grow at about half its historical rate if no new government programs and policies are implemented.

3) Implementation of energy conservation programs to raise fuel prices, increase efficiency of new household equipment, and improve thermal integrity of both new and existing housing units can have significant energy impacts. A vigorous conservation program (run 12) might yield an average annual growth rate of only 0.4 percent between 1975 and 2000, with an energy use in 2000 only 10 percent higher than 1975 energy use. Implementation of these programs (run 12) would reduce energy use in 2000 from the business-as-usual case (run 6) by almost 25 percent; the reduction relative to the high case (run 1) is 40 percent. These conservation programs assume no changes in life-style on the part of American households; nor do they assume use of solar energy for any household functions.

4) Implementation of a program to increase efficiency of residential equipment by 1980, as specified in the Energy Policy and Conservation Act, can cut energy use in the year 2000 by at least 10 percent (run 8). However, additional improvements after 1980 yield considerably greater savings. Run 9 assumes that equipment efficiencies continue to improve after 1980, but at a slower rate; the energy savings in the year 2000 in run 9 are 60 percent greater than those from run 8. These results suggest the need for additional research to further improve energy efficiencies of household equipment, and the need for programs to ensure that manufacturers produce and consumers purchase increasingly efficient household equipment.

5) Programs to improve thermal integrity of residential structures can also provide significant energy savings during the next 25 years. However, the estimated savings (runs 10 and 11) for thermal improvement programs are much less than for programs affecting residential equipment and appliances—only about one-third as great. The energy savings estimated for these ASHRAE-based thermal improvement programs are much less than could be achieved for single-family units. A tough, but economically efficient, set of thermal standards for new and existing residential units could yield savings comparable to those for the equipment efficiency programs. The different dynamics of retrofit and new construction programs suggest the desirability of implementing both. A combined program would yield short-term savings due to retrofits and long-term savings due to new construction standards.

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NEWS AND COMMENT

Cancer from Chemicals: Du Pont and Congressman in Numbers Slugfest

The Du Pont Company, which has long prided itself as a pioneer in protecting the health of its workers, now finds itself accused of deliberately obfuscating the incidence of cancer among its employees. The attack on the company's cancer statistics has been orchestrated primarily by Representative Andrew Maguire, a well-regarded young Democrat from northeastern New Jersey, who has been heading a cancer study for the subcommittee on oversight and investigation of the House Interstate and Foreign Commerce Committee. As part of that study, Maguire asked three outside experts to comment on a Du Pont cancer study that purported to find no evidence of cancer associated with the work environment. All three found fault with Du Pont's methodology and one—Michael B. Shimkin, professor of community medicine and oncology at the University of California's medical school in San Diego—issued the headline-making judgment that the Du Pont cancer registry was a deliberately misleading "public relations snow job."

In retaliation, Du Pont hired its own outside expert—Brian MacMahon, chairman of the epidemiology department at Harvard School of Public Health—to review the company's voluminous cancer data. MacMahon concluded that, while the Du Pont data does indeed have certain limitations, it may be more accurate than many other sources of cancer data. MacMahon praised Du Pont's foresight and dedication in assembling its cancer records and deplored the "derogatory tone and clear prejudice" in the attack issued by Congressman Maguire.

The fracas may not yet be over. The Du Pont Company has submitted its cancer registries to the National Cancer Institute and National Institute for Occupational Safety and Health (NIOSH) and asked for suggestions on what, if anything, should be done to improve them. (No reply has been received yet.) And