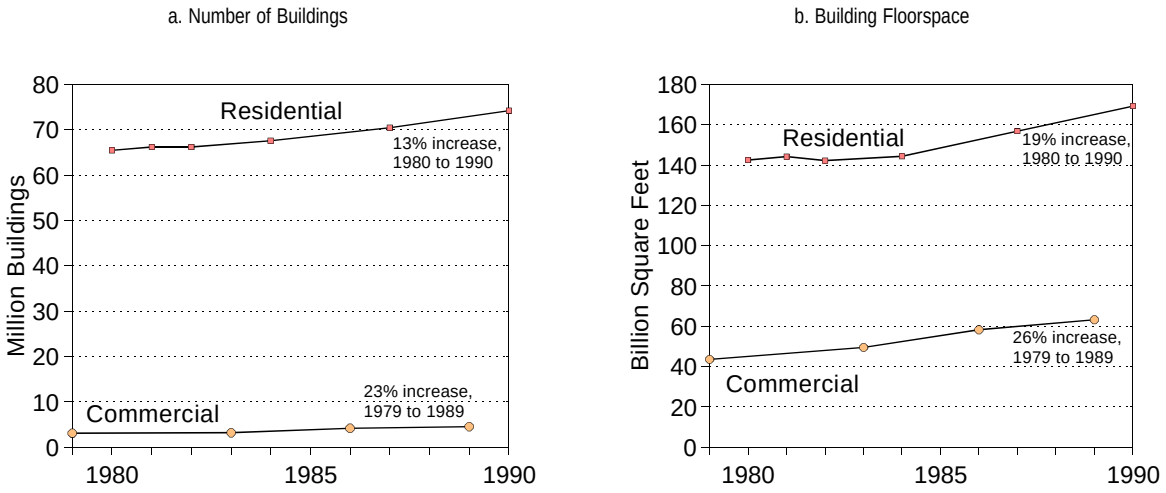
# 2. Characteristics of Buildings in the 1980's

By the end of the 1980's, there were more than 78 million buildings and 230 billion square feet of floorspace in the residential and commercial sectors in the United States. During the 1980's, the number of residential buildings increased by 13 percent to 74.2 million (about 95 percent of the total) and the number of commercial buildings increased 23 percent to 4.5 million (Figure 2.1a). Residential floorspace increased 19 percent to nearly 170 billion square feet (about 74 percent of the total), while commercial floorspace increased 26 percent to 63 billion square feet (Figure 2.1b).[4] The increase in the number of buildings and floorspace in these two sectors contrasts with the total population growth in the United States of only 9.8 percent, from 1980 to 1990 (Figure 2.2).

The population of residential and commercial buildings can be characterized in several ways, each of which has a bearing on the use and consumption of energy. Important categories are: type of building, average size of building, location of buildings, and year of construction.

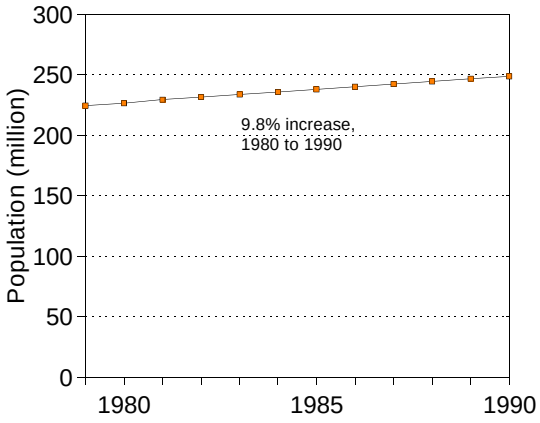
**Figure 2.1. Number and Size of Residential and Commercial Buildings in the 1980's**




Sources: Energy Information Administration, Office of Energy Markets and End Use, Form EIA-457 of the 1980 and 1990 Residential Energy Consumption Surveys.

[4]See Appendix C, "Data Quality", for adjustment of 1979 commercial buildings undercount.

**Figure 2.2. United States Population in the 1980's**




Sources: U.S. Bureau of the Census, *Statistical Abstract of the United States: 1993* (113th edition, Washington, DC, 1993).

## Buildings and Floorspace by Type of Building

Throughout the 1980's, the single-family detached home was, by far, the predominant type of building and occupied the most floorspace in both the residential and commercial sectors (Figures 1.3 and 1.4). By the end of the 1980's:

- Single-family detached homes accounted for nearly three-fourths of all buildings and more than half of total floorspace.

- Commercial buildings accounted for only six percent of buildings but slightly more than one-fourth of total floorspace because of the greater average size of commercial buildings.

The number of residential buildings increased 13 percent during the decade, while their floorspace increased 19 percent. The number of commercial buildings increased 23 percent, with a 26 percent increase in floorspace.

- Two types of residential buildings, single-family attached and the larger apartment buildings (five or more units), increased their numbers much more rapidly than average. The growth in the former is due to the increased popularity of condominiums and townhouses. Small apartment buildings (2 to 4 units) showed no growth in number of buildings but did increase in floorspace on average (Figures 2.3a and b).

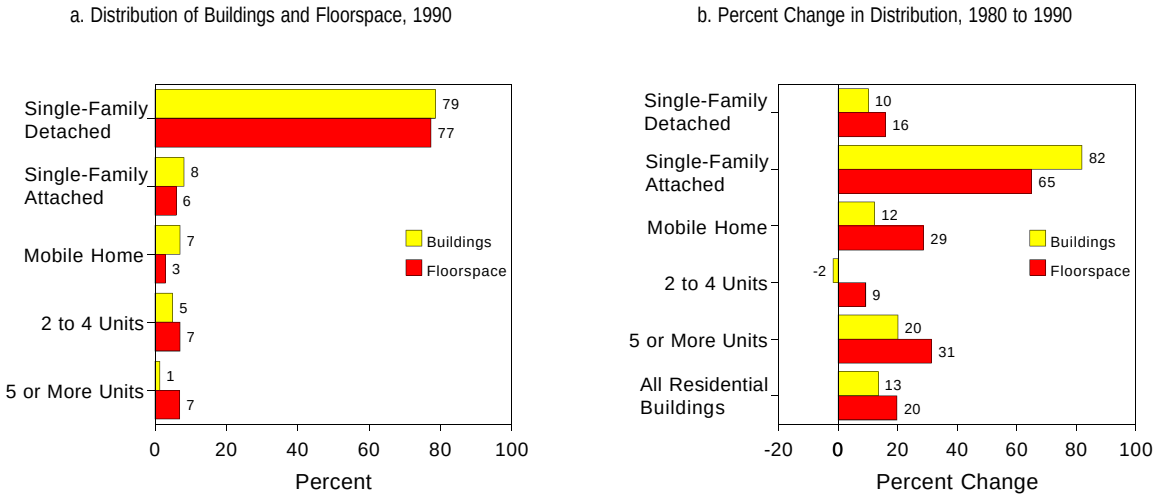
- In the commercial sector, offices and warehouses increased more in number of buildings and floorspace than average, while assembly, education, and health care buildings grew less than average in both number of buildings and floorspace (Figures 2.4a and b).

Residential and commercial buildings increased in average floorspace--from 2,176 to 2,280 square feet (an increase of 4.8 percent) for residential and from 13,637 to 13,954 square feet (an increase of 2.3 percent) for commercial.

- Floorspace in residential multi-unit buildings (small and large) and in mobile homes increased more than the average for residential buildings. Only single-family attached homes showed a decrease in average floorspace (Figures 2.5a and b).

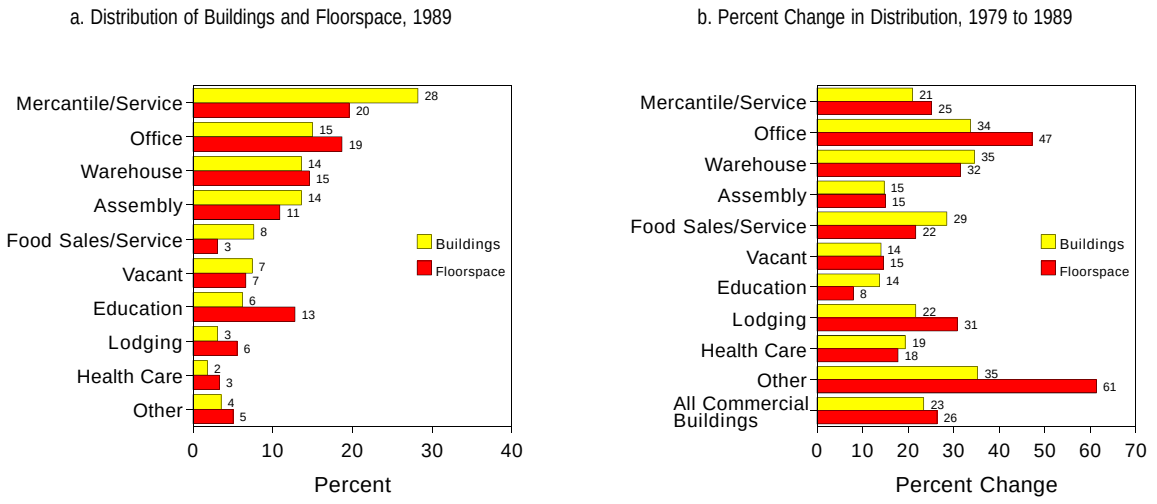
- In the commercial sector, floorspace in office and lodging buildings increased more than the average floorspace for commercial buildings overall. Education and food sales and service buildings showed a significant decrease in floorspace. The latter phenomenon possibly reflects the trend toward fast food restaurants (Figures 2.6a and b).

## Figure 2.3. Distribution of Residential Buildings and Floorspace by Type



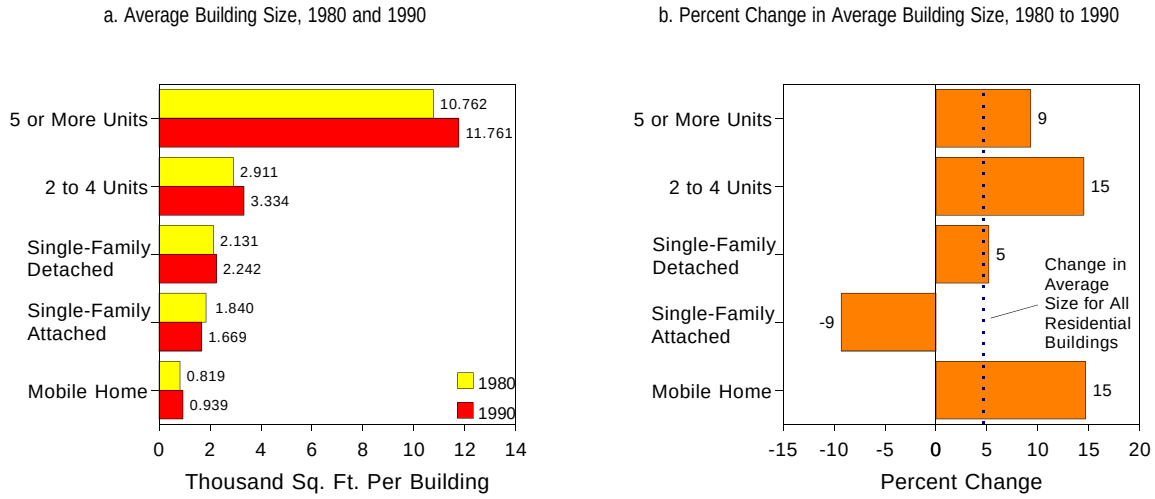

Sources: Energy Information Administration, Office of Energy Markets and End Use, Form EIA-457 of the 1980 and 1990 Residential Energy Consumption Surveys.

## Figure 2.4. Distribution of Commercial Buildings and Floorspace by Type



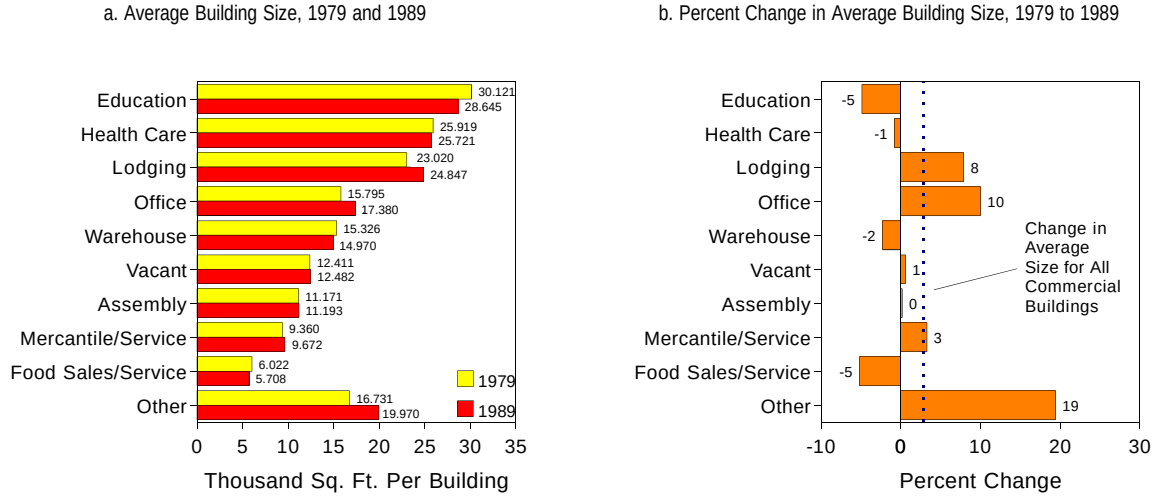

Sources: Energy Information Administration, Office of Energy Markets and End Use, Form EIA-143 of the 1979 Nonresidential Buildings Energy Consumption Survey and Form EIA-871 of the 1989 Commercial Buildings Energy Consumption Survey.

## Figure 2.5. Average Size of Residential Buildings by Type




Sources: Energy Information Administration, Office of Energy Markets and End Use, Form EIA-457 of the 1980 and 1990 Residential Energy Consumption Surveys.

## Figure 2.6. Average Size of Commercial Buildings by Type




Sources: Energy Information Administration, Office of Energy Markets and End Use, Form EIA-143 of the 1979 Nonresidential Buildings Energy Consumption Survey and Form EIA-871 of the 1989 Commercial Buildings Energy Consumption Survey.

# Buildings in Various Size Categories

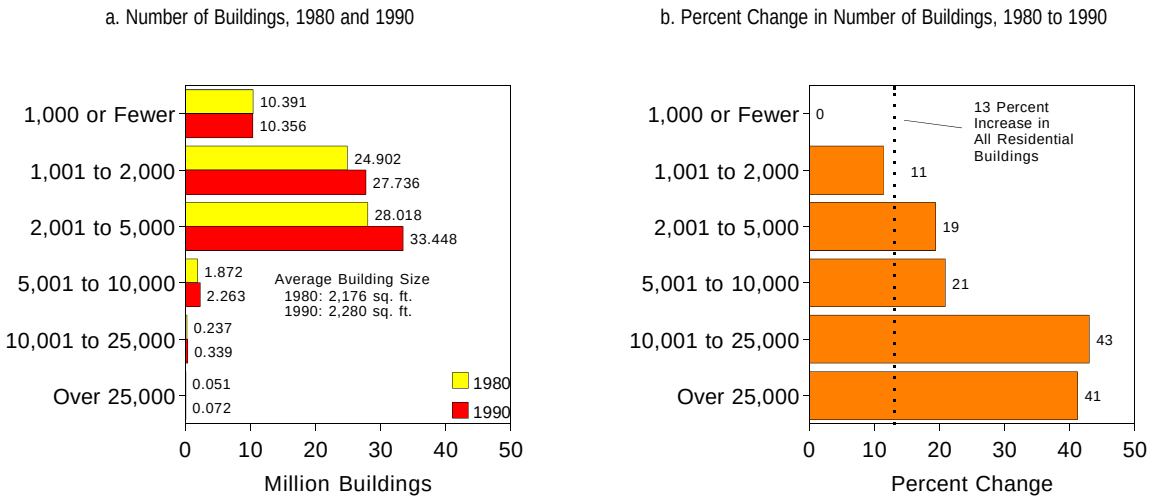
During the 1980's, the proportion of residential and commercial buildings in the various size categories remained approximately the same. Residential buildings were clustered in the three smallest categories, while commercial buildings were spread over a much larger range of sizes (Figures 2.7a and 2.8a). The average size of *all* residential buildings increased 4.8 percent between 1980 and 1990 (from 2,176 to 2,280 square feet per building). This change largely reflected the 5.2 percent increase in the average floorspace of single-family detached homes (from 2,131 to 2,242 square feet).

During the 1980's:

- The greatest growth in the number of residential buildings occurred in the categories of building size greater than 2,000 square feet. This growth was consistent with the increase in average size of single-family detached and apartment buildings. The greatest number of buildings added was in the 2,001 to 5,000 square feet category (Figure 2.7a and b).

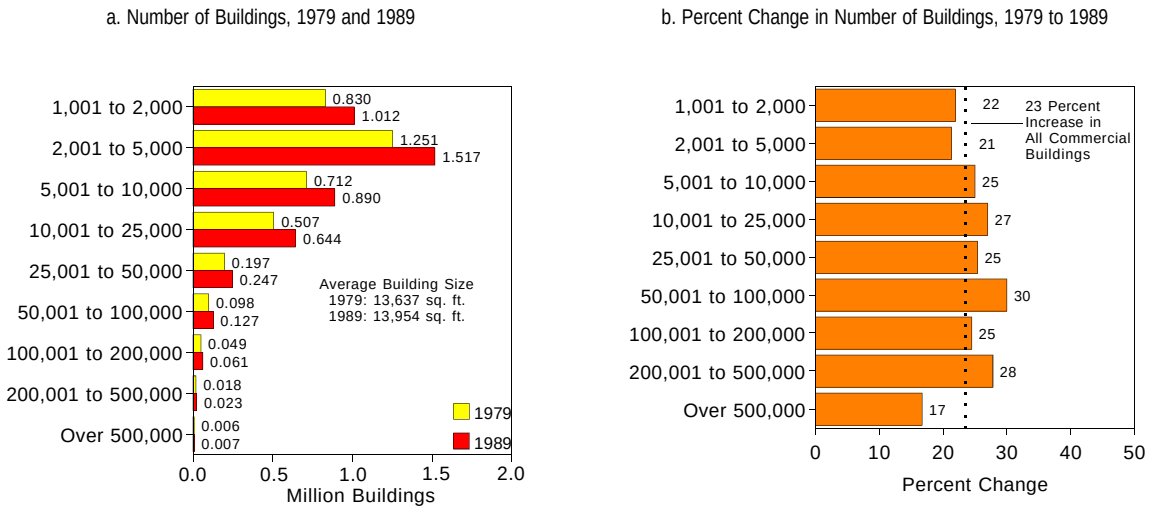
- Commercial buildings showed remarkably similar growth in number of buildings across all size categories. Almost all were within a few percentage points of the commercial average of 23 percent, with the exception of the largest category (Figure 2.8b).

**Figure 2.7. Number of Residential Buildings by Size**




Sources: Energy Information Administration, Office of Energy Markets and End Use, Form EIA-457 of the 1980 and 1990 Residential Energy Consumption Surveys.

**Figure 2.8. Number of Commercial Buildings by Size**




Sources: Energy Information Administration, Office of Energy Markets and End Use, Form EIA-143 of the 1979 Nonresidential Buildings Energy Consumption Survey and Form EIA-871 of the 1989 Commercial Buildings Energy Consumption Survey.

## Buildings and Floorspace by Census Region

Not surprisingly, the residential building distribution by Census region was similar to the population distribution. However, the distribution of floorspace differed by region--buildings were largest in the Northeast (due to more large apartment buildings) and smallest in the South (due to fewer large apartment buildings) (Figure 2.9a).

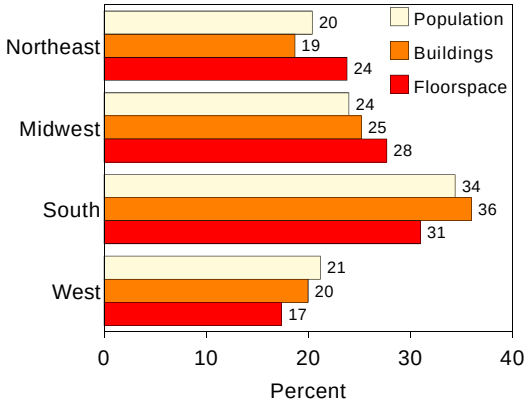
- The increase in the number of buildings and the amount of floorspace in both sectors exceeded population growth in all regions except in the West. In the Midwest and South, the increase in floorspace was greater than the increase in the number of buildings, i.e., the average building size increased (Figure 2.9b).

- The distribution of commercial buildings mirrored the 1989 population distribution fairly closely, although in the Northeast the proportion of buildings was less, and in the South the proportion of floorspace was less. As with residential buildings, commercial buildings tended to be larger in the Northeast and smaller in the South (Figure 2.10a).

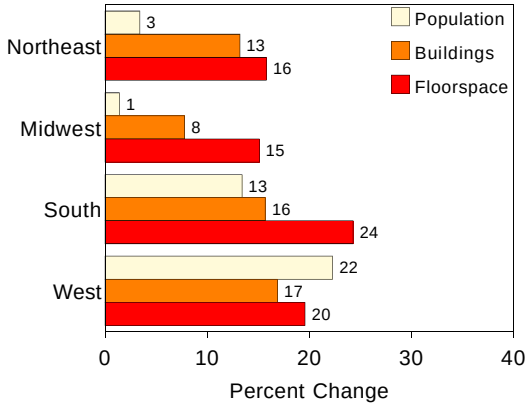
- In commercial buildings the percent change in both the number of buildings and floorspace exceeded the percent change in population in all regions, although in the West the percent change in the number of buildings was very close to the change in population. This is consistent with the increase in average size there (Figure 2.10b).

## Figure 2.9. Distribution of Residential Buildings, Floorspace, and U.S. Population by Census Region

a. Distribution of Buildings, Floorspace, and Population, 1990



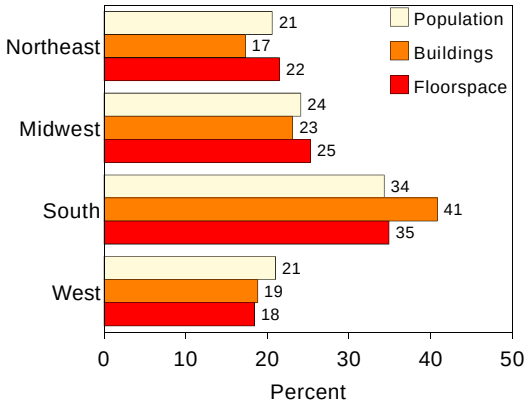

b. Percent Change in Distribution, 1980 to 1990



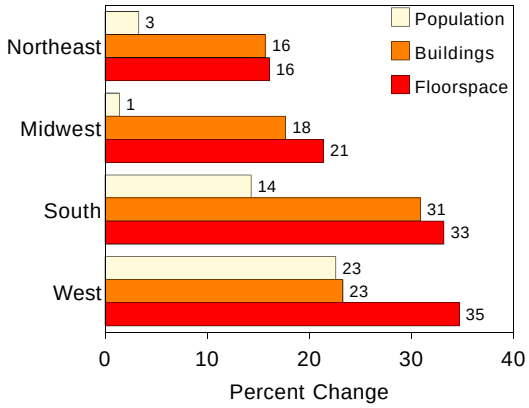

Sources: Energy Information Administration, Office of Energy Markets and End Use, Form EIA-457 of the 1980 and 1990 Residential Energy Consumption Surveys.

## Figure 2.10. Distribution of Commercial Buildings, Floorspace, and U.S. Population by Census Region

a. Distribution of Buildings, Floorspace, and Population, 1989




b. Percent Change in Distribution, 1979 to 1989




Sources: Energy Information Administration, Office of Energy Markets and End Use, Form EIA-143 of the 1979 Nonresidential Buildings Energy Consumption Survey and Form EIA-871 of the 1989 Commercial Buildings Energy Consumption Survey.

# Buildings and Floorspace by Year Constructed

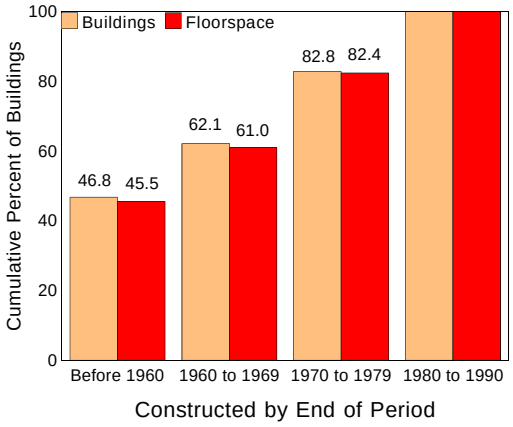
Because the number of buildings is so large, the addition of new buildings and floorspace over a decade has limited impact on the building stock.

- Buildings constructed during the 1980's accounted for only about 17 percent of the stock of residential buildings and their floorspace. At the end of the decade, nearly half of the buildings and floorspace were constructed before 1960 (Figure 2.11a).

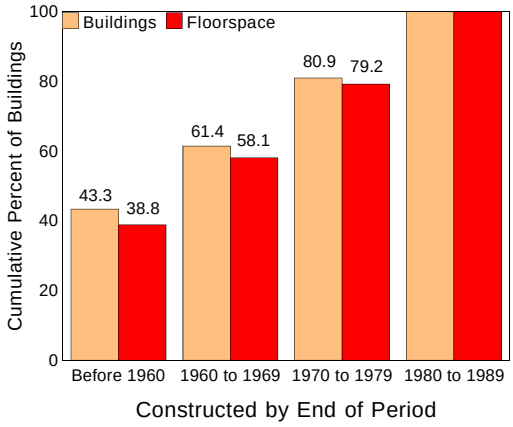
- In the commercial sector, 19 percent of buildings and 21 percent of floorspace were added between 1979 and 1989. Forty-three percent of commercial buildings (and 39 percent of floorspace) were constructed before 1960 (Figure 2.11b).

**Figure 2.11. Distribution of Buildings and Floorspace by Year Constructed**

a. Cumulative Percent of Residential Buildings and Floorspace, 1990




b. Cumulative Percent of Commercial Buildings and Floorspace, 1989




Sources: Energy Information Administration, Office of Energy Markets and End Use, Form EIA-457 of the 1990 Residential Energy Consumption Survey, and Form EIA-871 of the 1989 Commercial Buildings Energy Consumption Survey.

## Table 2.1. Number and Total Floorspace of Residential and Commercial Buildings

| Year of Survey | Residential Buildings | | Commercial Buildings | | |
|---|---|---|---|---|---|
| | Number of Buildings (thousand) | Total Floorspace (million sq. ft.) | Number of Buildings (thousand) | Total Floorspace (million sq. ft.) | |
| RSE Column Factors: | 1.0 | 1.1 | 1.0 | 1.0 | RSE Row Factors |
| **1979** | -- | -- | 3,073 | 43,546 | 5.8 |
| **1980** | 65,471 | 142,495 | -- | -- | 1.2 |
| **1981** | 66,210 | 144,201 | -- | -- | 1.3 |
| **1982** | 66,210 | 142,247 | -- | -- | 1.2 |
| **1983** | -- | -- | 3,185 | 49,471 | 5.8 |
| **1984** | 67,576 | 144,357 | -- | -- | 1.2 |
| **1985** | -- | -- | -- | -- | -- |
| **1986** | -- | -- | 4,154 | 58,199 | 3.2 |
| **1987** | 70,446 | 156,818 | | | 1.2 |
| **1988** | -- | -- | -- | -- | -- |
| **1989** | -- | -- | 4,528 | 63,184 | 3.2 |
| **1990** | 74,213 | 169,227 | -- | -- | 1.4 |

Notes: • To obtain the Relative Standard Error (RSE) percentage for any table cell, multiply the corresponding RSE column factor by the corresponding RSE row factor for the cell. • See "Glossary" for definition of terms used in this report.

Sources: Energy Information Administration, Office of Energy Markets and End Use, Form EIA-457 of the 1980, 1981, 1982, 1984, 1987, and 1990 Residential Energy Consumption Surveys; Forms EIA-143, 788, and 871 of the 1979, 1983, and 1986 Nonresidential Buildings Energy Consumption Surveys; and Form EIA-871 of the 1989 Commercial Buildings Energy Consumption Survey.

## Table 2.2 Number of Residential Buildings and Total Floorspace, 1980 and 1990

| Building Characteristics | Number of Buildings (thousand) | | Floorspace (million square feet) | | RSE Row Factors |
|---|---|---|---|---|---|
| | 1980 | 1990 | 1980 | 1990 | |
| RSE Column Factors: | 0.7 | 0.7 | 0.7 | 0.8 | |
| **All Buildings** | 65,471 | 74,213 | 142,495 | 169,227 | 2.1 |
| **Census Region** | | | | | |
| Northeast | 12,287 | 13,903 | 34,849 | 40,345 | 4.0 |
| Midwest | 17,388 | 18,738 | 40,796 | 46,939 | 3.8 |
| South | 23,105 | 26,735 | 42,182 | 52,440 | 4.0 |
| West | 12,691 | 14,837 | 24,668 | 29,503 | 4.3 |
| **Census Division** | | | | | |
| New England | 2,927 | 3,162 | 8,860 | 9,294 | 9.1 |
| Middle Atlantic | 9,360 | 10,741 | 25,988 | 31,051 | 4.9 |
| East North Central | 11,835 | 13,306 | 27,793 | 33,757 | 5.2 |
| West North Central | 5,552 | 5,433 | 13,003 | 13,181 | 7.2 |
| South Atlantic | 11,812 | 13,403 | 22,288 | 26,612 | 6.5 |
| East South Central | 4,567 | 5,436 | 8,557 | 10,770 | 11.8 |
| West South Central | 6,726 | 7,896 | 11,337 | 15,057 | 7.7 |
| Mountain | 3,507 | 4,167 | 6,338 | 7,818 | 9.8 |
| Pacific | 9,183 | 10,670 | 18,330 | 21,685 | 6.3 |
| **Type of Home** | | | | | |
| Mobile Home | 4,646 | 5,212 | 3,804 | 4,895 | 12.2 |
| Single-Family Detached | 52,992 | 58,363 | 112,941 | 130,855 | 3.1 |
| Single-Family Attached | 3,300 | 6,001 | 6,071 | 10,014 | 18.1 |
| 2 to 4 Units | 3,707 | 3,644 | 10,790 | 11,784 | 10.7 |
| 5 or More Units | 826 | 993 | 8,889 | 11,679 | 11.3 |
| **Building Floorspace (square feet)** | | | | | |
| Fewer than 1,001 | 10,391 | 10,356 | 7,791 | 8,297 | 6.6 |
| 1,001 to 2,000 | 24,902 | 27,736 | 37,212 | 41,190 | 4.4 |
| 2,001 to 5,000 | 28,018 | 33,448 | 79,248 | 96,277 | 4.0 |
| 5,001 to 10,000 | 1,872 | 2,263 | 11,789 | 14,465 | 13.3 |
| 10,001 to 25,000 | 237 | 339 | 3,288 | 4,441 | 22.8 |
| 25,001 to 50,000 | 31 | 34 | 1,046 | 1,135 | 25.7 |
| 50,001 to 100,000 | 14 | 29 | 910 | 1,930 | 34.5 |
| 100,001 to 200,000 | 5 | 7 | 767 | 820 | 46.5 |
| Over 200,000 | 2 | 2 | 445 | 673 | 39.7 |
| **Year Constructed** | | | | | |
| 1939 or Before | 18,382 | 16,760 | 43,283 | 40,769 | 5.7 |
| 1940 to 1949 | 6,173 | 6,069 | 11,861 | 11,592 | 9.1 |
| 1950 to 1959 | 12,347 | 11,883 | 23,703 | 24,694 | 7.1 |
| 1960 to 1969 | 12,086 | 11,356 | 26,207 | 26,191 | 7.0 |
| 1970 to 1979 | 15,280 | 15,329 | 34,323 | 36,274 | 6.3 |
| 1980 to 1990 | 1,204 | 12,815 | 3,119 | 29,708 | 12.9 |

Notes: • To obtain the Relative Standard Error (RSE) percentage for any table cell, multiply the corresponding RSE column factor by the corresponding RSE row factor for the cell. • Because of rounding, data may not sum to totals. • See "Glossary" for definition of terms used in this report.

Source: Energy Information Administration, Office of Energy Markets and End Use, Form EIA-457 of the 1980 and 1990 Residential Energy Consumption Surveys.

## Table 2.3. Number of Commercial Buildings and Total Floorspace, 1979 and 1989

| Building Characteristics | Number of Buildings (thousand) | | | Floorspace (million square feet) | | | RSE Row Factors |
|---|---|---|---|---|---|---|---|
| | 1979 | 1979 (adjusted)* | 1989 | 1979 | 1979 (adjusted) | 1989 | |
| RSE Column Factors: | 1.1 | NF | 0.8 | 1.1 | NF | 0.9 | |
| **All Buildings** | 3,073 | 3,667 | 4,528 | 43,546 | 50,004 | 63,184 | 4.3 |
| **Census Region** | | | | | | | |
| Northeast | 530 | 677 | 783 | 9,531 | 11,688 | 13,569 | 9.8 |
| Midwest | 977 | 889 | 1,046 | 14,197 | 13,144 | 15,955 | 8.5 |
| South | 1,094 | 1,411 | 1,847 | 13,661 | 16,548 | 22,039 | 8.2 |
| West | 472 | 690 | 851 | 6,156 | 8,624 | 11,620 | 9.6 |
| **Principal Building Activity** | | | | | | | |
| Assembly | 425 | 538 | 617 | 5,329 | 6,006 | 6,909 | 9.7 |
| Education | 158 | 248 | 282 | 5,969 | 7,482 | 8,076 | 9.6 |
| Food Sales and Service | 317 | 267 | 343 | 1,770 | 1,609 | 1,958 | 8.9 |
| Health Care | 50 | 67 | 80 | 1,955 | 1,744 | 2,054 | 15.7 |
| Lodging | 97 | 115 | 140 | 2,074 | 2,658 | 3,476 | 11.4 |
| Mercantile and Service | 968 | 1,056 | 1,278 | 9,959 | 9,879 | 12,365 | 6.4 |
| Office | 455 | 508 | 679 | 6,986 | 8,017 | 11,802 | 7.2 |
| Warehouse | 367 | 459 | 618 | 6,007 | 7,039 | 9,253 | 7.9 |
| Other | 115 | 116 | 157 | 2,129 | 1,940 | 3,129 | 12.8 |
| Vacant | 122 | 292 | 333 | 1,367 | 3,630 | 4,161 | 15.1 |
| **Building Floorspace (square feet)** | | | | | | | |
| 1,001 to 2,000 | 532 | 830 | 1,012 | 786 | 1,252 | 1,535 | 7.6 |
| 2,001 to 5,000 | 1,000 | 1,251 | 1,517 | 3,356 | 4,360 | 5,254 | 5.0 |
| 5,001 to 10,000 | 706 | 712 | 890 | 5,073 | 5,226 | 6,532 | 6.3 |
| 10,001 to 25,000 | 486 | 507 | 644 | 7,665 | 8,107 | 10,393 | 7.2 |
| 25,001 to 50,000 | 193 | 197 | 247 | 6,780 | 7,025 | 8,801 | 7.3 |
| 50,001 to 100,000 | 94 | 98 | 127 | 6,449 | 7,043 | 9,130 | 8.6 |
| 100,001 to 200,000 | 41 | 49 | 61 | 5,558 | 6,733 | 8,277 | 9.3 |
| 200,001 to 500,000 | 17 | 18 | 23 | 5,169 | 5,520 | 7,022 | 12.7 |
| Over 500,000 | 3 | 6 | 7 | 2,710 | 4,738 | 6,239 | 15.3 |
| **Year Constructed** | | | | | | | |
| 1899 or Before | 168 | 172 | 172 | 1,999 | 1,654 | 1,654 | 14.5 |
| 1900 to 1919 | 327 | 242 | 242 | 4,660 | 4,245 | 4,245 | 11.1 |
| 1920 to 1945 | 625 | 680 | 680 | 8,660 | 8,098 | 8,098 | 8.1 |
| 1946 to 1959 | 686 | 868 | 868 | 8,391 | 10,511 | 10,511 | 7.7 |
| 1960 to 1969 | 592 | 821 | 821 | 9,360 | 12,617 | 12,167 | 6.9 |
| 1970 to 1979 | 675 | 884 | 884 | 10,478 | 13,329 | 13,329 | 7.0 |
| 1980 to 1989 | -- | -- | 861 | -- | -- | 13,180 | 6.9 |

*See Appendix C, "Data Quality", for adjustment of 1979 buildings and floorspace estimates to account for 1979 CBECS undercoverage.

Notes: • To obtain the Relative Standard Error (RSE) percentage for any table cell, multiply the corresponding RSE column factor by the corresponding RSE row factor for the cell. • Because of rounding, data may not sum to totals. • See "Glossary" for definition of terms used in this report.

Source: Energy Information Administration, Office of Energy Markets and End Use, Form EIA-143 of the 1979 Nonresidential Buildings Energy Consumption Survey and Form EIA-871 the 1989 Commercial Buildings Energy Consumption Survey.