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# RESIDENTIAL HEATING AND COOLING LOADS COMPONENT ANALYSIS

**Joe Huang, James Hanford, and Fuqiang Yang**

**Building Technologies Department**
**Environmental Energy Technologies Division**
**Lawrence Berkeley National Laboratory**
**University of California**
**Berkeley CA 94720**

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## ABSTRACT

This study uses parametric computer simulations of 112 single-family and 63 multi-family residential building prototypes to quantify the contributions of building components such as roofs, walls, windows, infiltration, outside air, lighting, equipment, and people to the aggregate heating and cooling loads in U.S. residential buildings, and the overall efficiencies of typical residential heating and cooling systems in meeting these loads. The prototypical buildings are based on previous LBNL work that defined prototypical buildings by vintage and location to represent existing and new U.S. residential buildings. Parametric simulations were done using the DOE-2.1E program to determine the contribution of the following building components - roof, wall, foundation, window solar gain, window conduction, infiltration, people, lighting, and appliances - to the total heating and cooling loads of these buildings. The computed building loads are presented in two formats, first as split pie charts and then as conventional bar charts, aggregated at the national level, and then by building type, region, and vintage.

The total residential energy use for space conditioning taking into account heating and cooling equipment efficiencies is estimated as 5.93 Quads for heating and 0.48 Quads for cooling. These figures agree with the 1993 RECS estimates to within 10% for heating and 6% for cooling, and are also roughly consistent with other statistically-derived national estimates by DOE and the Gas Research Institute.

The net national residential heating load is nearly 4 Quads, 5.2 Quads due to heat losses minus 1.2 Quads displaced by "free heat" from internal and solar gain through windows. Of the heat losses, infiltration and window conduction are the two largest components, each comprising roughly 25% of the total load, followed by walls (20%), floors (15%), and roofs (12%). The net national cooling load is approximately 1 Quad, 1.15 Quads due to heat gains minus 0.15 Quad displaced by "free cooling" through the building foundation. Of the heat gains, the largest component is solar gain (32%), followed by internal gains from equipment and people (27%), infiltration (16%), roofs (14%), and walls (10%). In new buildings, cooling loads are relatively more important, increasing from ¼ to nearly ½ of the heating loads. At the same time, the relative magnitude of building loads through opaque surfaces (walls and roofs) are reduced for both heating and cooling due to increased levels of insulation. Consequently, window and infiltration now make up 60% of the total heating load, while window solar gain and internal loads make up 60% of the total cooling load.

# RESIDENTIAL HEATING AND COOLING LOADS COMPONENT ANALYSIS

**Y. Joe Huang, James W. Hanford, and Fuqiang Yang**
**Lawrence Berkeley National Laboratory, Berkeley CA**

## 1. INTRODUCTION

According to the 1993 Residential Energy Consumption Survey (RECS), space conditioning in U.S. residential buildings is responsible for 5.78 Quadrillion BTUs (Quads) of site, or 6.79 Quads of source, energy use per year (EIA 1995). This study, summarized in the accompanying set of charts, quantifies the approximate contribution of the major residential building components - roofs, walls, foundations, windows, infiltration, and internal gains - to heating and cooling loads in these buildings.

This study makes use of existing residential building prototypes developed at Lawrence Berkeley National Laboratory (LBNL) from 1985 through 1990 (Ritschard et al. 1992). The previous work defined prototypical buildings by vintage and location for single-family detached and multi-family housing units, which were then modeled using the DOE-2 building energy simulation program to calculate their heating and cooling loads. In this study, further DOE-2 analysis was done to derive the Component Loads attributable to the different parts of the buildings, which were then multiplied by the aggregate amounts of wall, roof, etc., in the building stock represented by each prototypical building, to produce a national estimate of Component Loads in the residential sector. In this aggregation, the Components Loads calculated for the single-family detached houses were also extended to single-family attached houses and mobile homes to produce estimates of the heating and cooling loads of the entire residential sector of the U.S.

The calculated loads (Total as well as Component Loads) do not include the effects of heating and cooling equipment or distribution systems, which will be the focus of a future follow-on study. Two types of results are included. First, we present a ranking of the heating and cooling loads for the major regional and house type subsectors of the residential population. This ranking suggests priorities for conservation potential in the residential building sector. Next, the component loads are presented as a series of charts, first at a total national level, then regionally and by building type and building vintage. The charts show the portion of residential heating and cooling loads attributable to the major building components - roofs, walls, foundations, and windows (conduction and solar gains) - and infiltration and internal gains.

## 2. METHODOLOGY

Two related projects carried out by LBNL for the Gas Research Institute (GRI) provided the fundamental methodology and technical basis for this study. The product of these two projects was a database of typical U.S. residential building characteristics and their simulated heating, cooling, water heating, and aggregate electric loads, first for multi-family buildings (Ritschard and Huang 1989) and then for single-family buildings (Ritschard et al. 1992). The general methodology consisted of (1) generating regional building prototype descriptions from data on building stock characteristics, (2) identifying base cities to use as climate zones for DOE-2 building energy simulations, and (3) performing the simulations and creating a database of the results. Sixteen base cities were chosen based on significant climate and population characteristics (See Table A.4 in Appendix A). Sixteen multi-family building

prototypes were developed, with 3 to 5 prototypes simulated in each city. Six single-family building prototypes, representing stock, new, and future building construction characteristics were developed for each Census Division and were simulated across the sixteen climates.

In the analysis presented here, we used the building characteristics and DOE-2 input files from the GRI database, and made additional DOE-2 simulations to determine how much of the buildings' heating and cooling loads could be attributed to the following major building components - roof, wall, foundation, infiltration, windows (conduction and solar loads), and internal gains from people, lights, and appliances. To derive these "Component Loads", we made parametric simulations for each building and location in which the thermal property of a particular component (U-value for building surfaces, Solar Heat Gain Coefficient (SHGC) for windows, leakage area for infiltration, and heat gain for internal gains), were set to zero. The differences in heating and cooling loads from that of the original prototypical building are taken as the Component Loads attributable to that building component.

In conditions with substantial loads, such as Minneapolis heating or Miami cooling, the sum of the Component Loads is within 5-10% of the actual calculated heating or cooling load of the house. However, in situations with small loads, such as Los Angeles heating, the sum of the Component Loads are often quite different from the calculated total house load because of the sensitivity of the heating season length to the modeled condition that creates nonlinearities in the Component Loads. For example, we found that removing the internal gains could in some cases more than double the heating load, resulting in a Component Load that would more than offset the entire house heating load. In such situations, the contribution of the internal loads or solar heat gain was already implicit by reducing the length of the heating season. To adjust for this interaction, we proportionally scaled the contributing loads (heat loss for heating, heat gain for cooling) so that the sum of the Component Loads (which includes offsetting as well as contributing loads) was equal to the total building load.

Once this adjusted Component Loads data base has been created, the loads are then scaled by the building population represented by each prototype based on the 1993 RECS (EIA 1995). From this, we derive a database of the population heating and cooling loads that allows the data to be aggregated and charted across a variety of regional, vintage, and building type combinations. This report includes charts that show component loads for the major subsectors of the residential building population.

## 3. BUILDING PROTOTYPES

The general building prototype descriptions from the GRI database projects are given in Tables A.1 and A.3 in Appendix A.

The single-family detached building prototypes were originally characterized using data in the 1980, 1981, and 1982 RECS. These descriptions were updated by LBL using data from the 1984 RECS. In addition, Census Bureau data on single-family construction for 1980-89 and the 1987 National Association of Homebuilders Annual Survey (NAHB 1989) were used for 1980s vintage building characteristics. The prototype definitions were developed based on data for eight of the nine Census Divisions. For some parameters the Pacific division was divided between North and South to account for significant climate and regional variation. In total, building prototypes were defined for ten geographical regions. As shown in Table A.1, the "A" Prototype is a pre-1940 vintage building with as-built thermal characteristics. The

"A1" Prototype is of the same vintage, but with thermally improved, or retrofitted, building components. In the same manner, the "B" and "B1" Prototypes represent 1950-1969 vintage buildings. The "C" Prototypes represent 1980s vintage buildings and were developed based on both Census Region and state-level data (Ritschard et al. 1992). Because of significant variations of climate within many of the Census Regions, we expanded the number of base cities to 16, with up to three locations within a single Census Region (see Table A.4).

The primary data source used in developing the multi-family building prototype descriptions was the 1982 RECS. Sixteen different prototypes, labeled 1 through 16, were defined to represent the major building types based on Census Region (Northeast, North Central, South, and West), building size (number of units per building, number of stories per building) and building vintage. Three to five prototypes were identified for each of the four Census Regions that in total represented approximately 50% of the U.S. multi-family unit population. In general, the prototypes can be described as 1) two-story walkups in the Northeast and North Central regions with interior stairs, 2) small (nine units or less) walk-ups in the West and South with exterior stairs, and 3) larger prototypes with three or more stories with mechanically vented double-loaded corridors, which were assumed to be conditioned in the colder climates. The older walk-up buildings were assumed to be like row housing that is typically one room wide and several rooms deep, while the units in double-loaded corridor buildings were assumed to be square in shape (Ritschard and Huang 1989). Although there were only four variations in prototypes by climate, we simulated the prototypes in the same 16 base cities as was chosen for the single-family prototypes (see Table A.4).

## 4. HOUSING UNIT POPULATIONS

The unit populations were derived from the 1993 RECS (EIA 1995). The GRI residential prototypes, especially for multi-family buildings, were originally defined to represent the building characteristics of the most numerous building populations, and not the entire residential sector. Based on geographic region, vintage, construction type, and thermal integrity, the prototypes were determined to represent approximately 50% of the multi-family sector and 40% of the single-family sector. To make the component loads analysis national in scope, the building populations were recalculated by assigning buildings that were unrepresented to the most closely matching prototype.

In the single-family building population, the sector population was allocated to the original GRI prototype definitions by (1) assigning the pre-1940s "A" and "A1" (retrofit) prototypes to the pre-1950s vintage, (2) assigning the 1950-1960s "B" and "B1" (retrofit) prototypes to the 1950-1979 vintage, and (3) assigning the 1980s "C" prototype for both the 1980-1989 and Post-89 vintages. The percentages of the pre-1950s and 1950-79 vintage buildings that have been retrofitted, i.e., those represented by the "A1" and "B1" prototypes, are based on information provided in a 1998 study by A.D. Little (Barbour and Linkswiler 1998, see Table A.2). The final assignments of the GRI prototypes to the RECS vintages used in this study are indicated on the last column of Table A.1.

In the multi-family building population, the original GRI prototype definitions were expanded to encompass the full range of building types. For example, the small (2 floor/2-4 unit) prototypical buildings (Prototypes 2, 8, 9, and 14) were used to also represent larger multi-family buildings (greater than 5 units) of the same vintage as defined in RECS. Conversely, some of the larger prototypical buildings (Prototypes 4, 13, 15, and 16) were used

to also represent smaller buildings (2-4 units) of the same vintage as defined in RECS. Lastly, both 1980-89 and Post-1989 vintage buildings were assigned to the 1980s Prototype in each region (4, 8, 13, and 16). These revised assignments are indicated on the last two columns of Table A.3.

For the single-family buildings, the loads and energies calculated for the prototypical buildings were used without modification in the aggregation. For the multi-family buildings, however, an attempt was made to correct for the large difference in surface-to-volume ratios between the 2-story walk-ups and the large multi-story apartments by multiplying the calculated Component Loads by estimated ratios of the amount of roof, wall, and foundation per amount of floor area.

The building populations were assigned to the 16 base cities by first dividing the RECS data to the Census Division level, and then further dividing the populations in 6 of the 9 Census Divisions with more than one base city based on Heating and Cooling Degree-days. Because there were no base cities in the East South Central (ESC) Census Division, these building populations were assigned to Washington and Atlanta based on the same climate criteria. The populations were assigned at the city level to allow for maximum flexibility in aggregating the populations and loads (see Figures A.1 in Appendix A for region locations and Figure A.2 for approximate geographical extent of Degree-day boundaries). The assignations of the entire country to the 16 base cities are indicated in Column 5 of Table A.4.

## 5. TERMINOLOGY

In the charts there are three different regional aggregations: national, North and South, and Census Regions. The North/South and Census Regions are depicted in the maps on the following pages. The North/South division is based on climate parameters and is split at 4000 base 65$^{o}$ F heating degree-days (see Figs. A.1 and A.2 for region locations).

The charts also give results by building type. In some cases, these are further broken down by building vintage and thermal integrity. The A and B single-family prototypes are considered as "Old", while the C prototype is considered "New". For the multi-family buildings, prototypes 1, 2, 3, 5, 6, 7, 9, 10, 11, 12, 14 and 15 are considered of "Old" vintage, while prototypes 4, 8, 13, and 16 are considered "New". Since the "New" vintage dates only from 1980, it is currently a much smaller portion of the housing stock as compared to the "Old" vintage buildings. However, if we consider that 1980s construction practices will continue into the future, buildings with these construction characteristics will grow as a proportion of the total residential sector, while the older prototypes will decrease in number due to housing retirements or demolitions. In addition, the comparison between old and new vintages serves to suggest the areas where construction practices have contributed to gains in energy efficiency, and the areas where new construction technologies could benefit energy efficiency in new construction.

## 6. RESULTS

The results are presented in this section, first by ranking the heating and cooling loads for the major population subsectors, and then by graphically displaying the Component Loads for various region, housing type, and vintage combinations.

Although the simulated space conditioning energy uses for the original GRI prototypes have been compared to survey and measured data with good agreement, it should be noted that the results presented here for the absolute loads have not been calibrated against actual building loads. The results are therefore best used for comparisons between one subsector and another, rather than for the absolute loads. A comparison with estimates of sector-wide space conditioning energy use can be found in the following section.

### 6.1 Loads Ranking

Table 1 below ranks heating and cooling loads for the major residential subsectors. These are taken from aggregating the component loads across regions, house types, and vintages. The vintages have been separated since the building populations in the "New" vintage are much smaller than the "Old" vintage, and the results are not directly comparable. Given that the "New" vintage describes current, as well as 1980s, construction practices, these breakouts describe the conservation potential in the retrofit and new construction markets.

### 6.2 Component Loads

In Appendix B, there are two series of charts that show the component loads. The first is a series of pie charts (p1, p2, p3, etc.) following a format first developed by the authors for a companion study on commercial building component loads (Huang and Franconi 1998). Each pie chart consists of two pies - one for heating and the other for cooling - scaled by the size of the load. The heat gains are shown as crosshatched pie slices and the heat losses as hatched pie slices. On the heating pies the heat losses (or loads) are plotted on the top half and the heat gains (or "free heat") on the bottom half. On the cooling pies, the heat gains (or loads) are plotted on the top half and the heat losses (or "free cooling") on the bottom half. The remaining exploded pie slice shows the imbalance between the heat gains and losses and represents the net heating or cooling load that must be supplied by the building's HVAC system. The numbers labeled “Net” indicate the total heating or cooling loads for the building sector. The concentric pie slices show the energy consumed by the HVAC system to meet those building loads, with the increase indicating the overall efficiency of the heating or cooling system. For cooling, a source multiplier of 3 has been added to avoid giving misleading impressions of cooling efficiency.

Although the size of the heating and cooling pies on each figure are scaled to their loads, the same scale was not used for all 20 pie charts. For the smaller building subsectors, a larger scale was used to enhance legibility of the pie charts. The scale used is indicated by the circles in the lower left of each pie chart.

The second type are bar charts (b1, b2, b3, etc.), which show the absolute load for each component but are more difficult to read as showing parts of the whole. Thus, the bar and the pie charts each have certain benefits in presenting the results, although each portray the same data. Each chart also shows the number of housing units and the heating, cooling, and total loads for that segment of the residential population.

The charts show component loads for eight different heat transfer elements - roofs (Roof), walls (Wall), foundations (Floor), infiltration (Infl), window conduction (Wndw), window solar gain (Solar), equipment (Equip), and occupants (Peop). There is a great deal of information in the accompanying charts, and in this section we will try to highlight the most

important issues. The charts which support the conclusions are referred to as charts 1 (p1 or b1), 2 (p2 or b2), etc., to allow the reader to reference the data being discussed. The data set is included in Appendix C.

*6.2.a National (chart 1)*

At the national level, the heating load is approximately four times the cooling load, or 4/5 of the total load. Since the efficiency of air-conditioning is 3-4 times that of furnaces, but the cost of electricity is four times that of fossil fuel, the ratio of heating to cooling costs is also roughly 4 to 1 .

Heating loads are dominated by infiltration, window conduction, walls, foundations, and roofs, in that order, although it needs to be pointed out that window solar gain recaptures 1/3 of the heat loss through the windows. In contrast, cooling loads are dominated by window solar, internal gains from appliances and people, infiltration, roofs, and walls, with window conduction adding very little additional heat gain.. Foundations actually are a negative cooling load - that is, they act as a slight cooling sink.

*6.2.b National, by building type (charts 2 ,3, and 4)*

The single-family loads represents ¾ of the entire residential sector, and are five times as large as the multi-family loads, and six times as large as those for single-family attached and mobile homes. This is because there are approximately 2.5 times as many single-family as multi-family housing units, and their loads per unit are roughly double that of multi-family units because of their larger size and increased roof, wall, and foundation areas. Window conduction, roofs, and foundation heating loads are substantially more important in single-family buildings than in multi-family buildings.

Internal gains are less of a benefit in single-family buildings because of the smaller amount of internal gains per conditioned building area. For cooling loads, internal gains are by far the most important in multi-family buildings while solar and internal gains drive the cooling loads in single-family buildings.

The aggregate heating and cooling loads of single-family attached house and mobile homes are less than a sixth those of single-family detached houses. The component characteristics are also very similar, but this may reflect more the limitations of this study. Since we did not have any single-family attached or mobile home prototypes, we simply used the single-family end-use intensities and assumed a size ratio of 0.60 for mobile homes and 0.90 for attached houses.

*6.2.c National, by vintage (charts 5 and 6)*

Cooling is a larger portion of the total load in new houses than in old houses. Two factors are likely responsible for this change. One is that as buildings become better insulated, heating loads are reduced much more than cooling loads. Second, the proportion of new housing stock in cooling climates is greater than for existing stock.

Walls, infiltration, and roofs are the biggest contributors to heating loads in the old, uninsulated buildings. In the retrofitted older buildings, the wall and roof loads are substantially reduced, but not so those of the windows, floor, or infiltration, which have been

assumed to be unchanged. Since the majority of the "Old" buildings are now in the retrofit category, the cumulative loads for all "Old" buildings shows the biggest components to be infiltration, windows, wall, floors, and roof. Since a third of the window conductive load is compensated by solar gain, the net window load in all "Old" buildings is less than that of the walls, but more than that of the roof. In new buildings, infiltration is the major component because gains in roof and wall insulation have surpassed infiltration load reduction technologies. In addition, increases in insulation levels are much easier to measure than changes in infiltration, which at this scale of analysis is more difficult to estimate.

Increases in roof and wall insulation in new buildings have also decreased the cooling load of these components. Solar gains, equipment, and infiltration are the largest drivers of cooling loads in new buildings.

*6.2.d National, single-family detached,, by vintage (charts 7 and 8)*

Cooling loads increase from 19% of the total load in old buildings to 34% of the total load in new single-family detached buildings.

Infiltration contributes a larger portion of the total load in new buildings, whereas walls, roofs, and window conduction decrease in total load.

Cooling loads in old buildings are split rather evenly between the roof, walls, infiltration, solar gains, and internal gains. In new buildings, solar and internal gains from equipment and people account for 2/3 of the cooling load.

*6.2.e National, multi-family, by vintage (charts 9 and 10)*

Heating and cooling loads for new (built in the 1980s) multi-family buildings are quite small compared to new single-family buildings.

Cooling loads are 1/2 of the total load in new multi-family buildings compared to 1/4 in old buildings.

Infiltration is the largest contributor to heating loads and total loads in new multi-family buildings. Walls and window conduction remain significant for heating loads, while internal gains dominate the cooling load.

Internal gains become a net positive total load in new buildings. That is, they contribute more to increasing the cooling load than to decreasing the heating load.

*6.2f National, single-family attached and mobile homes, by vintage (charts 11 and 12)*

The loads for these subsectors are about 12-13% of that of single-family detached housing. The distribution of the loads is virtually identical, but that is implicit in this analysis since the loads were scaled from single-family detached prototypes, because we did not have prototypes for such buildings. In actuality, one would expect some differences in the loads characteristics from single-family detached housing, probably lower levels of thermal integrity, but not drastic differences.

*6.2.g Regional (charts 13 and 17)*

The North/South regional split generally separates heating from cooling climates. In the North region as defined, 14% of the total load is cooling load, whereas in the South, the total load is 50% heating and 50% cooling.

In both climates, heating loads are distributed relatively evenly among the major components of roofs, walls, foundations, infiltration, and window conduction.

Cooling loads are more dominated by internal gains and infiltration in the South than in the North.

*6.2.h Regional, by building type (charts 18 through 30)*

A comparison of new with old buildings within the North and South regions supports the conclusions mentioned earlier in comparing loads across building vintages and climates:

Walls, roofs, and infiltration are the largest heating loads in old buildings in the North (14), with roofs and walls becoming much less important in new buildings (16).

Roof and wall insulation in new buildings in the South (22) has greatly reduced their component heating and cooling loads compared to old buildings (20). Internal and solar gains remain the largest drivers of cooling loads in the South.

The regional breakdown by Census Region reveals little more than the North/South regional breakdown. Trends in the Northeast and North Central Census Regions mirror the trends in the North region while the South Census Region breakdown resembles the South region. The West Census Region has a combination of heating, cooling, and temperate climates and thus does not follow any particular pattern.

## 7. COMPARISON OF COMPONENT LOADS WITH OTHER DATA

Although this analysis has focussed on the distribution of building loads to Component Loads, the DOE-2 simulations were actually done using a standard residential HVAC system, so that data also exist on the simulated heating and cooling energy use of the prototypical buildings. To determine the reliability of the simulated results, in this section we compare the aggregated heating and cooling energy consumptions from this study with other estimates of national residential energy use, i.e., the 1995 and 1997 Annual Energy Outlook (AEO) forecast outputs (EIA 1996, 1998), and the 1995 and 1997 forecasts by the Gas Research Institute (GRI 1996,1998).

Table 2 shows that the results from this study are quite consistent with the AEO and RECS values, and somewhat higher than those estimated by the GRI. A word of caution is needed, however, that the comparison used one procedure to aggregate the prototypical building loads that yielded results consistent with the comparison studies, but that there are other aggregation procedures that would have produced significantly larger discrepancies between this study and the RECS/AEO national totals. The cumulative loads and energy consumption displayed in this report were aggregated in the following manner :

(Prototypical house energy use) * (fraction of floor area heated/cooled) * (No. of houses)

However, if the data had been aggregated using the following equation, a substantially different answer would have resulted :

(Prototypical house energy use per $ft^2$) * (floor area heated/cooled) * (No. of houses)

With this formulation, this study would produce similar cooling energy use as the previous formulation, but the national residential heating energy use would be 7 Quads, or 40% higher than shown in RECS or AEO. The reason for this discrepancy is due to the surprisingly large average heated floor areas reported in the 1993 RECS for single-family detached houses in the Northeast and North Central regions. While the prototypical buildings in these areas had floor areas from 1100 to 2220 $ft^2$, the average heat floor areas reported in RECS were from 2800 to 3400 $ft^2$.

## 8. AVERAGE BUILDING COMPONENT LOADS

For conservation and technology assessment purposes, the data presented here may be too disaggregated for simple analyses. Thus, we have constructed average buildings and their populations and component loads that can be used for assessing conservation potential from envelope heat gain and loss measures and also from new HVAC equipment technologies. Four average buildings are defined, including North/Old, North/New, South/Old, and South/New. "Old" buildings are all pre-1980 vintage. "New "buildings are post-1979 vintage. Thus, the existing building population includes both Old and New buildings, and the New buildings are representative of current construction practices. The per-building and population component loads are presented in Table 3.

## 9. CONCLUSIONS

The results presented in this analysis highlight the relative importance of different building types and building components in the overall heating and cooling loads for the residential building sector. For example, the ranking of loads suggests that heating in single-family buildings in the North region is the largest single load for both old and new vintage buildings, while heating loads in older multi-family buildings in the North region and both heating and cooling in single-family buildings in the South are also significant to the overall total. The charts graphically depict the contribution of the various building components to the heating and cooling loads and deserve careful study. Finally, the building prototype heating and cooling component loads provide a baseline for estimating conservation potential from both envelope component and equipment improvements in the residential sector. A comparison of the calculated loads with end-use estimates for heating and cooling energy use suggests that the calculations give reasonable estimates of the total sector heating and cooling loads and thus can be used with confidence.

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**Table 1. Ranking of Loads by Housing Type, Region and End Use**

| House Type | Region | End Use | Population[1] (millions) | Load[2] (trillion Btu) |
|---|---|---|---|---|
| *Old Vintage* | | | | |
| Single-Family Detached | North | Heating | 25.3 | 1756 |
| Single-Family Detached | South | Heating | 21.9 | 798 |
| Single-Family Detached | South | Cooling | 21.9 | 434 |
| Multi-Family | North | Heating | 11.9 | 434 |
| Single-Family Detached | North | Cooling | 25.3 | 184 |
| Single-Family Attached | North | Heating | 2.8 | 183 |
| Mobile Home | North | Heating | 1.5 | 63 |
| Multi-Family | South | Heating | 6.8 | 56 |
| Multi-Family | South | Cooling | 6.8 | 55 |
| Single-Family Attached | South | Heating | 1.6 | 52 |
| Multi-Family | North | Cooling | 11.9 | 41 |
| Single-Family Attached | South | Cooling | 1.6 | 31 |
| Mobile Home | South | Heating | 1.3 | 33 |
| Single-Family Attached | North | Cooling | 2.8 | 19 |
| Mobile Home | South | Cooling | 1.3 | 16 |
| Mobile Home | North | Cooling | 1.5 | 5 |
| *New Vintage* | | | | |
| Single-Family Detached | North | Heating | 4.7 | 254 |
| Single-Family Detached | South | Heating | 7.4 | 149 |
| Single-Family Detached | South | Cooling | 7.4 | 161 |
| Single-Family Attached | North | Heating | 1.0 | 50 |
| Single-Family Attached | South | Heating | 1.8 | 42 |
| Mobile Home | North | Heating | 1.0 | 43 |
| Multi-Family | North | Heating | 2.1 | 38 |
| Single-Family Detached | North | Cooling | 4.7 | 36 |
| Single-Family Attached | South | Cooling | 1.8 | 30 |
| Mobile Home | South | Heating | 1.7 | 27 |
| Multi-Family | South | Cooling | 3.2 | 25 |
| Mobile Home | South | Cooling | 1.7 | 18 |
| Multi-Family | South | Heating | 3.2 | 12 |
| Multi-Family | North | Cooling | 2.1 | 9 |
| Single-Family Attached | North | Cooling | 1.0 | 7 |
| Mobile Home | North | Cooling | 1.0 | 5 |

1. population of buildings; not necessarily population with installed end-use equipment.
**2.** load calculated as (building population) x (% conditioned) x (building load).

**Table 2. Comparison of Sector Loads from End-Use Energy Consumption (all Energy and Loads in Quadrillion Btu of site energy)**

| | Component Loads Analysis | 1993 RECS | 1995 AEO for 1993 | 1997 AEO for 1995 | 1995 GRI for 1993 | 1997 GRI for 1995 |
|---|---|---|---|---|---|---|
| **Space Heating** | **5.93** | **5.32** | **5.90** | **5.65** | **5.07** | **5.31** |
| Natural Gas | 5.93 | 3.67 | 3.68 | 3.48 | 3.56 | 3.39 |
| Other Fuels | | 0.99 | 1.06 | 1.06 | 0.76 | 1.14 |
| Electricity | | 0.41 | 0.37 | 0.43 | 0.75 | 0.79 |
| Other, e.g. wood | | 0.25 | 0.79 | 0.68 | | |
| **Space Cooling** | **0.48** | **0.46** | **0.53** | **0.49** | **0.60** | **0.79** |
| Natural Gas | | 0.00 | 0.00 | 0.01 | 0.00 | 0.13 |
| Electricity | 0.48 | 0.46 | 0.53 | 0.48 | 0.60 | 0.66 |
| **Water Heating** | **1.19** | **1.83** | **1.63** | **1.75** | **1.83** | **1.90** |
| Natural Gas | 1.19 | 1.31 | 1.11 | 1.25 | 1.25 | 1.28 |
| Other Fuels | | 0.17 | 0.16 | 0.15 | 0.10 | 0.13 |
| Electricity | | 0.34 | 0.36 | 0.35 | 0.47 | 0.49 |
| **Lighting** | **0.59** | | **0.32** | **0.32** | **0.28** | **0.28** |
| **Other End-Uses** | **2.47** | **2.94** | **2.23** | **2.31** | **1.61** | **1.35** |
| Natural Gas | 0.84 | 0.29 | 0.32 | 0.27 | 0.30 | 0.20 |
| Other Fuels | | 0.29 | 0.05 | 0.04 | 0.02 | 0.10 |
| Electricity | 1.63 | 2.07 | 1.81 | 1.98 | 1.30 | 1.05 |
| **Total Energy Usage** | **10.66** | **10.55** | **10.61** | **10.52** | **9.39** | **9.63** |
| Natural Gas | 7.95 | 5.27 | 5.11 | 5.01 | 5.11 | 4.99 |
| Other Fuels | | 1.45 | 1.27 | 1.25 | 0.89 | 1.38 |
| Electricity | 2.11 | 3.28 | 3.39 | 3.56 | 3.39 | 3.26 |
| Other, e.g. wood | | 0.55 | 0.84 | 0.70 | | |

**Table 3. Adjusted Single Building and Building Population Loads for Average Buildings**

| Region | Vintage | Popln. (mill.) | Load | Component Load roof | wall | wndw solar | wndw cond. | infilt | peop | equip. | ground | total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Per Building Loads (MMBtu/yr)* | | | | | | | | | | | | |
| North | Old | 41.5 | Heat | -9.2 | -14.2 | 4.7 | -16.1 | -21.3 | 1.5 | 8.2 | -12.4 | -58.7 |
| | | | Cool | 1.0 | 0.8 | 2.4 | 0.0 | 0.9 | 0.3 | 1.4 | -0.7 | 6.0 |
| North | New | 8.9 | Heat | -3.1 | -9.5 | 3.5 | -16.3 | -18.1 | 1.4 | 8.6 | -9.9 | -43.4 |
| | | | Cool | 0.5 | 0.7 | 2.8 | 0.1 | 1.0 | 0.4 | 1.7 | -0.8 | 6.4 |
| South | Old | 31.6 | Heat | -6.6 | -8.3 | 5.0 | -13.1 | -9.8 | 1.0 | 5.7 | -3.5 | -29.7 |
| | | | Cool | 3.0 | 1.7 | 5.3 | 0.2 | 3.1 | 0.8 | 3.5 | -0.7 | 17.0 |
| South | New | 14.2 | Heat | -2.0 | -4.6 | 3.5 | -8.1 | -7.9 | 0.8 | 5.3 | -3.3 | -16.2 |
| | | | Cool | 1.6 | 1.4 | 5.7 | 0.1 | 3.0 | 1.1 | 4.7 | -1.1 | 16.5 |
| *Building Population Loads (Trillion Btu/yr)* | | | | | | | | | | | | |
| North | Old | 41.5 | Heat | -381 | -589 | 194 | -667 | -885 | 63 | 342 | -513 | -2435 |
| | | | Cool | 41 | 33 | 100 | -1 | 37 | 13 | 57 | -30 | 248 |
| North | New | 8.9 | Heat | -28 | -84 | 31 | -145 | -161 | 12 | 77 | -87 | -385 |
| | | | Cool | 4 | 6 | 25 | 1 | 9 | 3 | 15 | -7 | 57 |
| South | Old | 31.6 | Heat | -210 | -262 | 157 | -415 | -309 | 31 | 180 | -111 | -939 |
| | | | Cool | 95 | 53 | 167 | 7 | 99 | 25 | 111 | -21 | 536 |
| South | New | 14.2 | Heat | -29 | -66 | 49 | -114 | -111 | 12 | 76 | -47 | -230 |
| | | | Cool | 23 | 20 | 80 | 2 | 43 | 15 | 67 | -16 | 234 |
| Total | | 96.1 | Heat | -647 | -1001 | 431 | -1341 | -1466 | 117 | 674 | -758 | -3989 |
| | | | Cool | 163 | 112 | 373 | 9 | 187 | 56 | 250 | -74 | 1075 |

# APPENDIX A : BACKGROUND AND DATA INPUTS

**Table A.1. General Specifications for Single Family Prototypes**

| Census Division | Proto-type | Year Built | No. Stories | Floor Area (ft2) | Window Area (ft2) | Wall Type | Found-ation Type | Conservation Wall (R) | Roof (R) | Floor (R) | Panes (no.) | Found-ation Ins. | Component Load Assignment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| New England | A | pre 1940s | 2 | 1440 | 280 | Wood | Bsmt | 0 | 0 | 0 | 2 | none | Pre-50 |
| | A1 | pre 1940s | 2 | 1440 | 280 | Wood | Bsmt | 7 | 22 | 0 | 2 | none | Pre-50 |
| | B | 1950-1970 | 2 | 2220 | 430 | Wood | Bsmt | 0 | 22 | 0 | 2 | none | 1950-79 |
| | B1 | 1950-1970 | 2 | 2220 | 430 | Wood | Bsmt | 7 | 22 | 0 | 2 | none | 1950-79 |
| | C | 1980s | 2 | 2090 | 261 | Wood | Bsmt | 13 | 27 | 0 | 2 | none | Post-79 |
| Mid Atlantic | A | pre 1940s | 2 | 1400 | 277 | Wood | Bsmt | 0 | 0 | 0 | 2 | none | Pre-50 |
| | A1 | pre 1940s | 2 | 1400 | 277 | Wood | Bsmt | 7 | 7 | 0 | 2 | none | Pre-50 |
| | B | 1950-1970 | 2 | 1960 | 385 | Wood | Bsmt | 0 | 7 | 0 | 2 | none | 1950-79 |
| | B1 | 1950-1970 | 2 | 1960 | 385 | Wood | Bsmt | 7 | 11 | 0 | 2 | none | 1950-79 |
| | C | 1980s | 2 | 2090 | 243 | Wood | Bsmt | 13 | 27 | 19 | 2 | none | Post-79 |
| East North Central | A | pre 1940s | 2 | 1580 | 300 | Wood | Bsmt | 0 | 0 | 0 | 2 | none | Pre-50 |
| | A1 | pre 1940s | 2 | 1580 | 300 | Wood | Bsmt | 7 | 11 | 0 | 2 | none | Pre-50 |
| | B | 1950-1970 | 1 | 1380 | 264 | Brick | Bsmt | 0 | 11 | 0 | 2 | none | 1950-79 |
| | B1 | 1950-1970 | 1 | 1380 | 264 | Brick | Bsmt | 7 | 19 | 0 | 2 | none | 1950-79 |
| | C | 1980s | 2 | 2220 | 275 | Alum | Bsmt | 13 | 32 | 0 | 2 | none | Post-79 |
| West North Central | A | pre 1940s | 2 | 1580 | 310 | Wood | Bsmt | 0 | 0 | 0 | 2 | none | Pre-50 |
| | A1 | pre 1940s | 2 | 1580 | 310 | Wood | Bsmt | 7 | 7 | 0 | 2 | none | Pre-50 |
| | B | 1950-1970 | 1 | 1100 | 216 | Wood | Bsmt | 0 | 7 | 0 | 2 | none | 1950-79 |
| | B1 | 1950-1970 | 1 | 1100 | 216 | Wood | Bsmt | 7 | 22 | 0 | 2 | none | 1950-79 |
| | C ** | 1980s | 2 | 2220 | 262 | Wood | Bsmt | 19 | 32 | 0 | 2 | R-5 4ft | Post-79 |
| South Atlantic | A | pre 1940s | 1 | 1165 | 207 | Wood | Crawl | 0 | 0 | 0 | 2 | none | Pre-50 |
| | A1 | pre 1940s | 1 | 1165 | 207 | Wood | Crawl | 7 | 7 | 0 | 2 | none | Pre-50 |
| | B | 1950-1970 | 1 | 1415 | 249 | Brick | Crawl | 0 | 7 | 0 | 2 | none | 1950-79 |
| | B1 | 1950-1970 | 1 | 1415 | 249 | Brick | Crawl | 7 | 11 | 0 | 2 | none | 1950-79 |
| | C ** | 1980s | 2 | 2180 | 270 | Alum | Bsmt | 11 | 27 | 19 | 2 | none | Post-79 |
| West South Central | A | pre 1940s | 1 | 1055 | 216 | Wood | Slab | 0 | 0 | 0 | 2 | none | Pre-50 |
| | A1 | pre 1940s | 1 | 1055 | 216 | Wood | Slab | 7 | 7 | 0 | 2 | none | Pre-50 |
| | B | 1950-1970 | 1 | 1390 | 286 | Brick | Slab | 0 | 7 | 0 | 2 | none | 1950-79 |
| | B1 | 1950-1970 | 1 | 1390 | 286 | Brick | Slab | 7 | 19 | 0 | 2 | none | 1950-79 |
| | C ** | 1980s | 1 | 1620 | 214 | Wood | Slab | 11 | 27 | 0 | 1 | R-5 2ft | Post-79 |
| Mountain | A | pre 1940s | 1 | 975 | 177 | Wood | Bsmt | 0 | 0 | 0 | 2 | none | Pre-50 |
| | A1 | pre 1940s | 1 | 975 | 177 | Wood | Bsmt | 7 | 11 | 0 | 2 | none | Pre-50 |
| | B | 1950-1970 | 1 | 1080 | 196 | Brick | Slab | 0 | 11 | 0 | 2 | none | 1950-79 |
| | B1 | 1950-1970 | 1 | 1080 | 196 | Brick | Slab | 7 | 11 | 0 | 2 | none | 1950-79 |
| | C ** | 1980s | 1 | 1660 | 179 | Stucco | Slab | 13 | 29 | 0 | 2 | R-5 2ft | Post-79 |
| Pacific North | A | pre 1940s | 1 | 1400 | 244 | Wood | Crawl | 0 | 0 | 0 | 2 | none | Pre-50 |
| | A1 | pre 1940s | 1 | 1400 | 244 | Wood | Crawl | 7 | 11 | 0 | 2 | none | Pre-50 |
| | B | 1950-1970 | 1 | 1390 | 242 | Wood | Crawl | 0 | 11 | 0 | 2 | none | 1950-79 |
| | B1 | 1950-1970 | 1 | 1390 | 242 | Wood | Crawl | 7 | 19 | 0 | 2 | none | 1950-79 |
| | C | 1980s | 2 | 2070 | 383 | Wood | Crawl | 11 | 32 | 19 | 2 | none | Post-79 |
| Pacific South | A | pre 1940s | 1 | 1400 | 244 | Wood | Crawl | 0 | 0 | 0 | 1 | none | Pre-50 |
| | A1 | pre 1940s | 1 | 1400 | 244 | Wood | Crawl | 7 | 7 | 0 | 1 | none | Pre-50 |
| | B | 1950-1970 | 1 | 1390 | 242 | Stucco | Crawl | 0 | 7 | 0 | 1 | none | 1950-79 |
| | B1 | 1950-1970 | 1 | 1390 | 242 | Stucco | Crawl | 7 | 11 | 0 | 1 | none | 1950-79 |
| | C | 1980s | 2 | 2070 | 325 | Stucco | Slab | 11 | 25 | 0 | 2 | none | Post-79 |

** Prototypes vary by city. Average or typical prototype shown here.

**Table A.2. Fraction of older vintage single-family buildings with retrofits**
(from A.D. Little briefing to DOE, Ed Barbour and Jason Linkswiler, June 3, 1998)

| | Number of buildings by prototype vintages (thousands) | | | | | | | Fraction of A & B vintages w/retrofits | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | A1 | B | B1 | C | D | Total | A | A1 | B | B1 |
| **Northeast** | | | | | | | | | | | |
| Boston | 752 | 1452 | 179 | 803 | 578 | 73 | 3837 | 0.341 | 0.659 | 0.182 | 0.818 |
| New York | 1267 | 2524 | 544 | 1790 | 1162 | 133 | 7420 | 0.334 | 0.666 | 0.233 | 0.767 |
| **North Central** | | | | | | | | | | | |
| Chicago | 1574 | 3779 | 1191 | 6248 | 1227 | 352 | 14371 | 0.294 | 0.706 | 0.160 | 0.840 |
| Minneapolis | 381 | 1122 | 206 | 1044 | 183 | 108 | 3044 | 0.253 | 0.747 | 0.165 | 0.835 |
| Kansas City | 381 | 1122 | 206 | 1044 | 183 | 108 | 3044 | 0.253 | 0.747 | 0.165 | 0.835 |
| **South** | | | | | | | | | | | |
| Washington | 238 | 299 | 392 | 624 | 992 | 366 | 2911 | 0.443 | 0.557 | 0.386 | 0.614 |
| Atlanta | 238 | 299 | 392 | 624 | 992 | 366 | 2911 | 0.443 | 0.557 | 0.386 | 0.614 |
| Miami | 238 | 299 | 392 | 624 | 992 | 366 | 2911 | 0.443 | 0.557 | 0.386 | 0.614 |
| E.South Central | 601 | 559 | 491 | 372 | 752 | 208 | 2983 | 0.518 | 0.482 | 0.569 | 0.431 |
| Fort Worth | 145 | 63 | 286 | 481 | 451 | 150 | 1577 | 0.697 | 0.303 | 0.373 | 0.627 |
| New Orleans | 145 | 63 | 286 | 481 | 451 | 150 | 1577 | 0.697 | 0.303 | 0.373 | 0.627 |
| **West** | | | | | | | | | | | |
| Denver | 80 | 173 | 79 | 234 | 133 | 52 | 753 | 0.317 | 0.683 | 0.253 | 0.747 |
| Albuquerque | 80 | 173 | 79 | 234 | 133 | 52 | 753 | 0.317 | 0.683 | 0.253 | 0.747 |
| Phoenix | 80 | 173 | 79 | 234 | 133 | 52 | 753 | 0.317 | 0.683 | 0.253 | 0.747 |
| Seattle | 149 | 321 | 197 | 682 | 438 | 52 | 1839 | 0.318 | 0.682 | 0.224 | 0.776 |
| San Francisco | 867 | 565 | 883 | 1590 | 318 | 52 | 4274 | 0.605 | 0.395 | 0.357 | 0.643 |
| Los Angeles | 867 | 565 | 883 | 1590 | 318 | 52 | 4274 | 0.605 | 0.395 | 0.357 | 0.643 |
| **Total** | **8084** | **13551** | **6767** | **18702** | **9434** | **2693** | **59231** | **0.374** | **0.626** | **0.266** | **0.734** |

**Table A.3. General specifications for multi-family prototypes**

| Census region | Prototype no. | Year built | Population[1] (%) | No. of units | No. of floors | Flr area /unit ($ft^2$) | Wall type | Wndws /unit[2] ($ft^2$) | Conservation (R) ceil | (R) wall | (No.) panes | Component Loads Assignment 2-4 units | > 5 units |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| North-east | 1 | pre-1940's | 10.6 | 2-4 | 2 | 1143 | Wood | 123 | 0 | 0 | 2 | Pre-50s | - |
| | 2 | 1950-1959 | 2.2 | 2-4 | 2 | 1357 | Brick | 172 | 7 | 0 | 2 | 50-79 | 50-79 |
| | 3 | pre-1940's | 4.7 | >5 | 3-5 | 675 | Brick | 62 | 0 | 0 | 1 | - | Pre-50s |
| | 4 | 1980's | 0.3 | >5 | 3-5 | 920 | Brick | 129 | 30 | 13 | 2 | Post-79 | Post-79 |
| North Central | 5 | pre-1940's | 6.6 | 2-4 | 2 | 1130 | Brick | 103 | 0 | 0 | 2 | Pre-50s | Pre-50s |
| | 6 | 1960-1969 | 2.3 | 2-9 | 2 | 968 | Brick | 65 | 7 | 7 | 2 | 50-79 | - |
| | 7 | 1970-1979 | 5.0 | >5 | 2-5 | 954 | Brick | 77 | 19 | 11 | 2 | - | 50-79 |
| | 8 | 1980's | 0.3 | 2-4 | 2 | 1050 | Wood | 88 | 30 | 13 | 2 | Post-79 | Post-79 |
| South | 9 | pre-1940's | 2.4 | 2-4 | 2 | 863 | Wood | 83 | 0 | 0 | 1 | Pre-50s | Pre-50s |
| | 10 | 1960-1969 | 2.4 | 2-4 | 2 | 893 | Brick | 57 | 0 | 0 | 1 | 50-79 | - |
| | 11 | 1960-1969 | 3.2 | >5 | 2-5 | 947 | Brick | 34 | 0 | 0 | 1 | - | 50-79 |
| | 12 | 1970-1979 | 3.7 | >5 | 2-5 | 1022 | Brick | 37 | 3 | 0 | 1 | - | 50-79 |
| | 13 | 1980's | 0.5 | >5 | 2-5 | 968 | Brick | 48 | 21 | 12 | 2 | Post-79 | Post-79 |
| West | 14 | pre-1940's | 2.6 | 2-4 | 2 | 679 | Wood | 112 | 0 | 0 | 1 | Pre-50s | Pre-50s |
| | 15 | 1970-1979 | 4.7 | >5 | 2-5 | 960 | Wood | 65 | 6 | 3 | 1 | 50-79 | 50-79 |
| | 16 | 1980's | 1.8 | >5 | 2-5 | 955 | Wood | 49 | 23 | 13 | 2 | Post-79 | Post-79 |

**Table A.4. Base cities for Single-family and Multi-family data bases**

| CENSUS REGION | | | | | |
|---|---|---|---|---|---|
| | | Heating | Cooling | Component Loads assigned areas | |
| | Weather | Deg.-Days | Deg.-Days | Area | |
| Base Cities | Tape | (65 F) | (65 F) | Number | Description |
| NORTHEAST | | | | | |
| Boston | WYEC2 | 5697 | 723 | 1 | New England |
| New York | WYEC2 | 4941 | 1034 | 2 | Middle Atlantic |
| NORTH CENTRAL | | | | | |
| Chicago | WYEC2 | 6264 | 979 | 3,4 | East North Central |
| Minneapolis | WYEC2 | 8070 | 750 | 5 | West North Central, > 7000 HDD |
| | | | | 14 | Mountain, > 7000 HDD |
| Kansas City | WYEC2 | 4859 | 1642 | 6 | West North Central, < 7000 HDD |
| SOUTH | | | | | |
| Washington | WYEC2 | 4236 | 1425 | 7 | South Atlantic, > 4000 HDD |
| | | | | 10 | East South Central, > 4000 HDD |
| Atlanta | WYEC2 | 3022 | 1579 | 8 | South Atlantic, < 4000 HDD, < 3000 CDD |
| | | | | 11 | East South Central, < 4000 HDD |
| Miami | WYEC2 | 227 | 4005 | 9 | South Atlantic, < 4000 HDD. > 3000 CDD |
| Fort Worth | WYEC2 | 2376 | 2543 | 12 | West South Central, > 2000 HDD |
| Lake Charles | WYEC2 | 1535 | 2693 | 13 | West South Central, < 2000 HDD |
| WEST | | | | | |
| Denver | WYEC2 | 5936 | 630 | 15 | Mountain, < 7000 HDD, > 5000 HDD |
| Albuquerque | WYEC2 | 4242 | 1287 | 16 | Mountain, < 5000 HDD, < 2000 CDD |
| Phoenix | WYEC2 | 1355 | 3661 | 17 | Mountain, < 5000 HDD, > 2000 CDD |
| Seattle | WYEC2 | 5222 | 97 | 18 | Pacific, > 4000 HDD |
| San Francisco | TMY2 | 3238 | 68 | 19 | Pacific, < 4000 HDD, > 2000 HDD |
| Los Angeles | WYEC2 | 1704 | 459 | 20 | Pacific, < 2000 HDD |

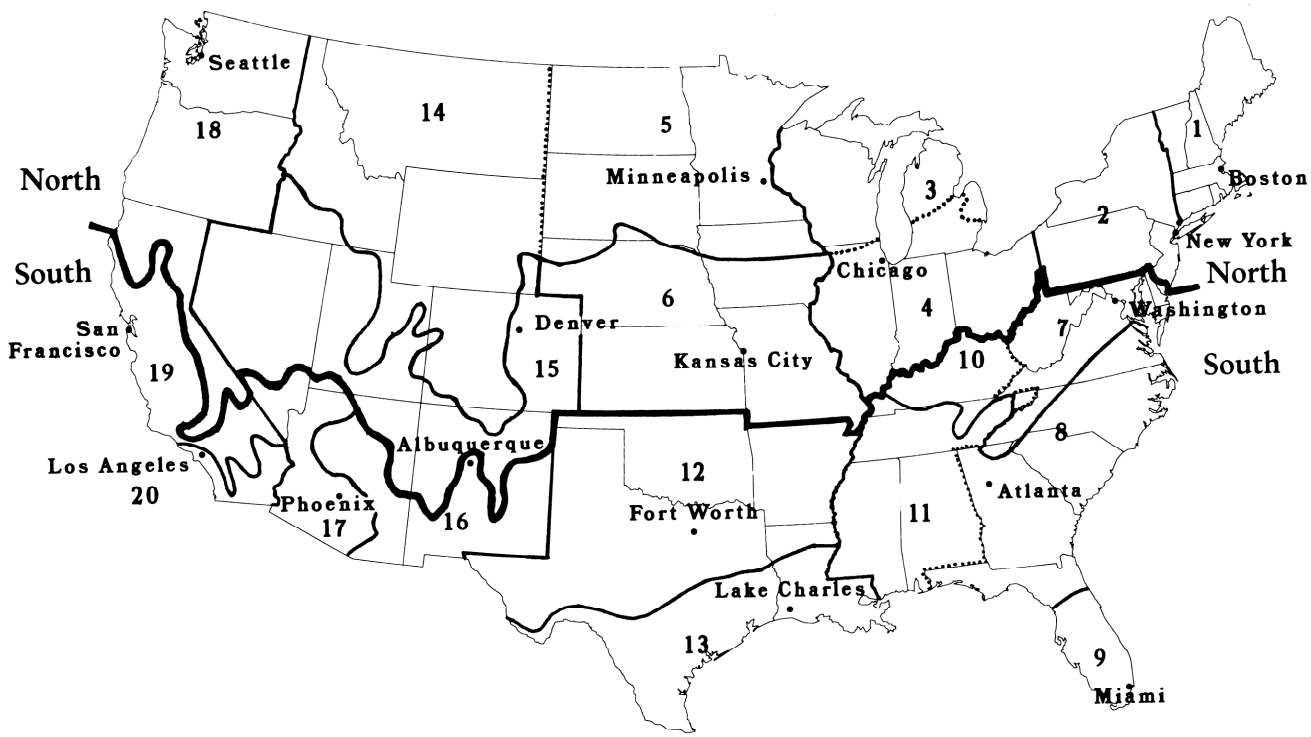
**Figure A.1. Map of U.S. showing Census Regions, Census Divisions, and States.**

This analysis splits the Pacific division into North and South at the California/Oregon border

Adapted from "Housing Characteristics 1987", EIA (RECS).

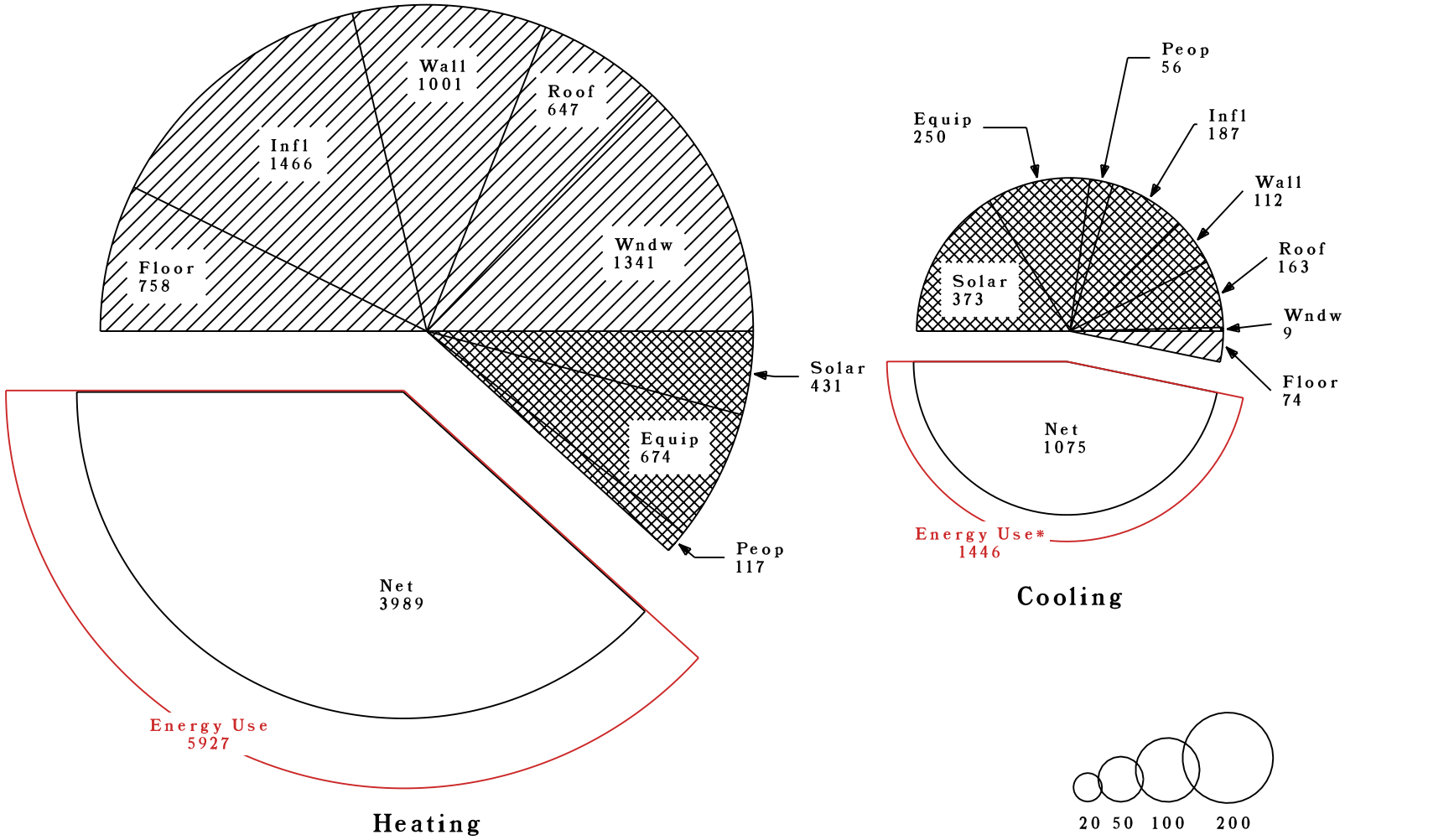
**Figure A2. Map of U.S. showing the 20 Location Areas and the North and South regions used in the analysis.**

Adapted from "Housing Characteristics 1987", EIA (RECS) and
“Climate Atlas of the United States”, U. S. Dept. of Commerce (1979)



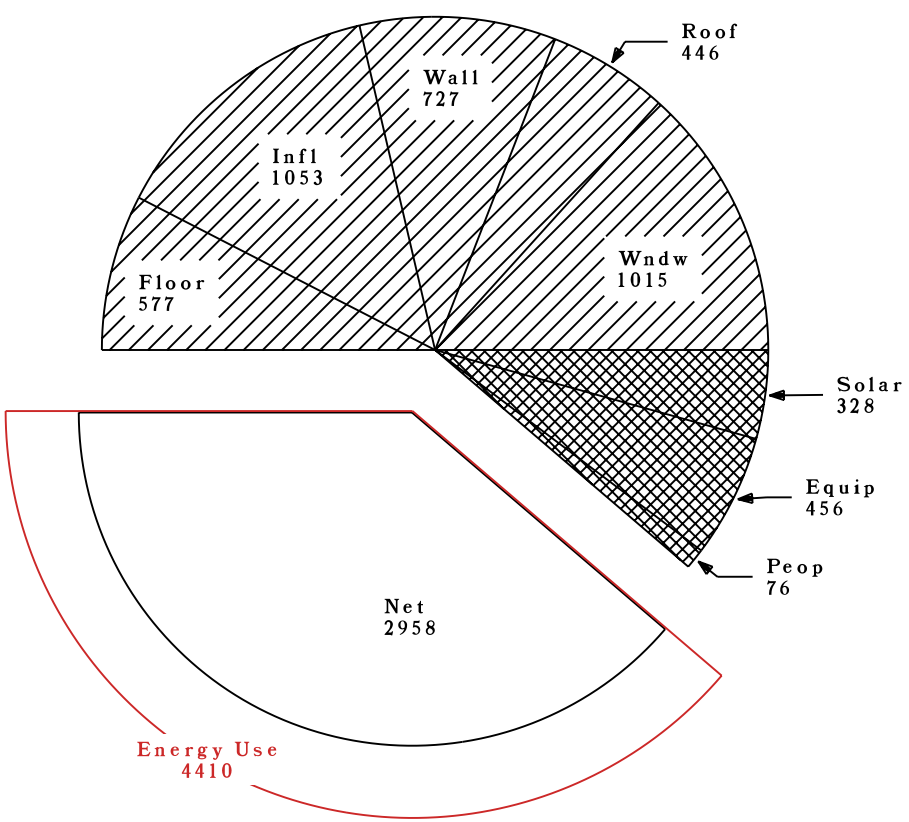
# APPENDIX B : PIE CHARTS

## Figure P-1. Aggregate Component Loads for All Residential Buildings (Trillion Btu's)

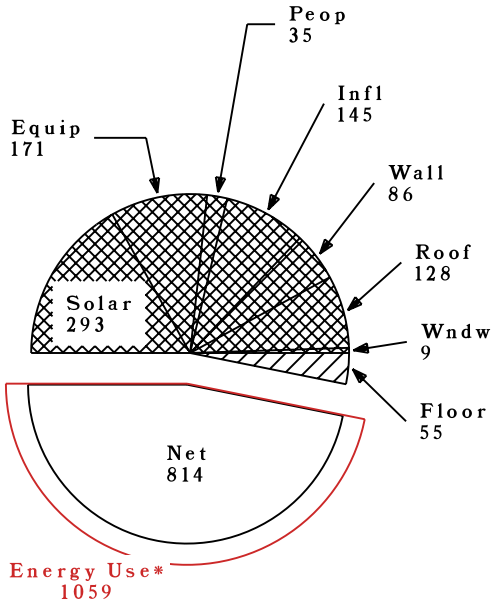



* Source multiplier of 3 used for electricity

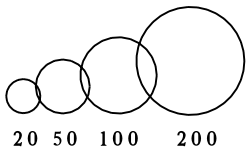
Figure P-2. Aggregate Component Loads for All Single-Family Detached Buildings
(Trillion Btu's)




Heating



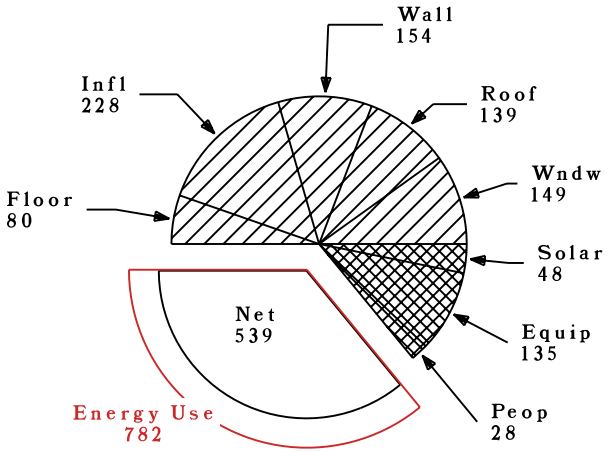

Cooling



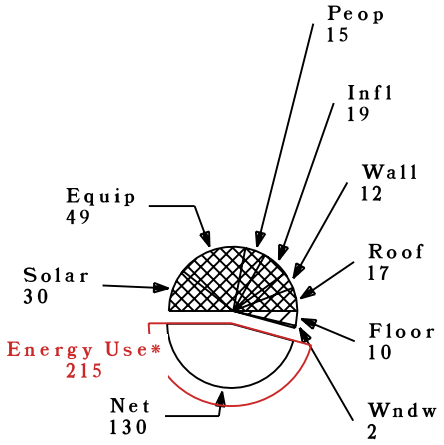

Scale (Trillion Btu's)

* Source multiplier of 3 used for electricity

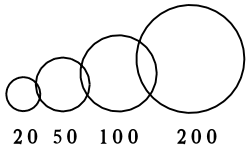
## Figure P-3. Aggregate Component Loads for All Multi-Family Buildings (Trillion Btu's)




Heating



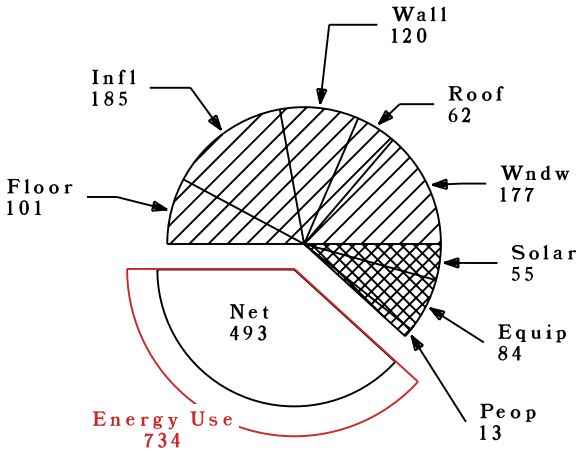

Cooling



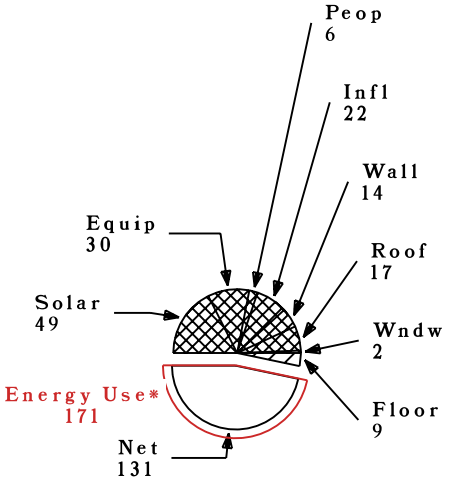

Scale (Trillion Btu's)

* Source multiplier of 3 used for electricity

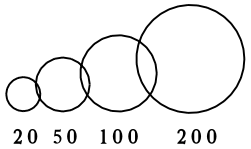
## Figure P-4. Aggregate Component Loads for All Single-Family Attached and Mobile Home Buildings (Trillion Btu's)




Heating



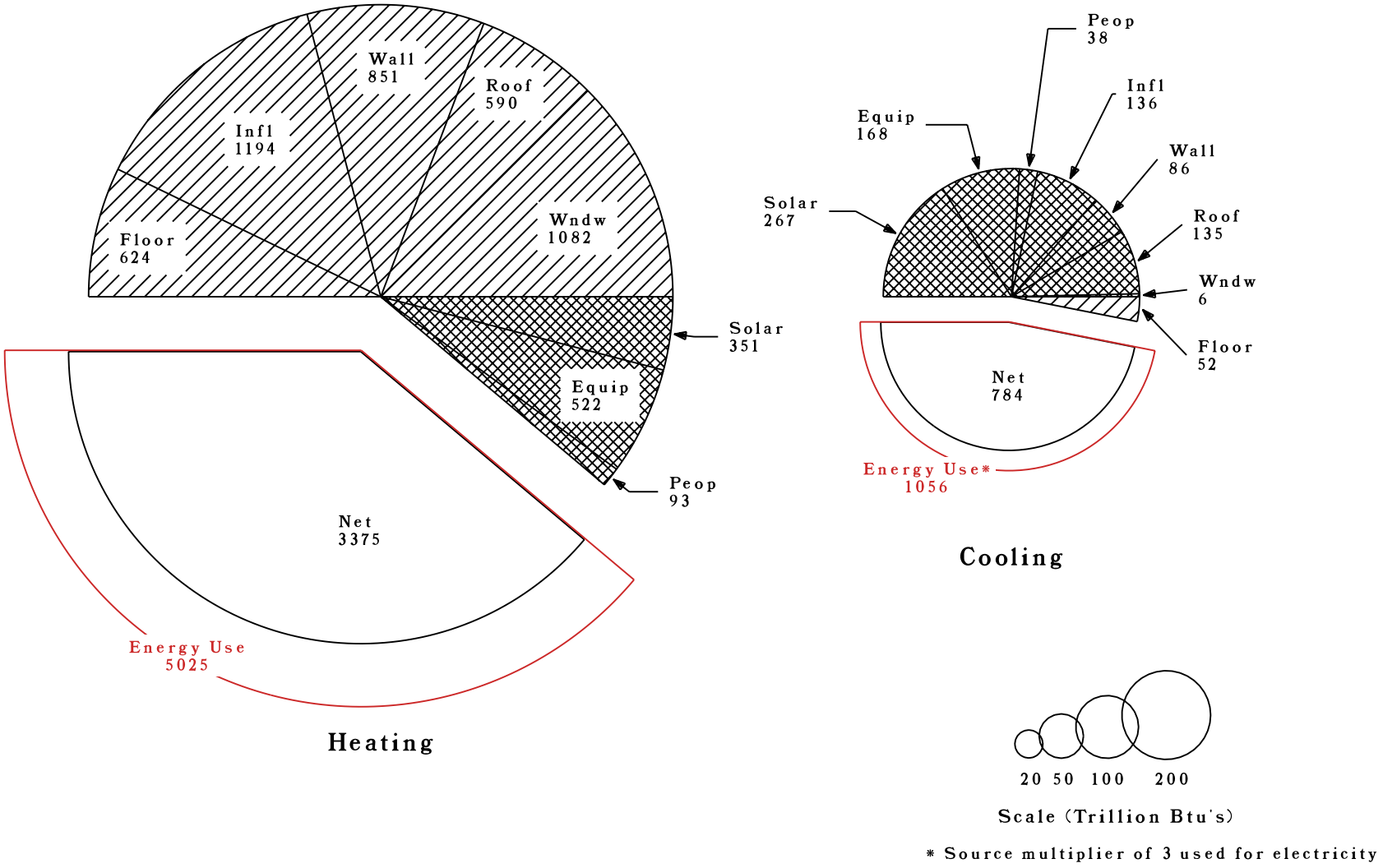

Cooling




Scale (Trillion Btu's)

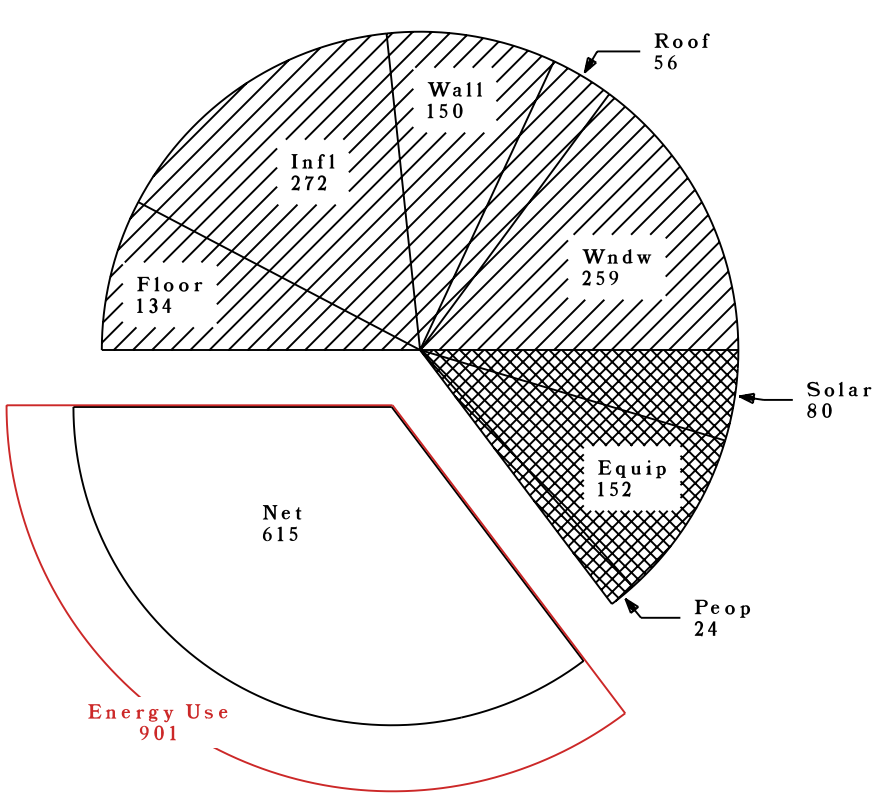
* Source multiplier of 3 used for electricity

Figure P-5. Aggregate Component Loads for Old Residential Buildings
(Trillion Btu's)

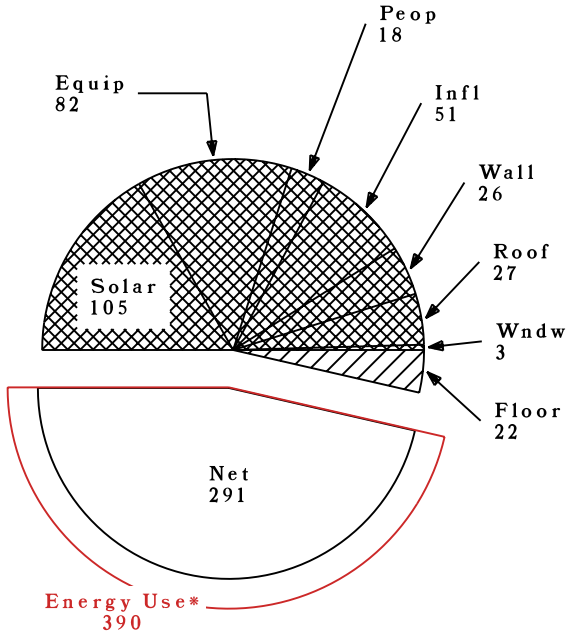



* Source multiplier of 3 used for electricity

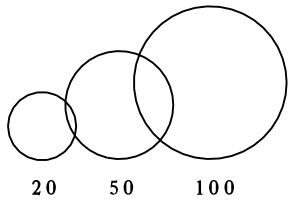
## Figure P-6. Aggregate Component Loads for New Residential Buildings (Trillion Btu's)




Heating



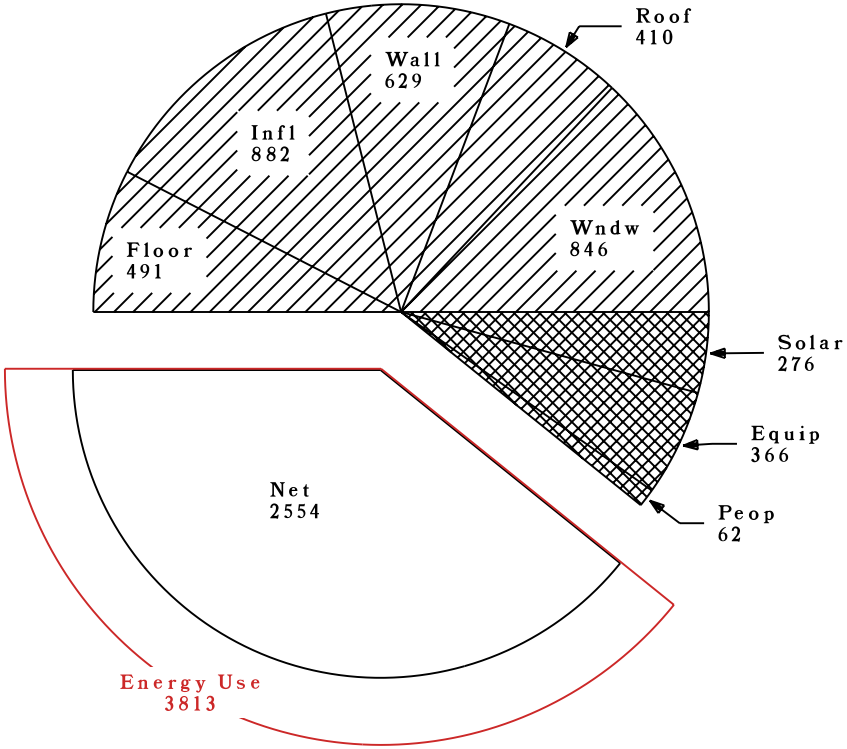

Cooling



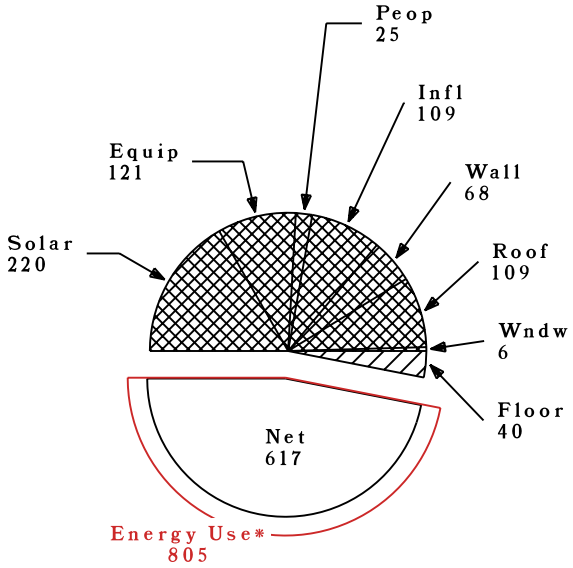

Scale (Trillion Btu's)

* Source multiplier of 3 used for electricity

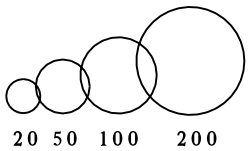
Figure P-7. Aggregate Component Loads for Old Single-Family Detached Buildings
(Trillion Btu's)




Heating



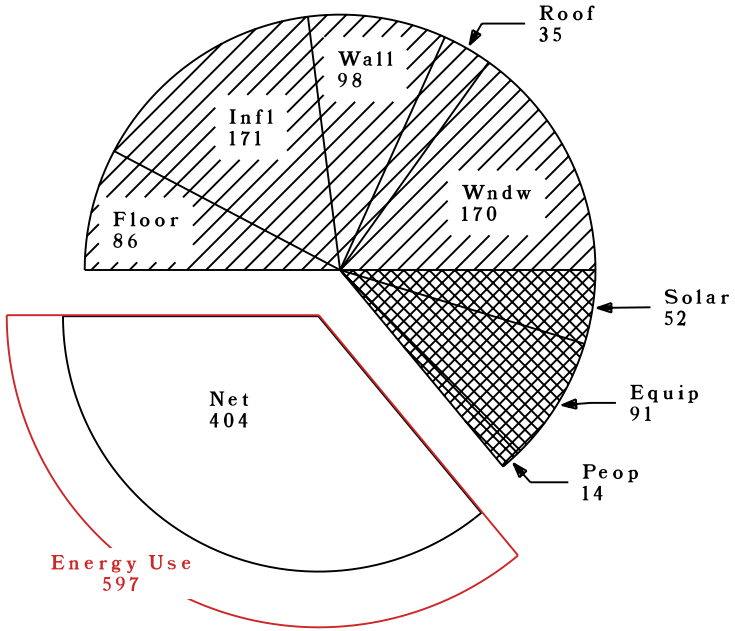

Cooling



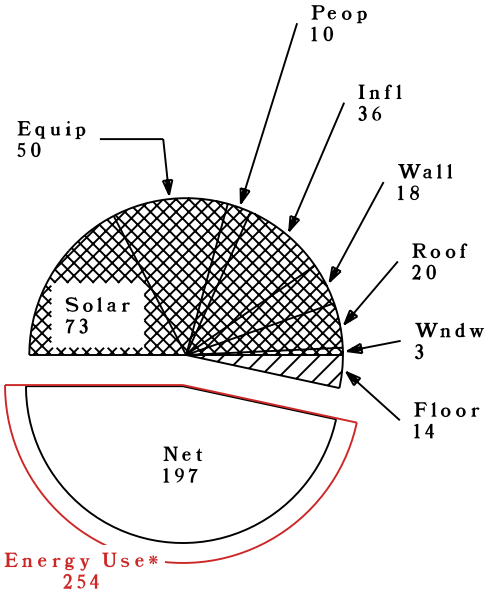

Scale (Trillion Btu's)

* Source multiplier of 3 used for electricity

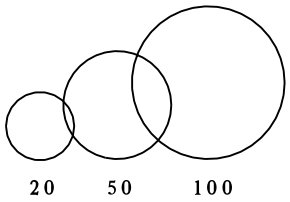
## Figure P-8. Aggregate Component Loads for New Single-Family Detached Buildings (Trillion Btu's)




Heating



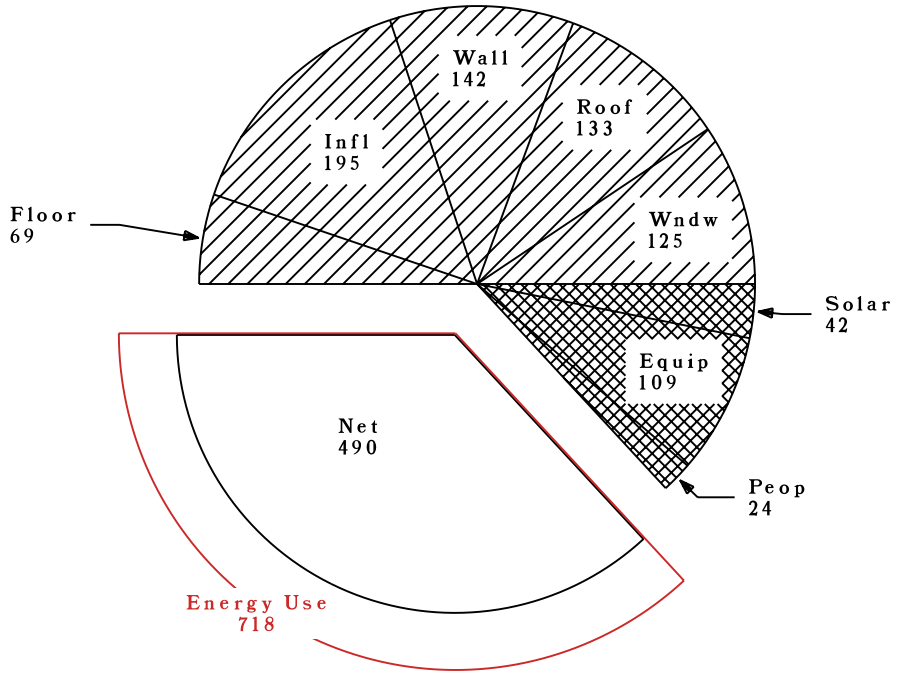

Cooling



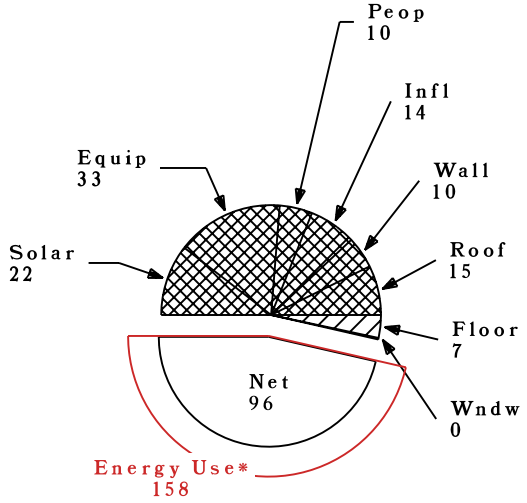

Scale (Trillion Btu's)

* Source multiplier of 3 used for electricity

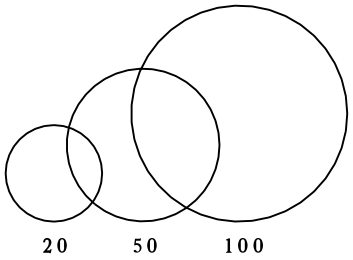
## Figure P-9. Aggregate Component Loads for Old Multi-Family Buildings (Trillion Btu's)




Heating



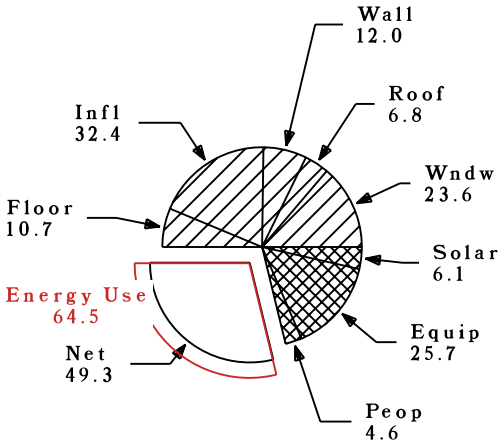

Cooling



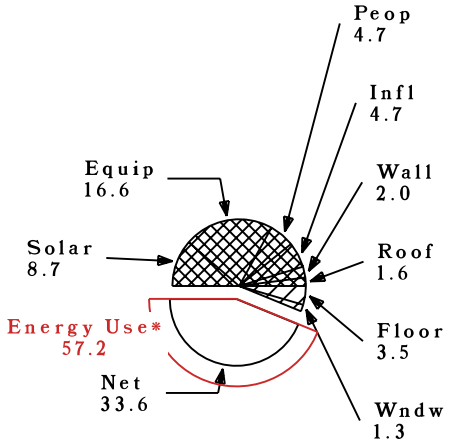

Scale (Trillion Btu's)

* Source multiplier of 3 used for electricity

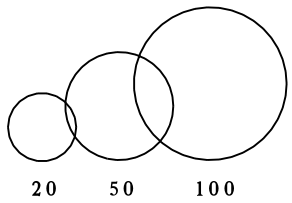
## Figure P-10. Aggregate Component Loads for New Multi-Family Buildings (Trillion Btu's)




Heating



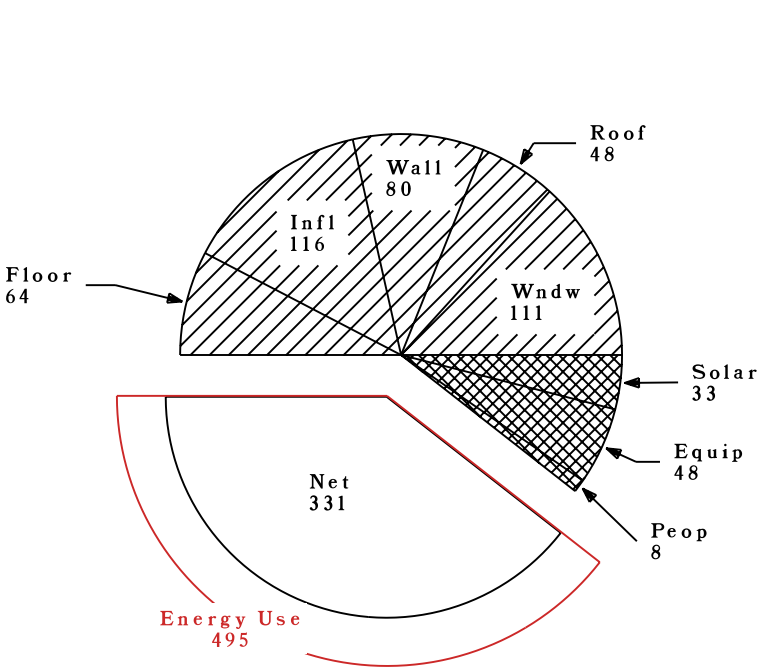

Cooling



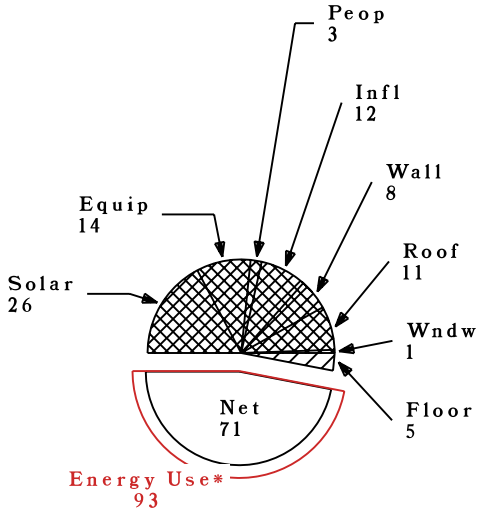

Scale (Trillion Btu's)

* Source multiplier of 3 used for electricity

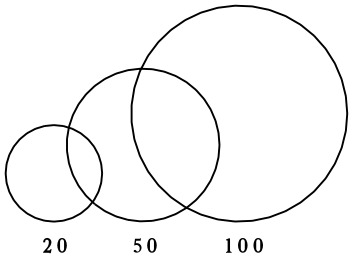
## Figure P-11. Aggregate Component Loads for Old Single-Family Attached and Mobile Home Buildings (Trillion Btu's)




Heating



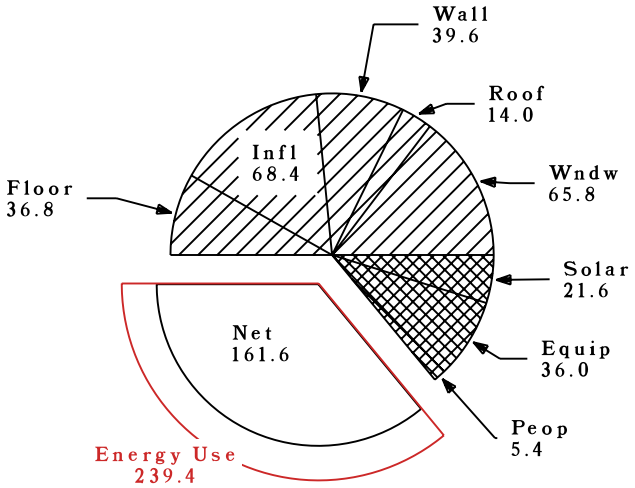

Cooling



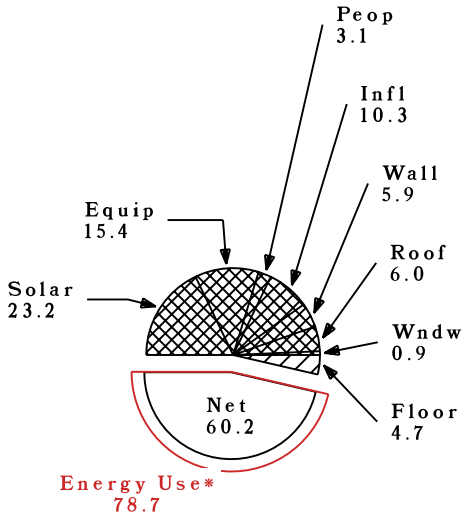

Scale (Trillion Btu's)

* Source multiplier of 3 used for electricity

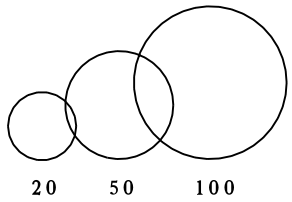
## Figure P-12. Aggregate Component Loads for New Single-Family Attached and Mobile Home Buildings (Trillion Btu's)




Heating



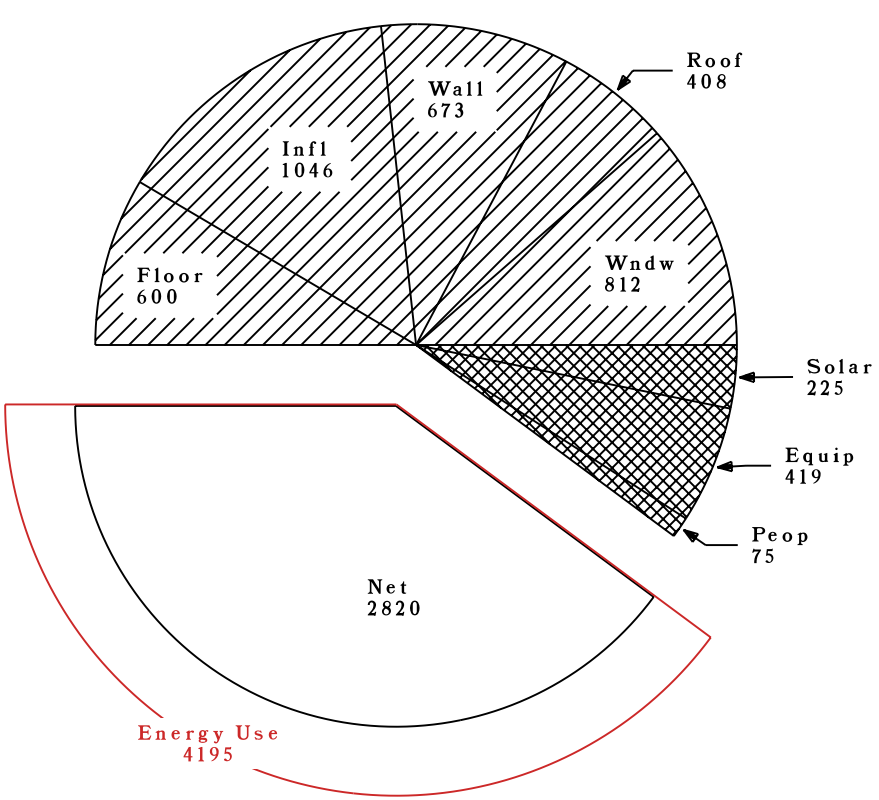

Cooling



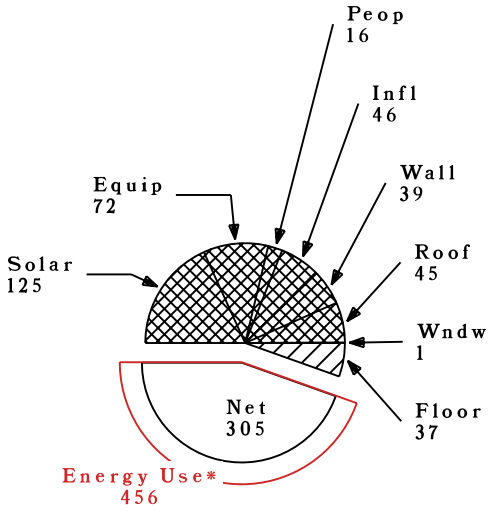

Scale (Trillion Btu's)

* Source multiplier of 3 used for electricity

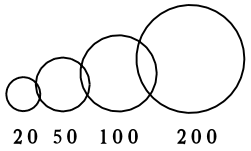
Figure P-13. Aggregate Component Loads for All North Buildings
(Trillion Btu's)




Heating



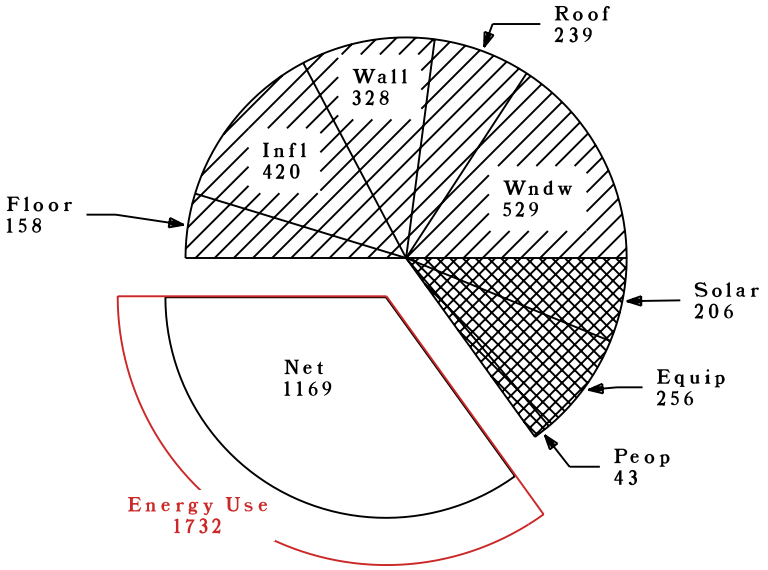

Cooling



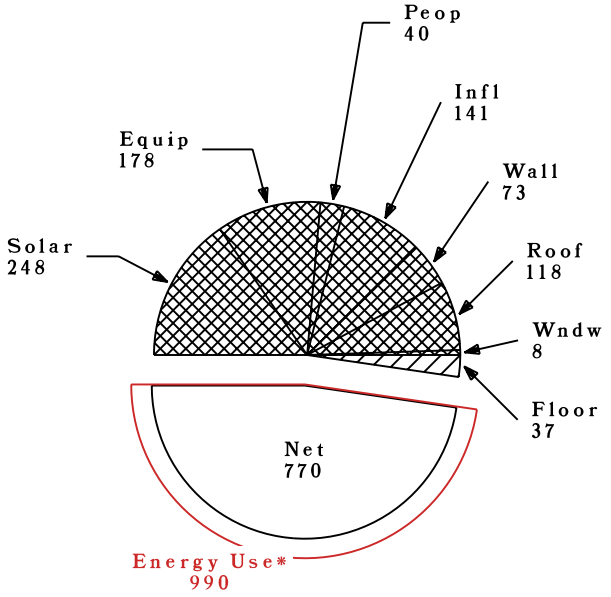

Scale (Trillion Btu's)

* Source multiplier of 3 used for electricity

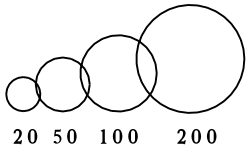
## Figure P-14. Aggregate Component Loads for All South Buildings (Trillion Btu's)




Heating



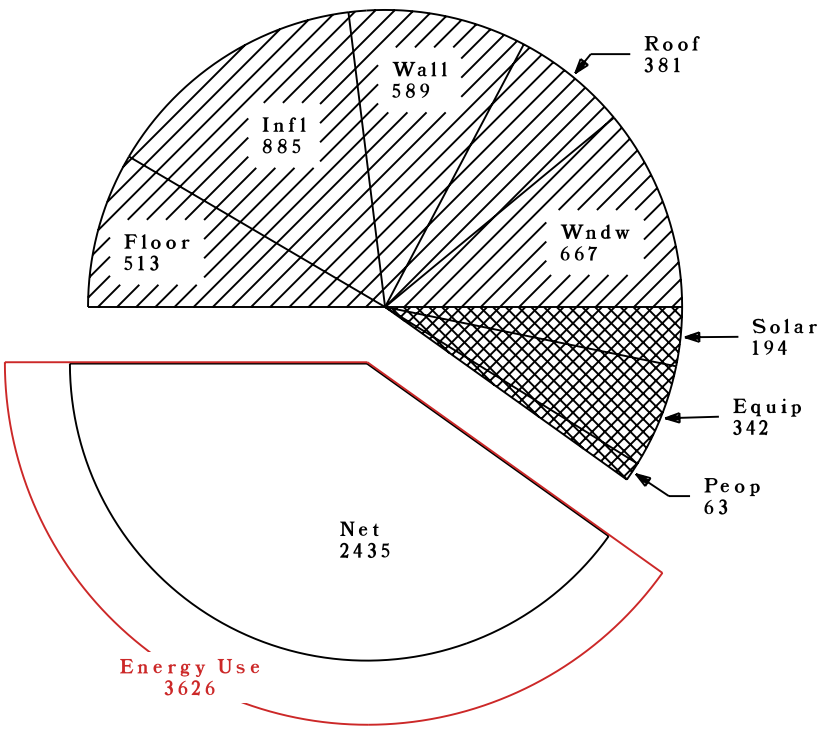

Cooling



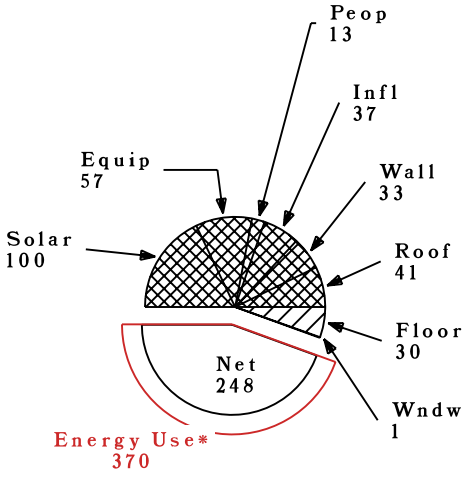

Scale (Trillion Btu's)

* Source multiplier of 3 used for electricity

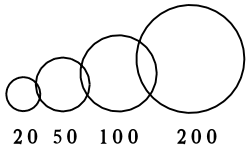
Figure P-15. Aggregate Component Loads for North Old Residential Buildings
(Trillion Btu's)




Heating



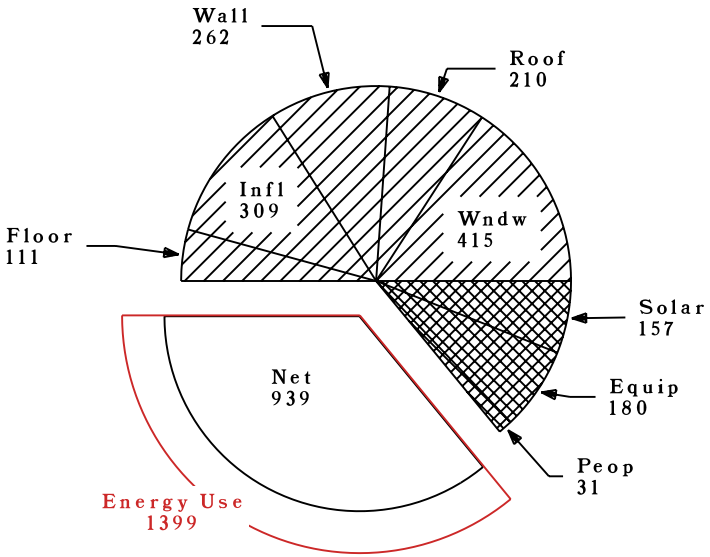

Cooling



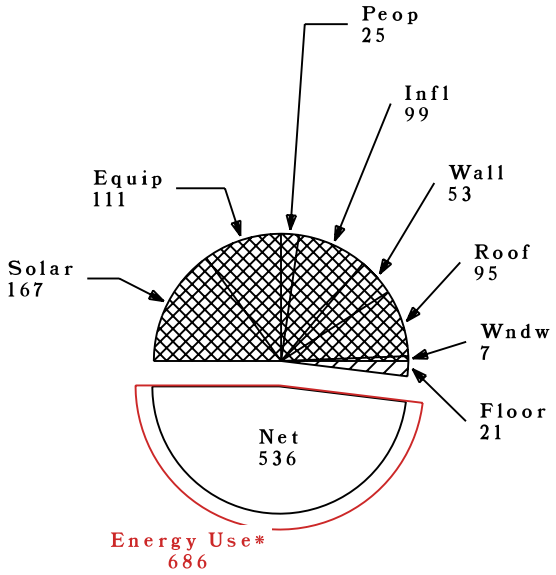

Scale (Trillion Btu's)

* Source multiplier of 3 used for electricity

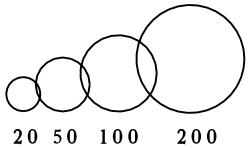
Figure P-16. Aggregate Component Loads for South Old Residential Buildings
(Trillion Btu's)




Heating



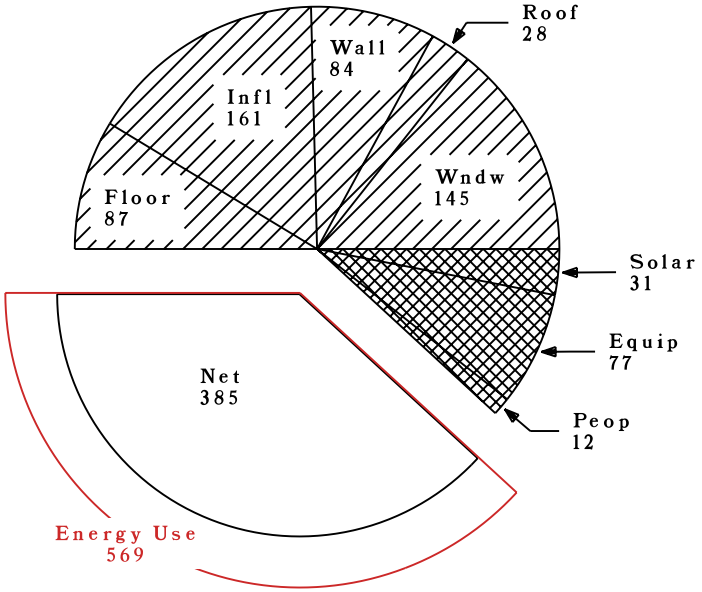

Cooling



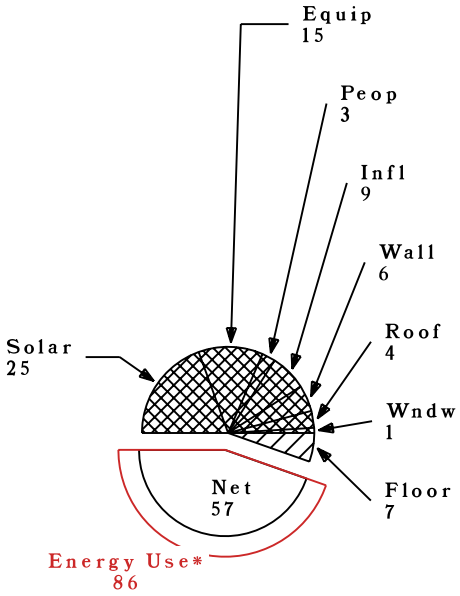

Scale (Trillion Btu's)

* Source multiplier of 3 used for electricity

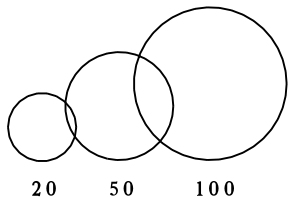
Figure P-17. Aggregate Component Loads for North New Residential Buildings
(Trillion Btu's)




Heating



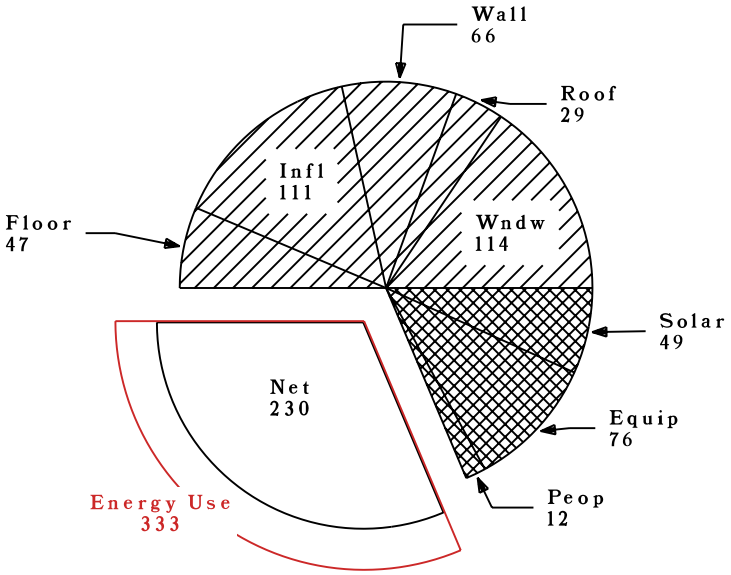

Cooling



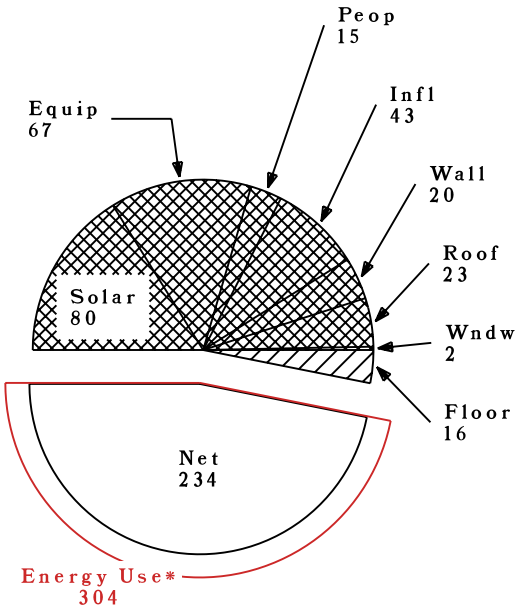

Scale (Trillion Btu's)

* Source multiplier of 3 used for electricity

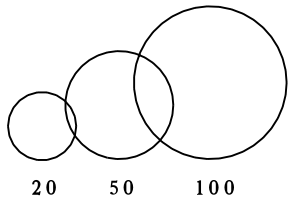
## Figure P-18. Aggregate Component Loads for South New Residential Buildings (Trillion Btu's)




Heating



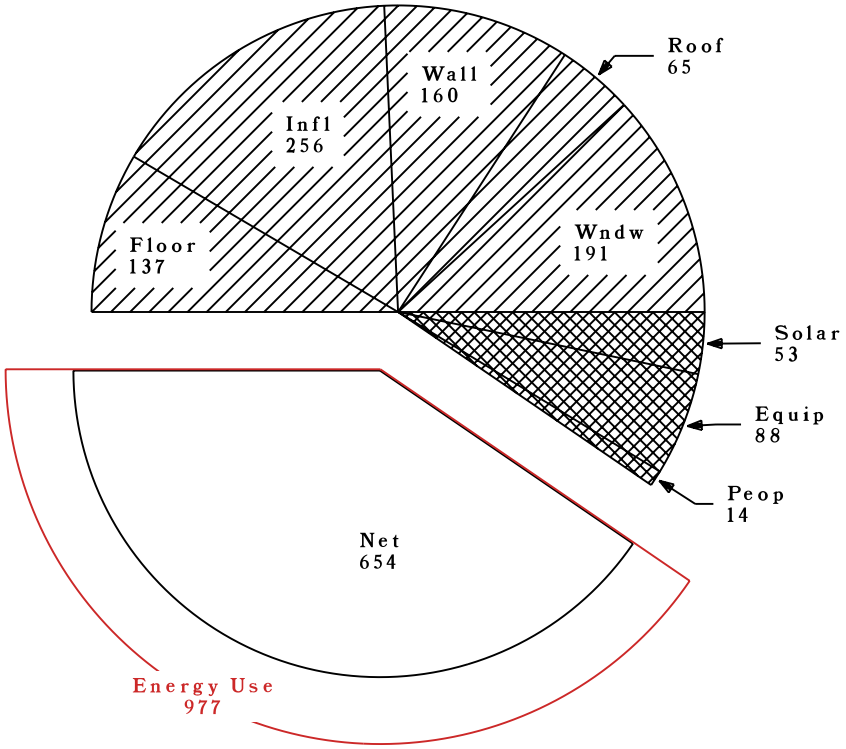

Cooling



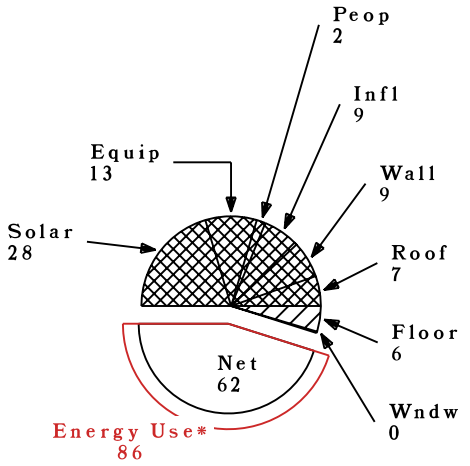

Scale (Trillion Btu's)

* Source multiplier of 3 used for electricity

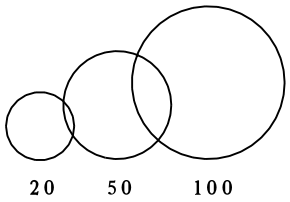
## Figure P-19. Aggregate Component Loads for Single-Family Detached Buildings in Northeast US (Trillion Btu's)




Heating



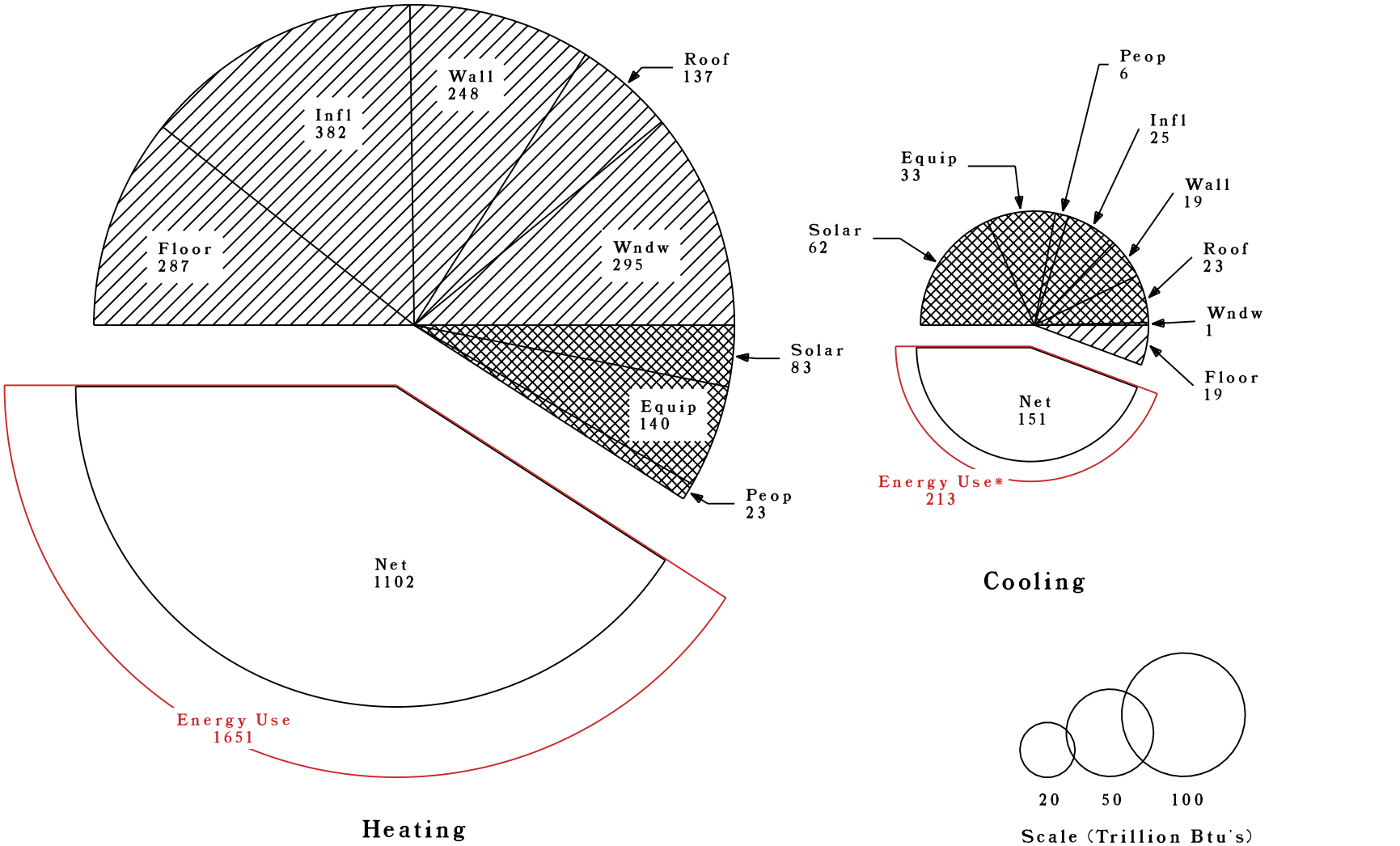

Cooling




Scale (Trillion Btu's)

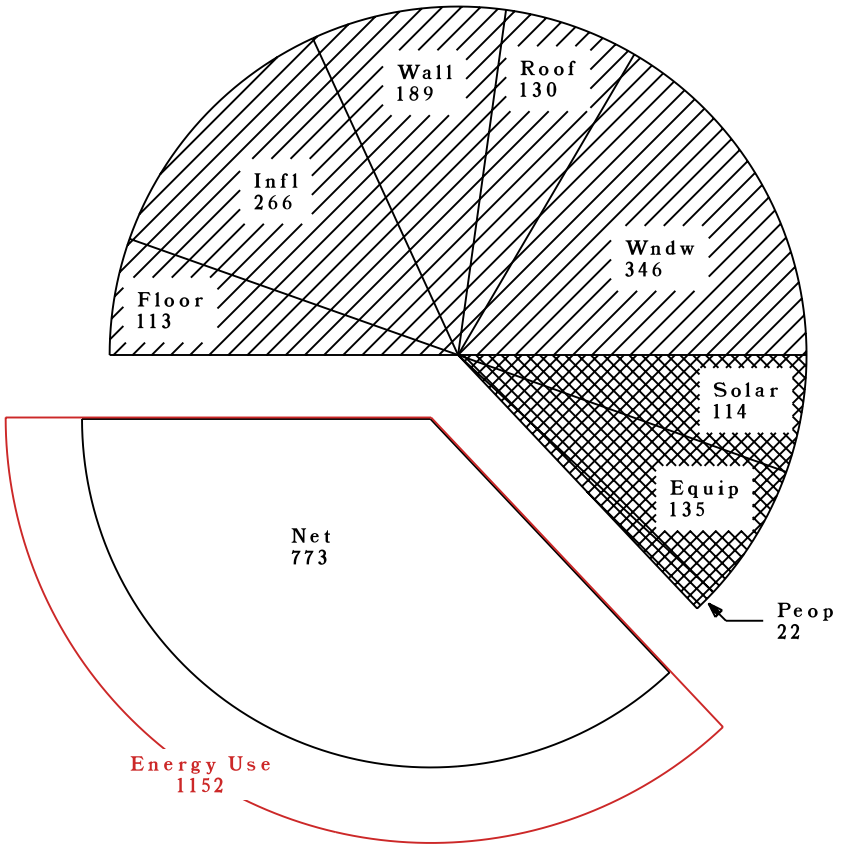
* Source multiplier of 3 used for electricity

## Figure P-20. Aggregate Component Loads for Single-Family Detached Buildings in North Central US (Trillion Btu's)

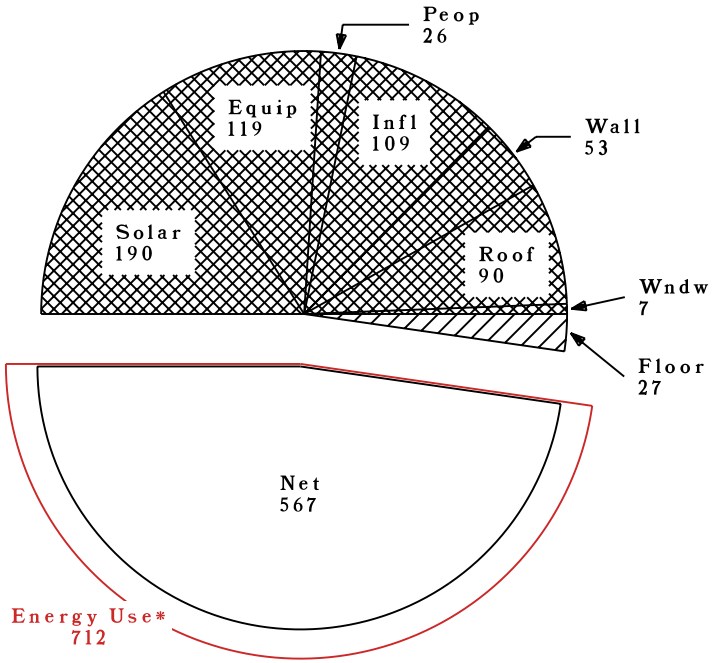



* Source multiplier of 3 used for electricity

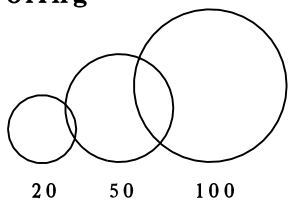
## Figure P-21. Aggregate Component Loads for Single-Family Detached Buildings in South US (Trillion Btu's)




Heating



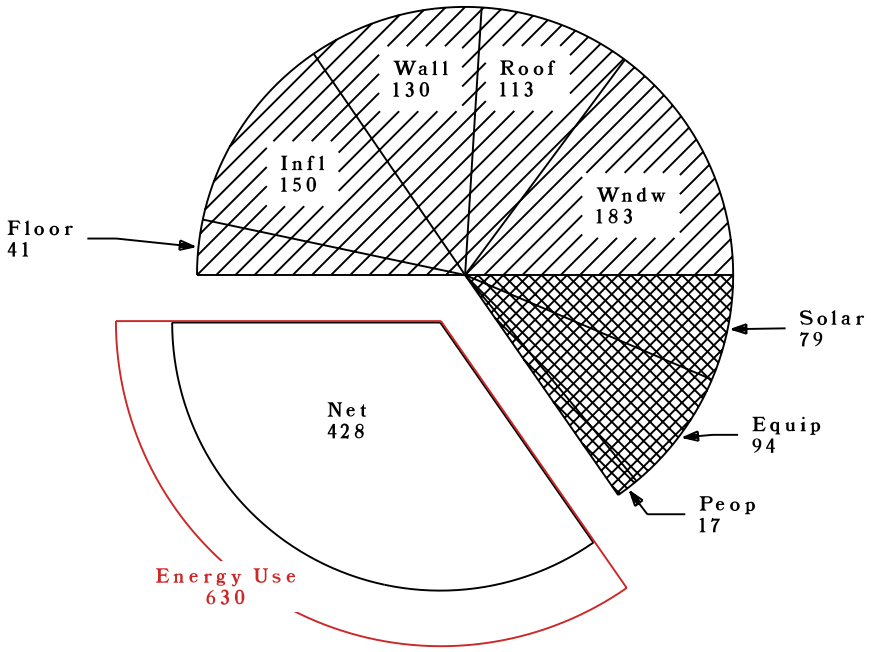

Cooling



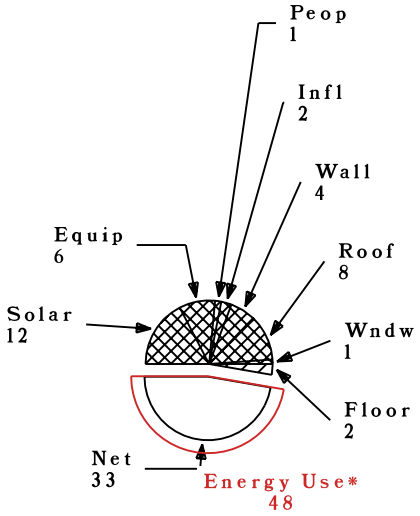

Scale (Trillion Btu's)

* Source multiplier of 3 used for electricity

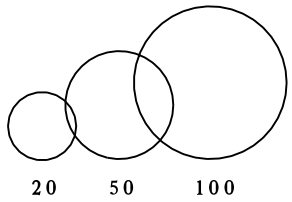
## Figure P-22. Aggregate Component Loads for Single-Family Detached Buildings in West US (Trillion Btu's)




Heating



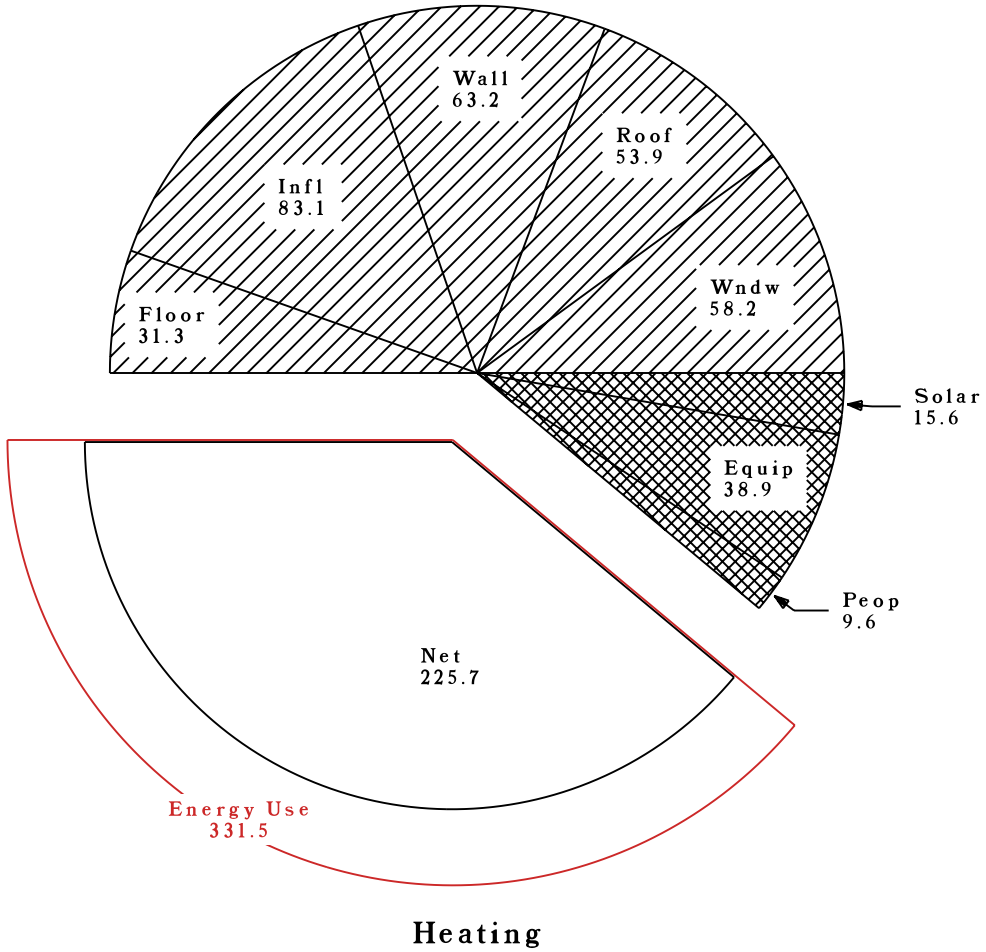

Cooling



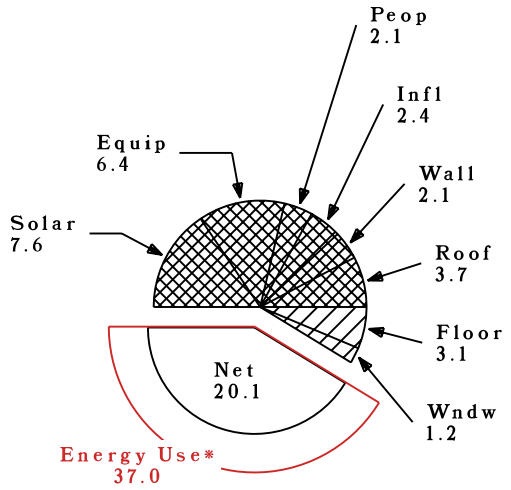

Scale (Trillion Btu's)

* Source multiplier of 3 used for electricity

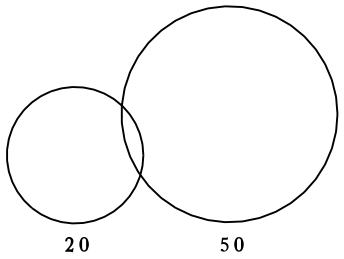
## Figure P-23. Aggregate Component Loads for Multi-Family Buildings in Northeast US (Trillion Btu's)




Heating



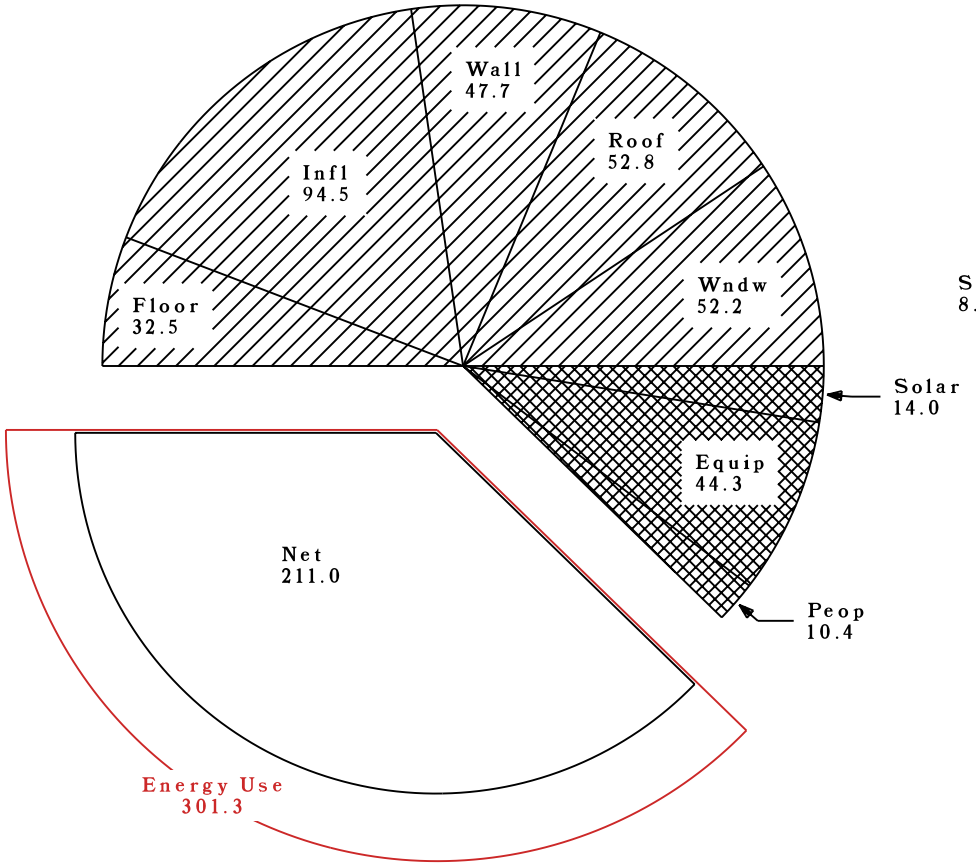

Cooling



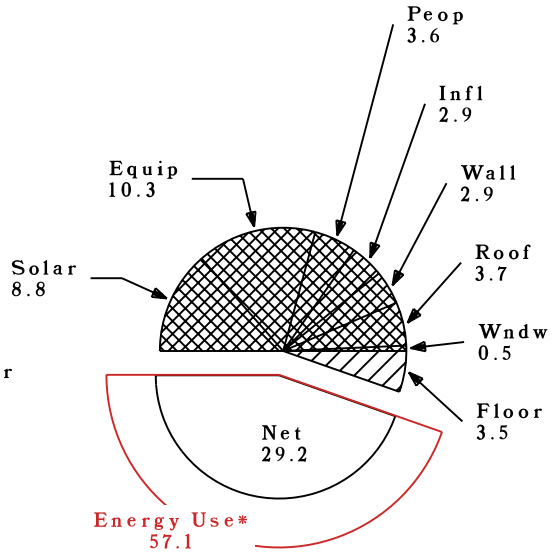

Scale (Trillion Btu's)

* Source multiplier of 3 used for electricity

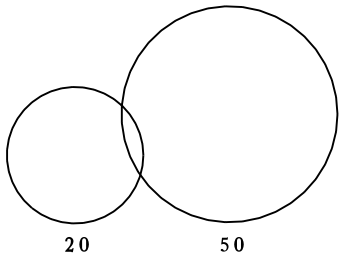
## Figure P-24. Aggregate Component Loads for Multi-Family Buildings in North Central US (Trillion Btu's)




Heating



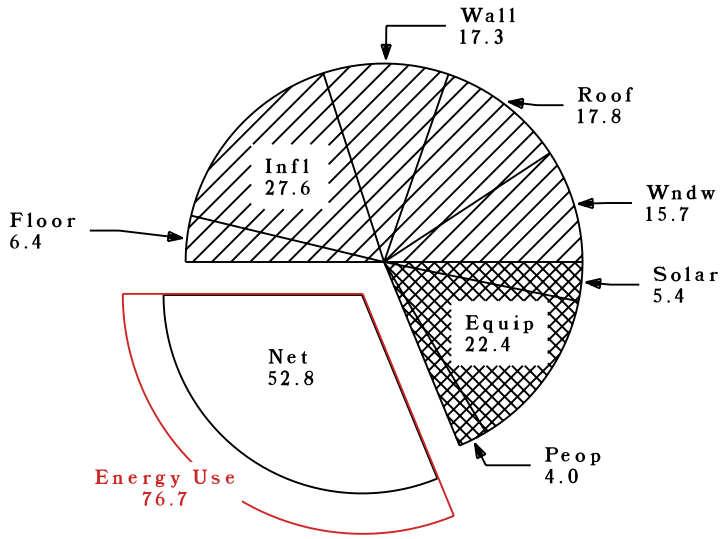

Cooling



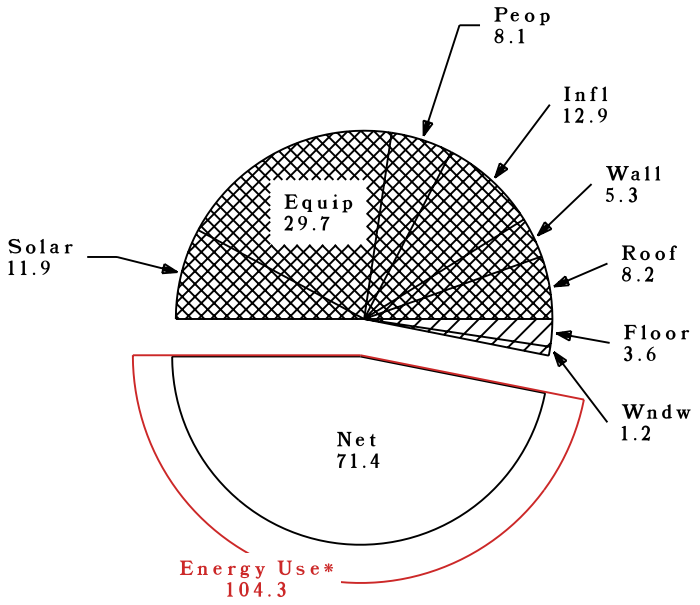

Scale (Trillion Btu's)

* Source multiplier of 3 used for electricity

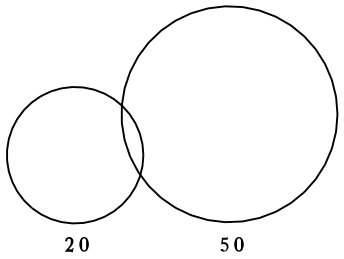
## Figure P-25. Aggregate Component Loads for Multi-Family Buildings in South US (Trillion Btu's)




Heating



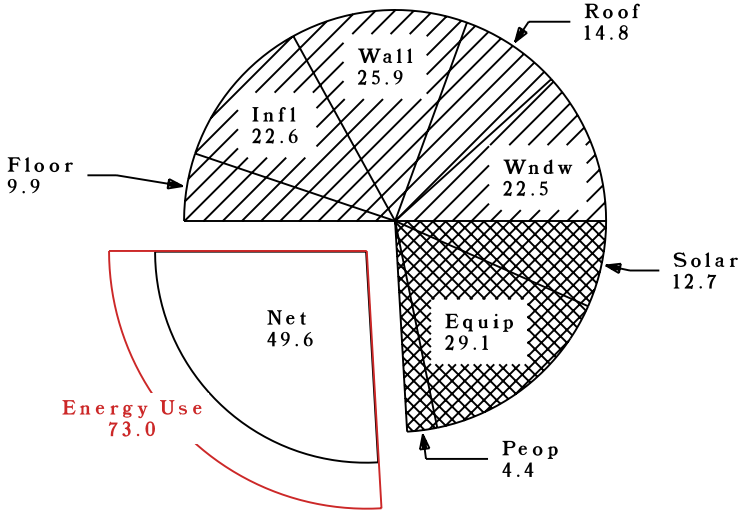

Cooling



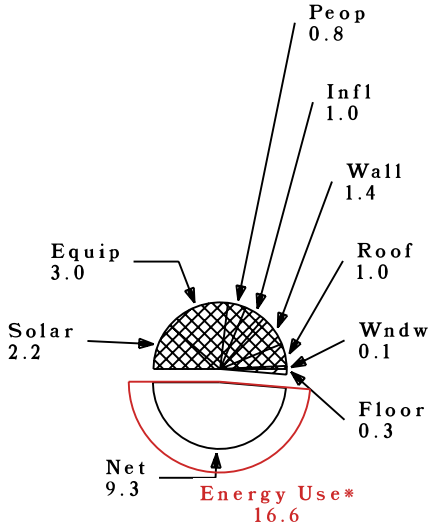

Scale (Trillion Btu's)

* Source multiplier of 3 used for electricity

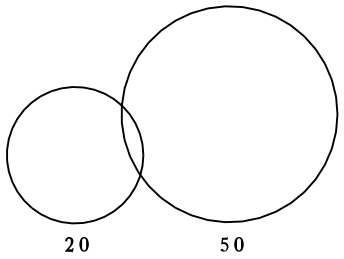
## Figure P-26. Aggregate Component Loads for Multi-Family Buildings in West US (Trillion Btu's)




Heating



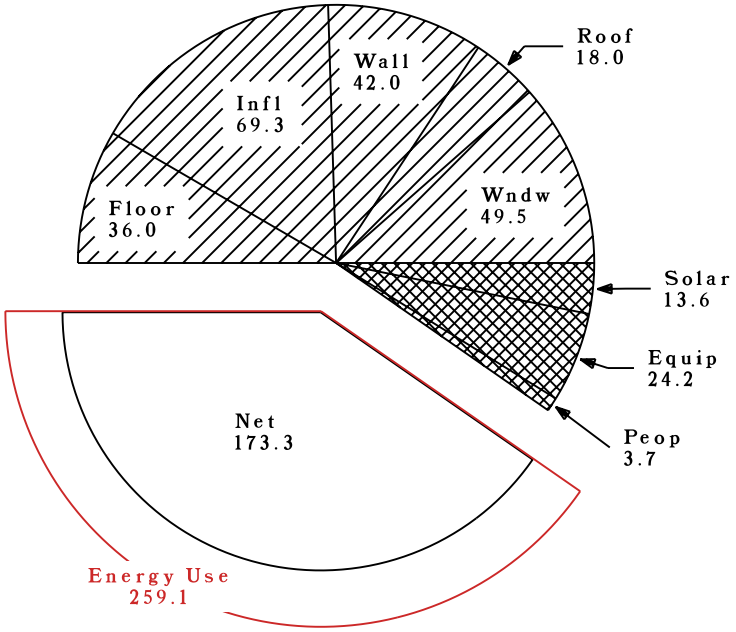

Cooling



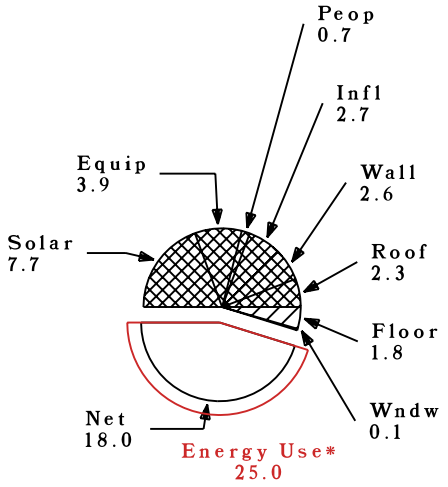

Scale (Trillion Btu's)

* Source multiplier of 3 used for electricity

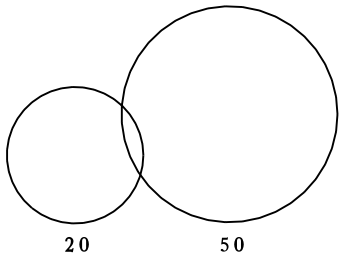
## Figure P-27. Aggregate Component Loads for Single-Family Attached and Mobile Home Buildings in Northeast US (Trillion Btu's)




Heating



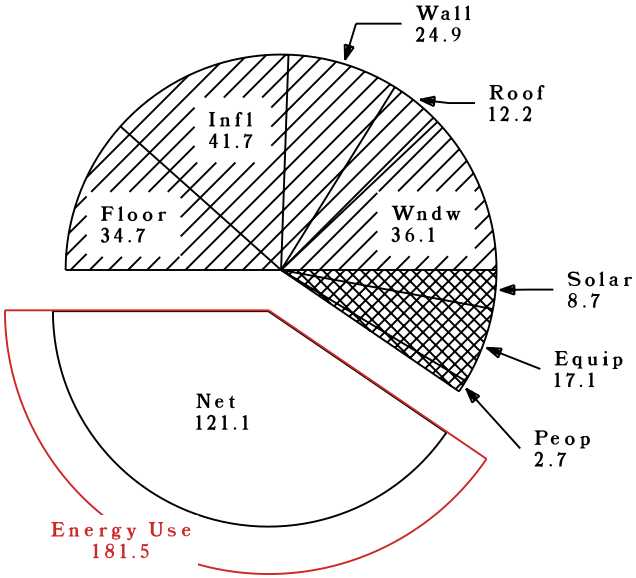

Cooling



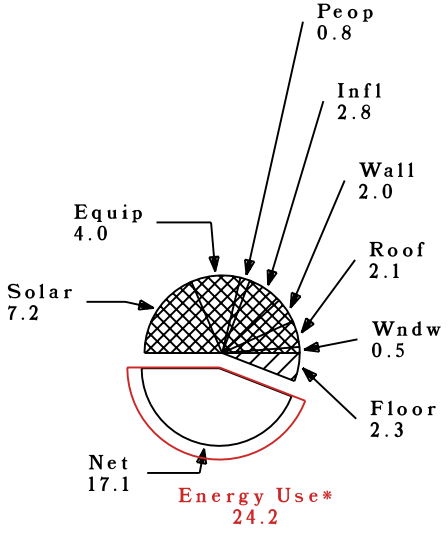

Scale (Trillion Btu's)

* Source multiplier of 3 used for electricity

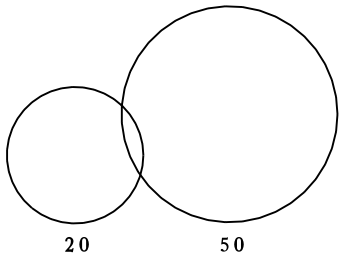
## Figure P-28. Aggregate Component Loads for Single-Family Attached and Mobile Home Buildings in North Central US (Trillion Btu's)




Heating



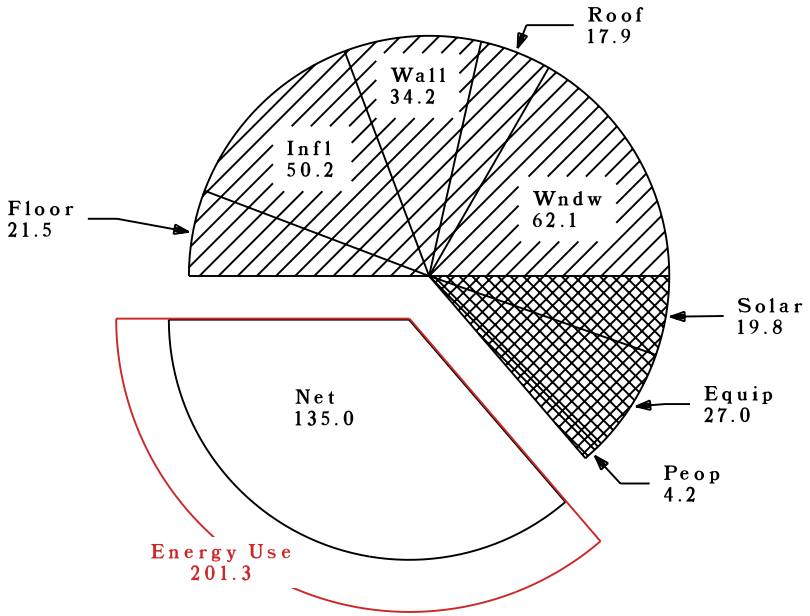

Cooling



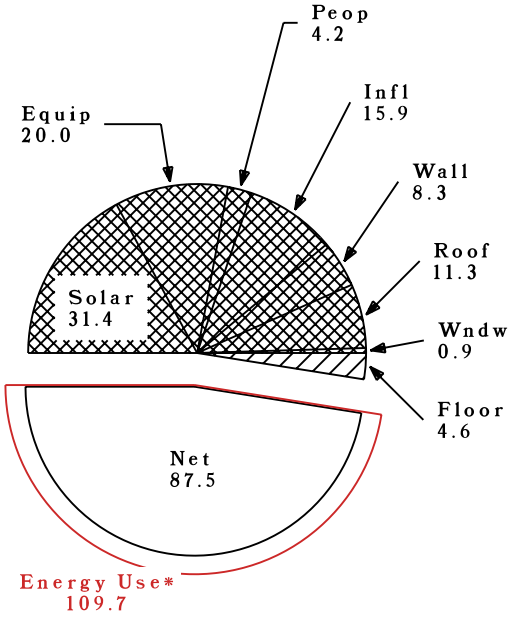

Scale (Trillion Btu's)

* Source multiplier of 3 used for electricity

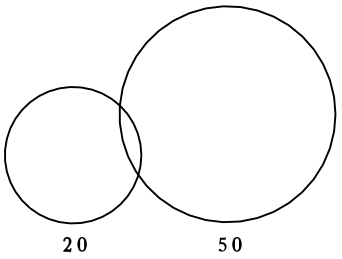
## Figure P-29. Aggregate Component Loads for Single-Family Attached and Mobile Home Buildings in South US (Trillion Btu's)




Heating



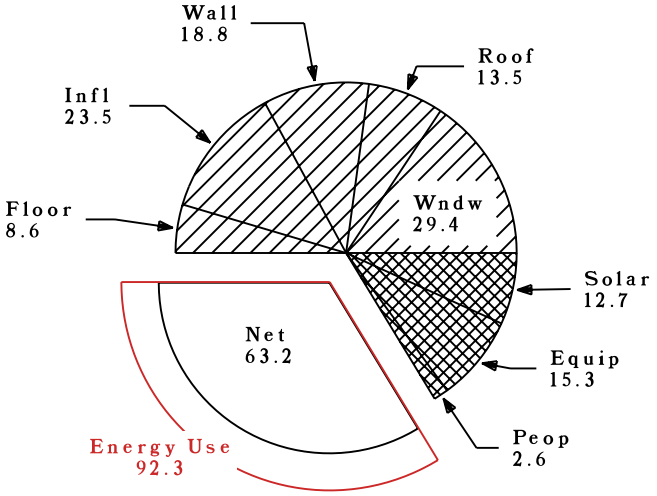

Cooling



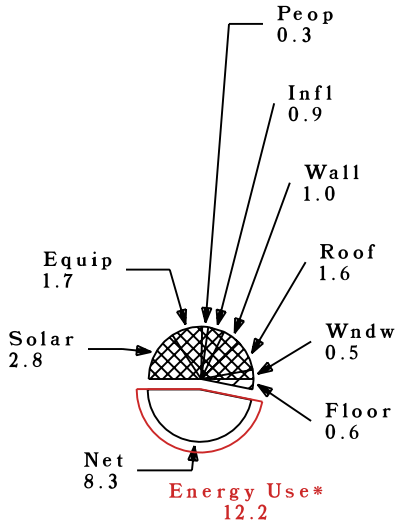

Scale (Trillion Btu's)

* Source multiplier of 3 used for electricity

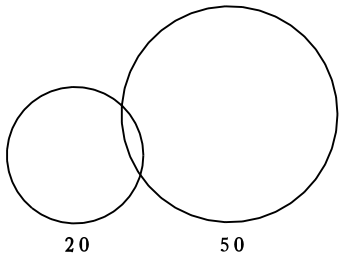
## Figure P-30. Aggregate Component Loads for Single-Family Attached and Mobile Home Buildings in West US (Trillion Btu's)




Heating




Cooling




Scale (Trillion Btu's)

* Source multiplier of 3 used for electricity

**Figure B-1. Aggregate Component Loads for All Residential Buildings (Trillion Btu's)**

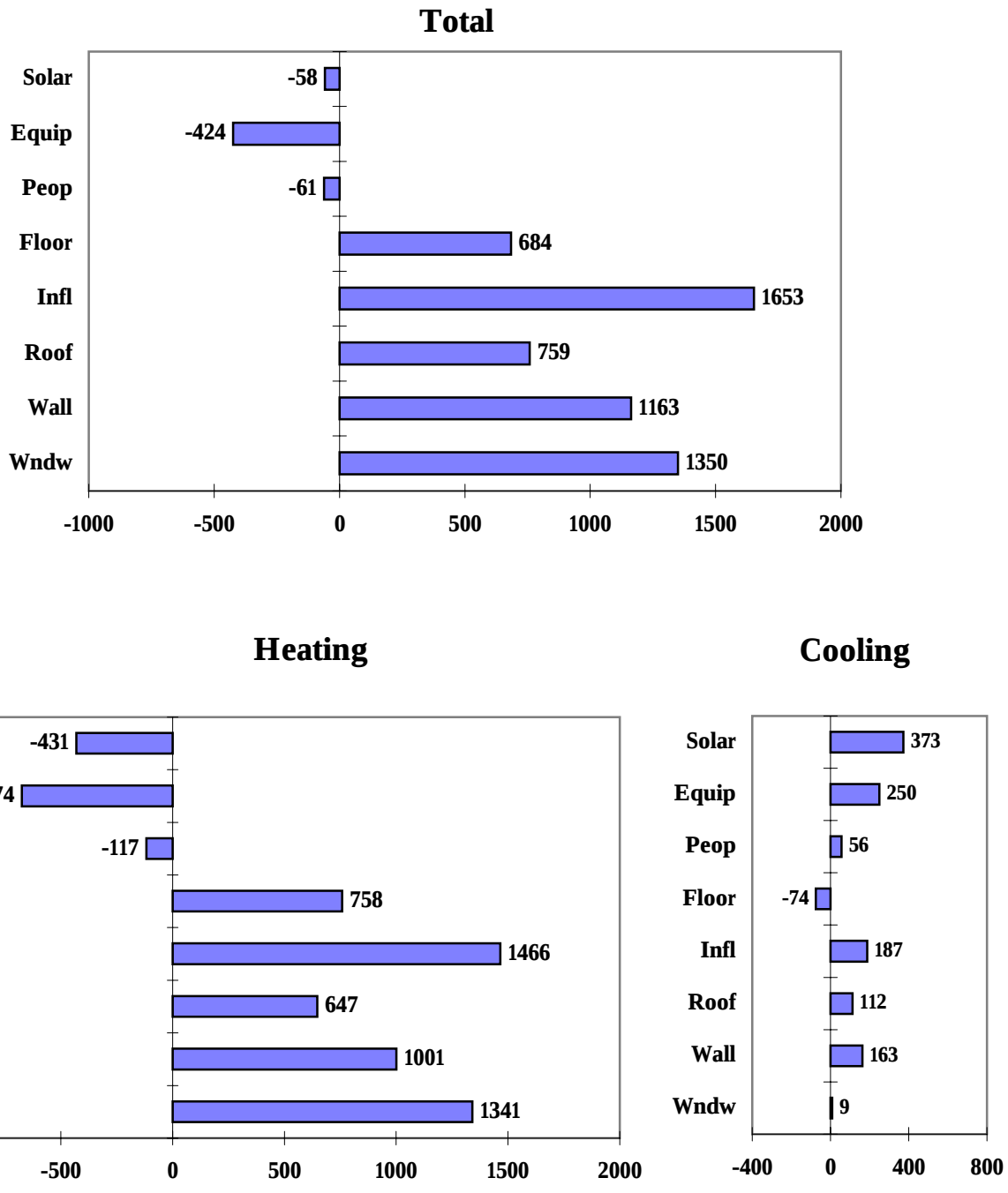
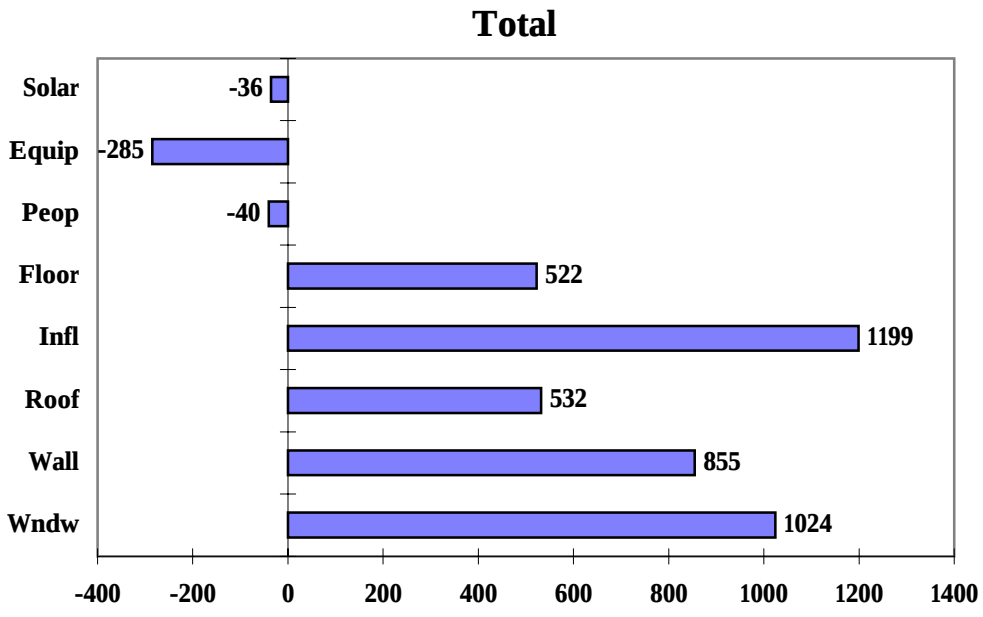
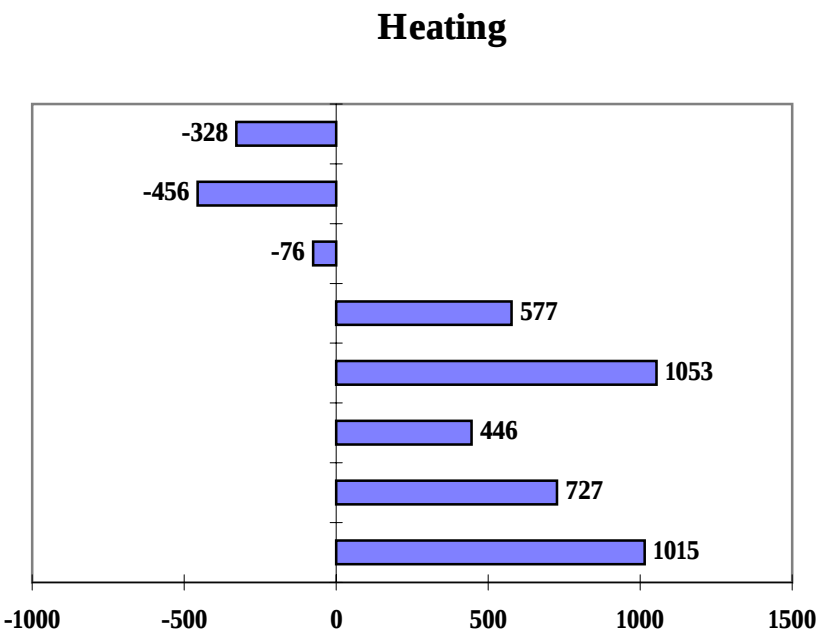


**Figure B-2. Aggregate Component Loads for All Single-Family Detached Buildings (Trillion Btu's)**



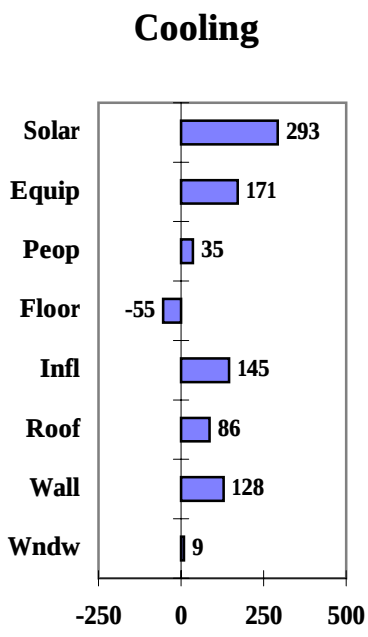
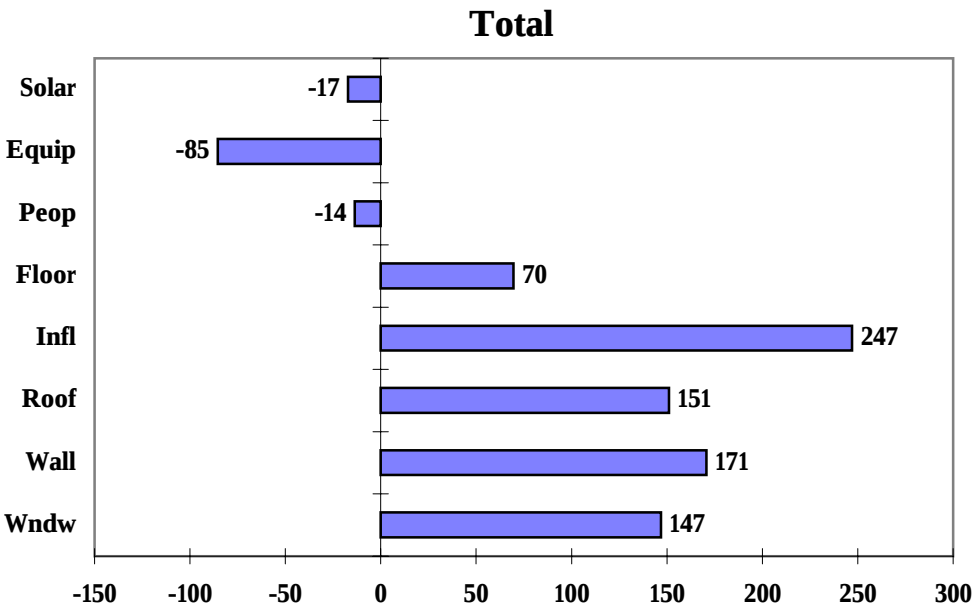
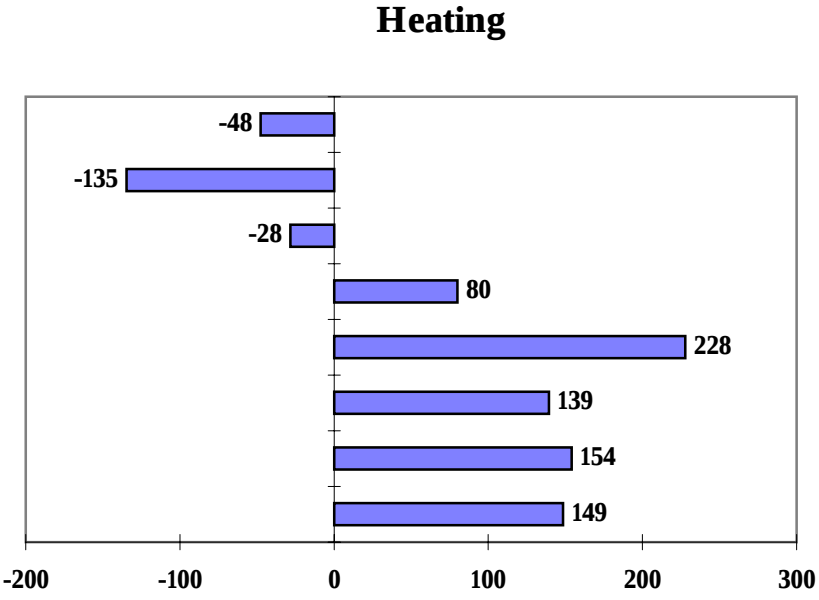



**Figure B-3. Aggregate Component Loads for All Multi-Family Buildings (Trillion Btu's)**



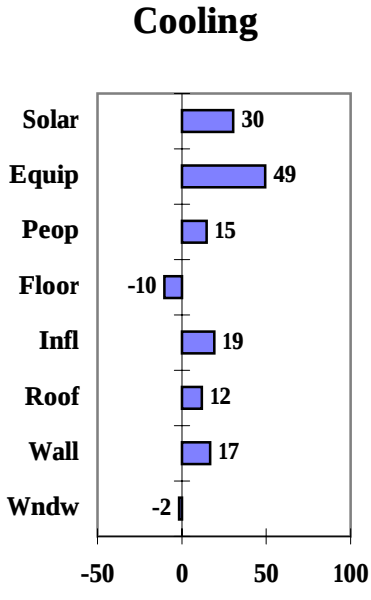
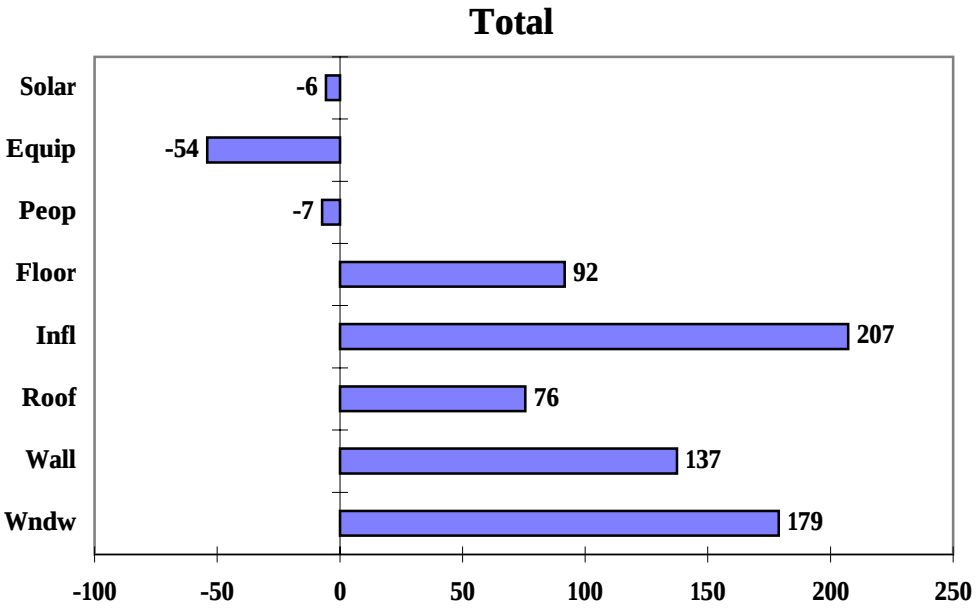
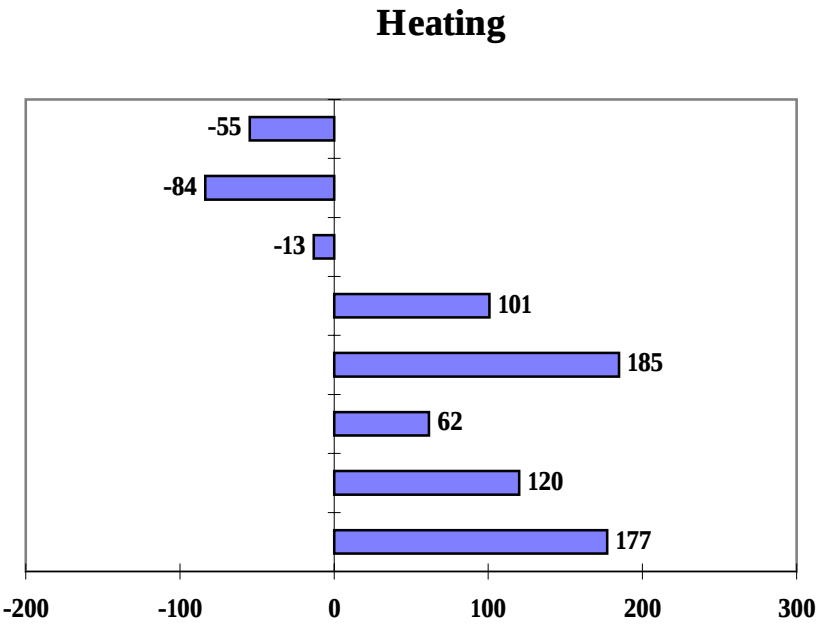



**Figure B-4. Aggregate Component Loads for All Single-Family Attached and Mobile Home Buildings (Trillion Btu's)**



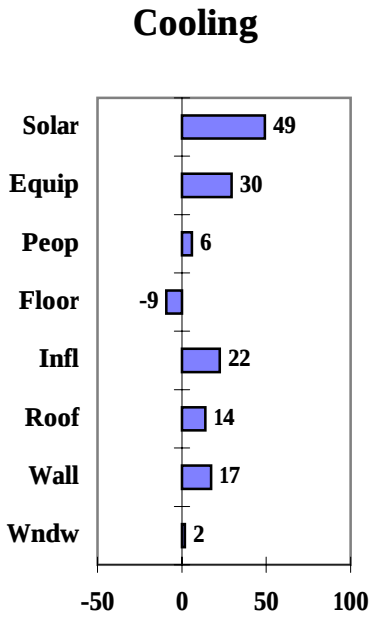
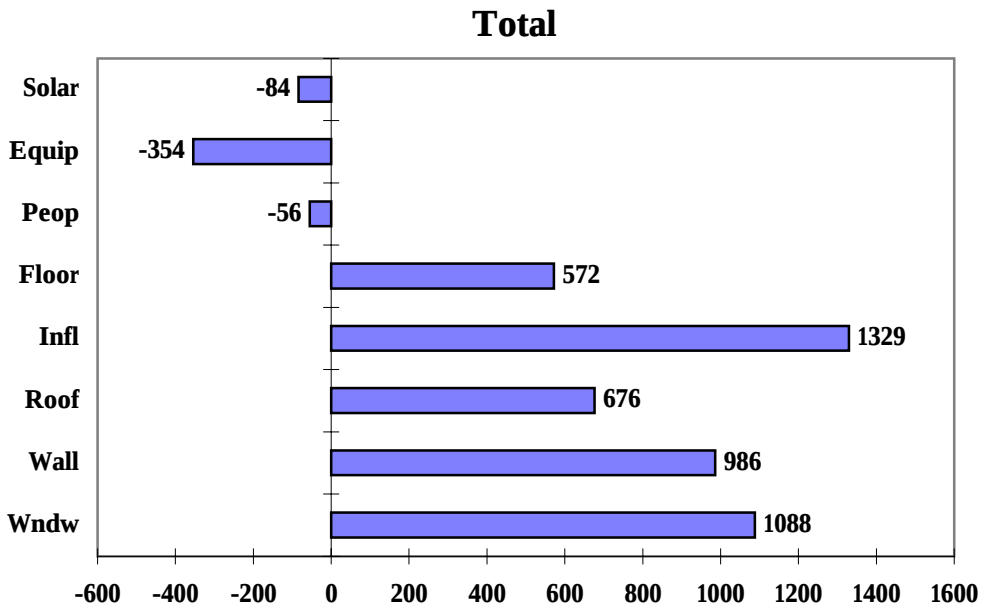
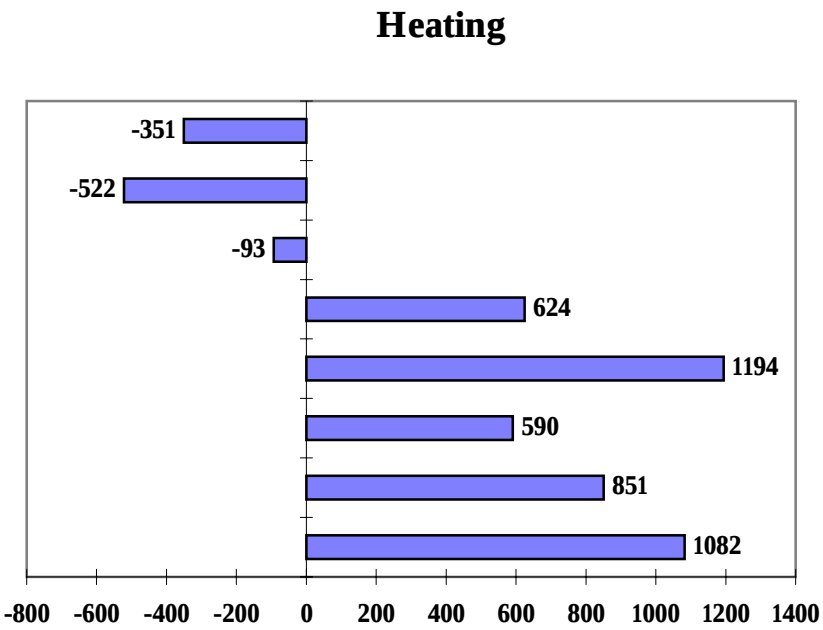



**Figure B-5. Aggregate Component Loads for Old Residential Buildings (Trillion Btu's)**



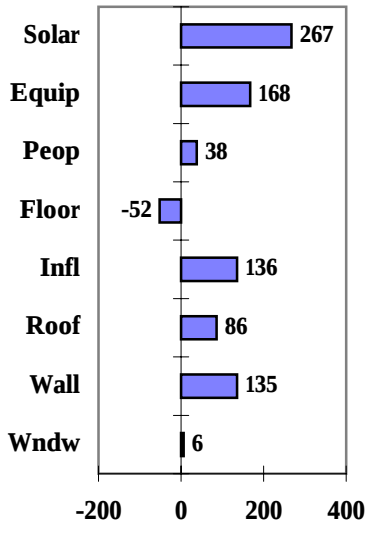
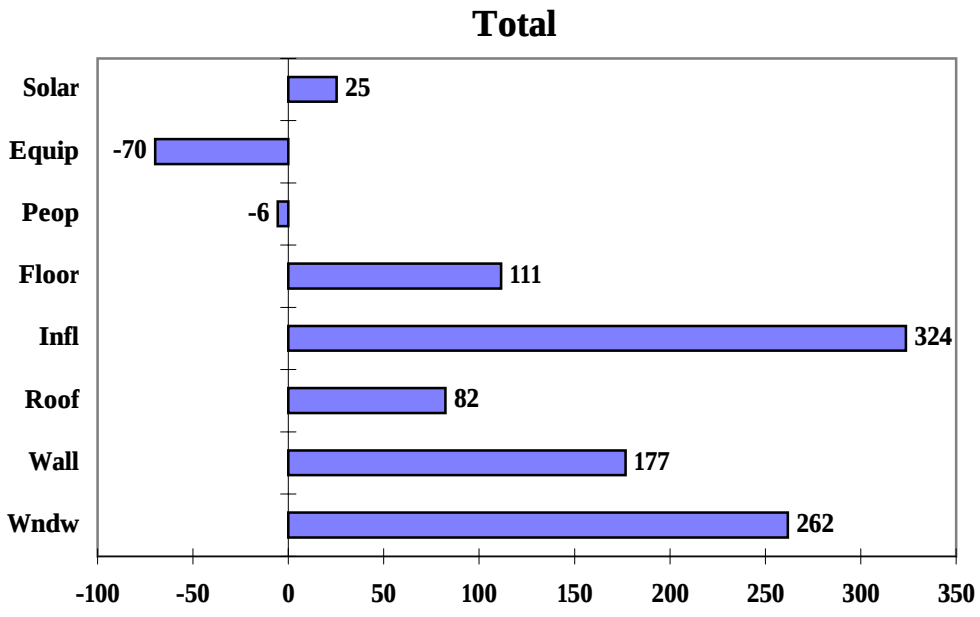
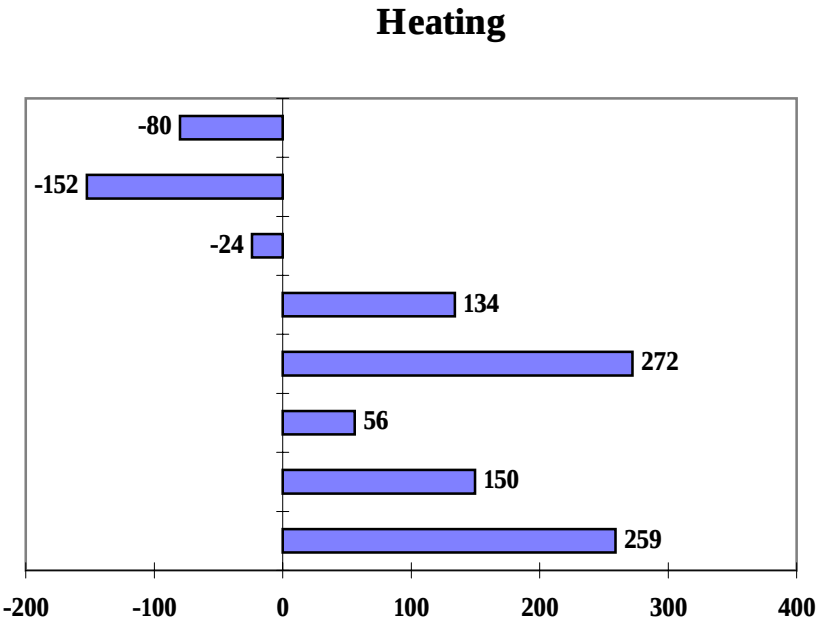



**Figure B-6. Aggregate Component Loads for New Residential Buildings (Trillion Btu's)**



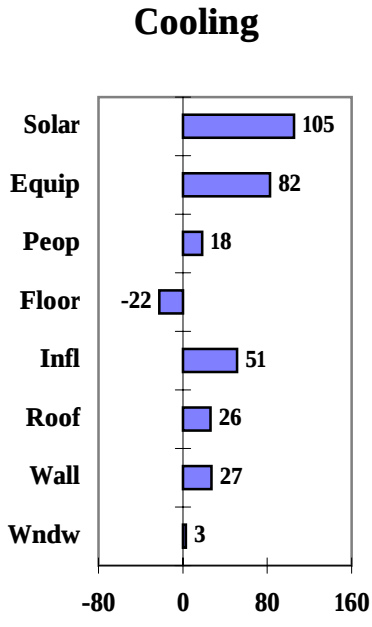
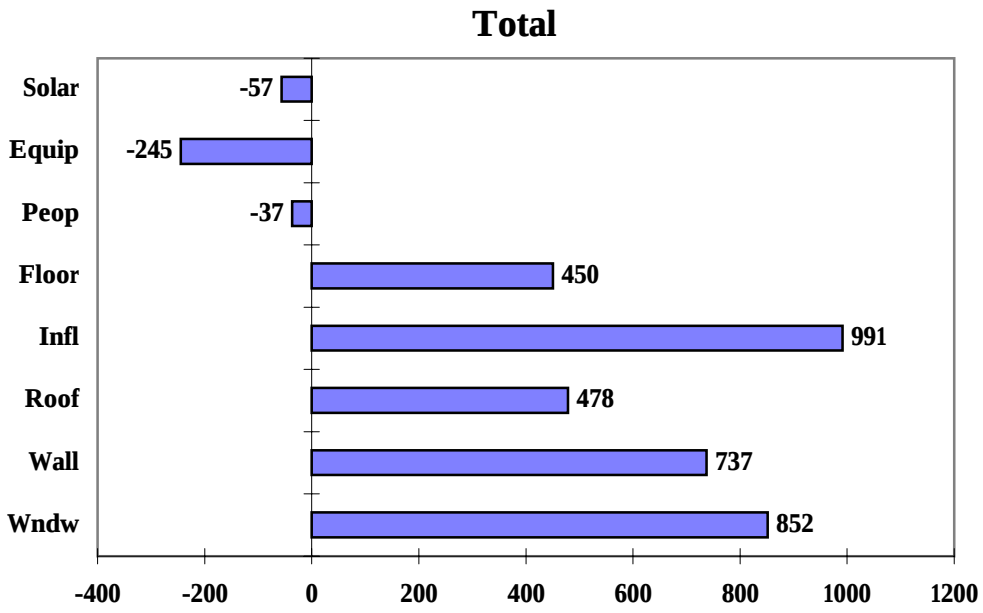
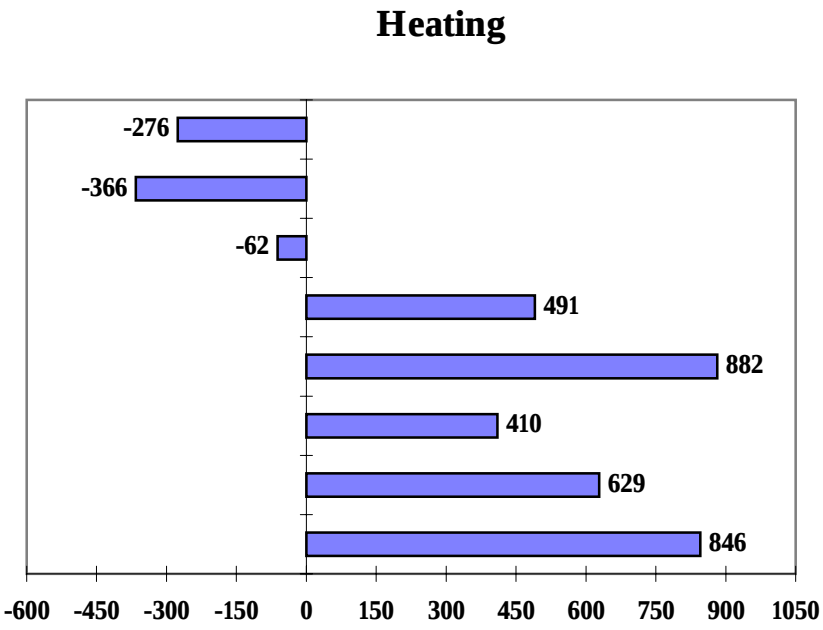



**Figure B-7. Aggregate Component Loads for Old Single-Family Detached Buildings (Trillion Btu's)**



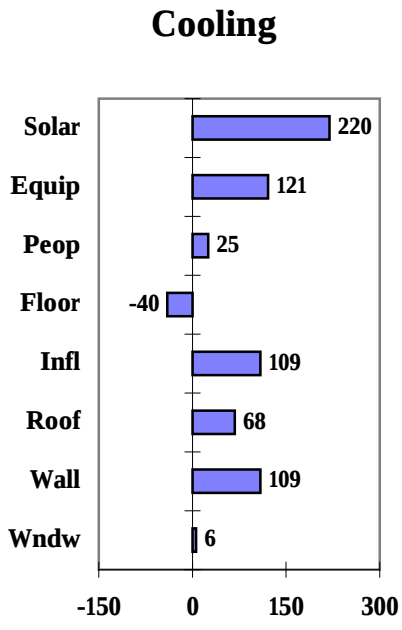



**Figure B-8. Aggregate Component Loads for New Single-Family Detached Buildings (Trillion Btu's)**

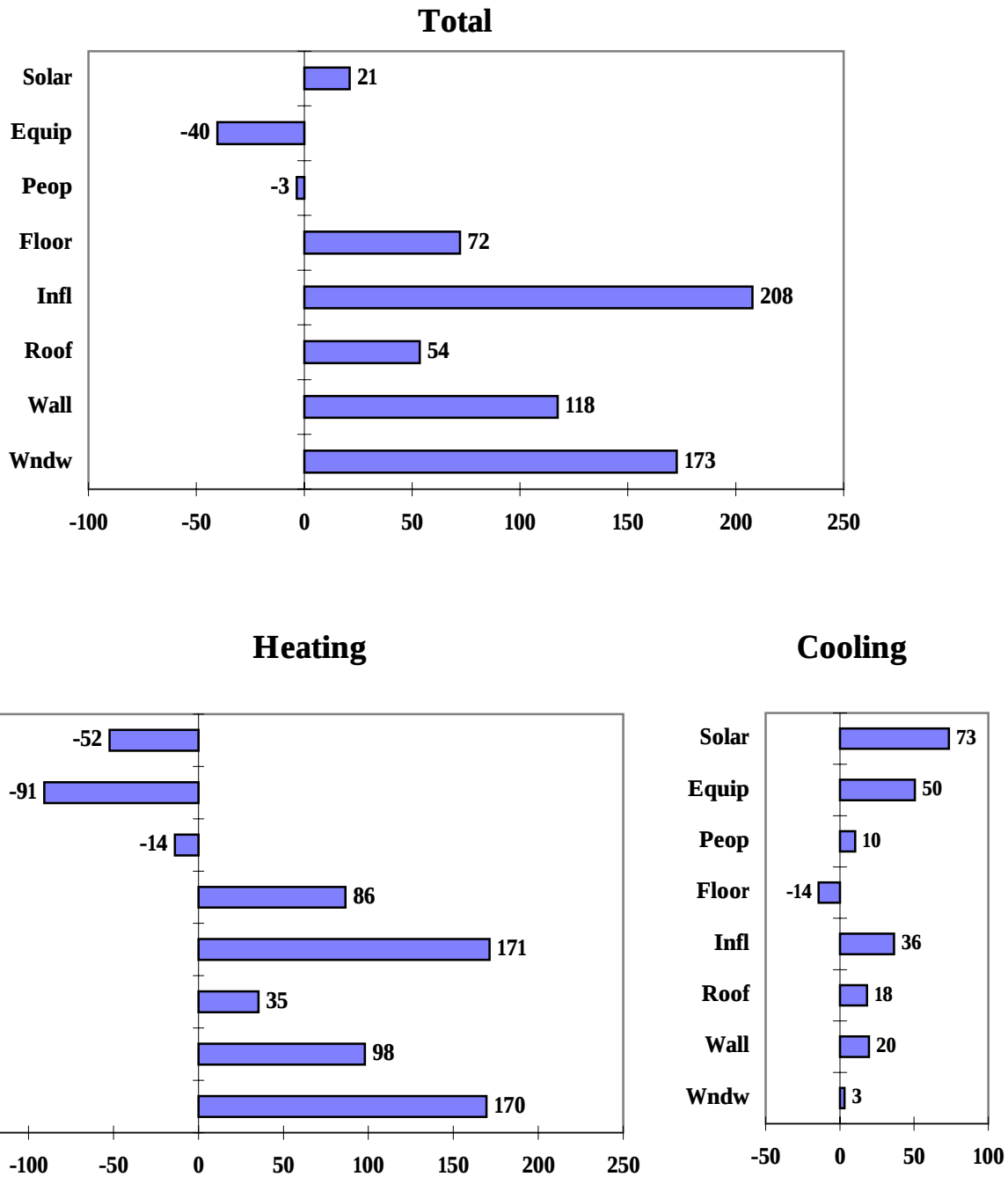
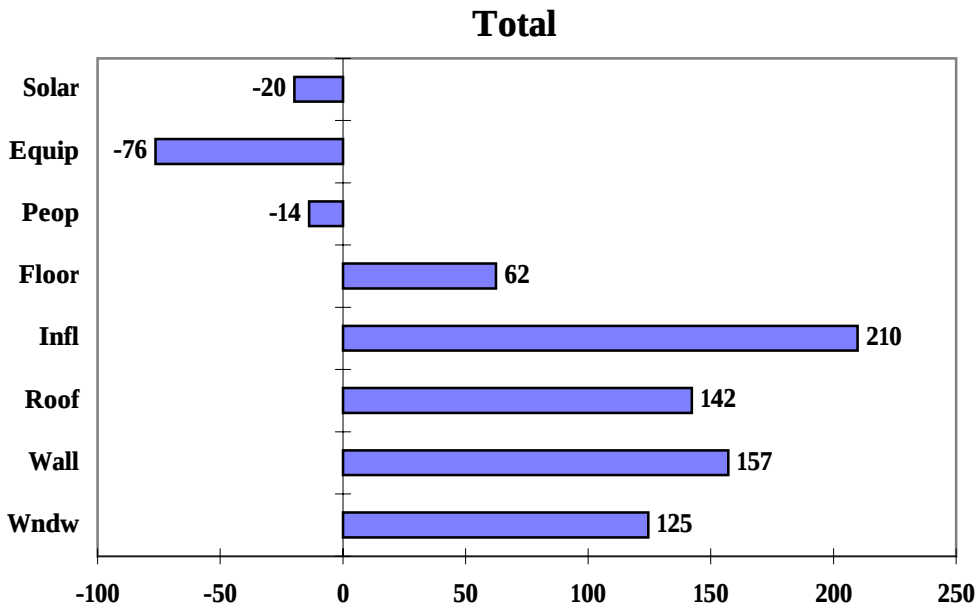
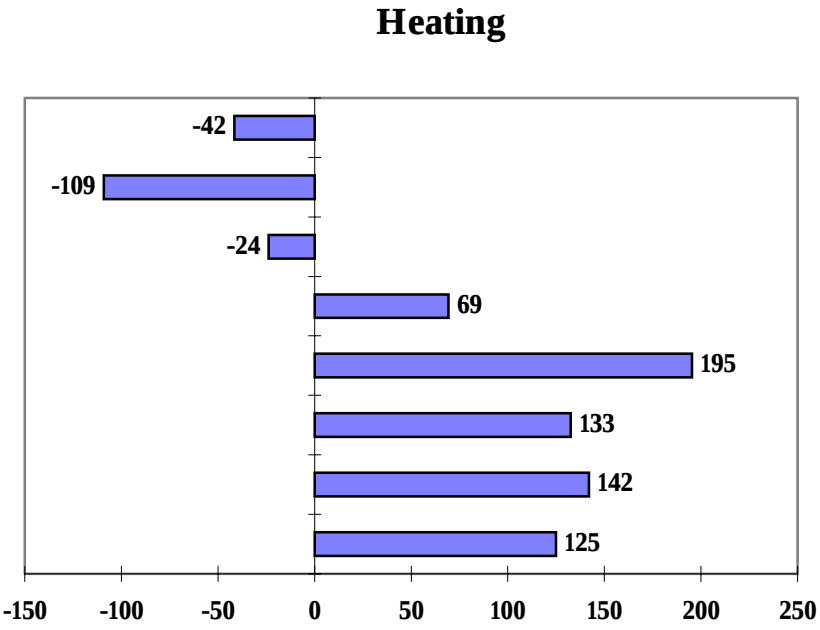


**Figure B-9. Aggregate Component Loads for Old Multi-Family Buildings (Trillion Btu's)**



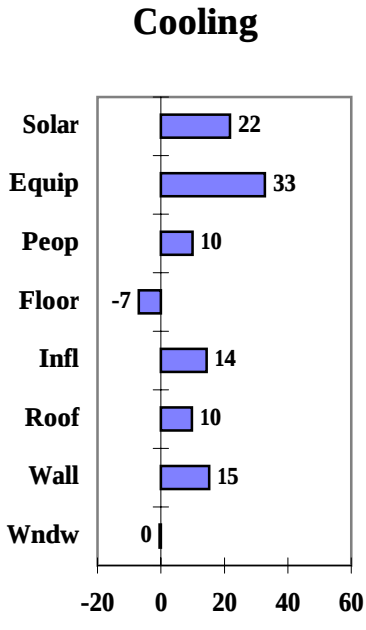
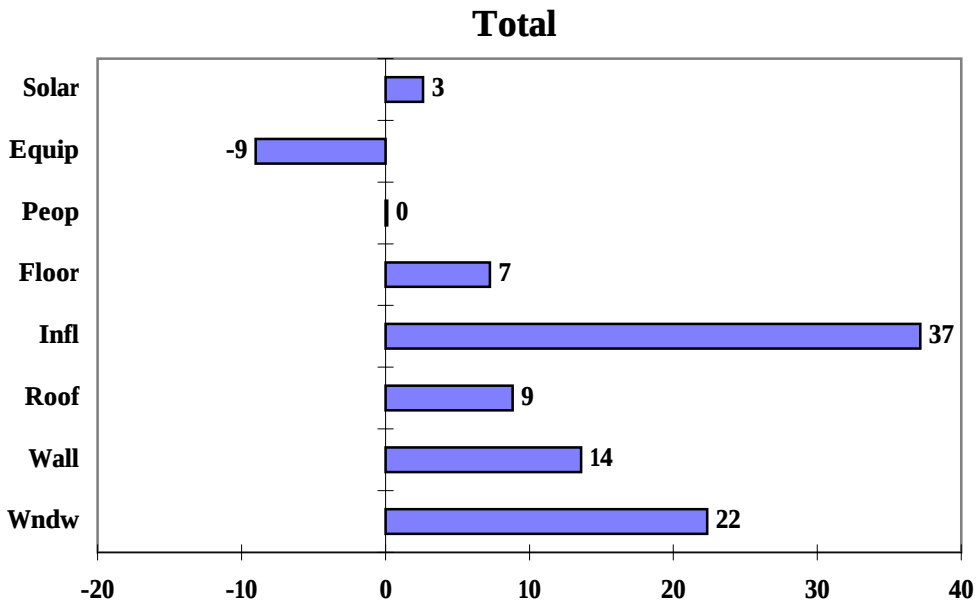
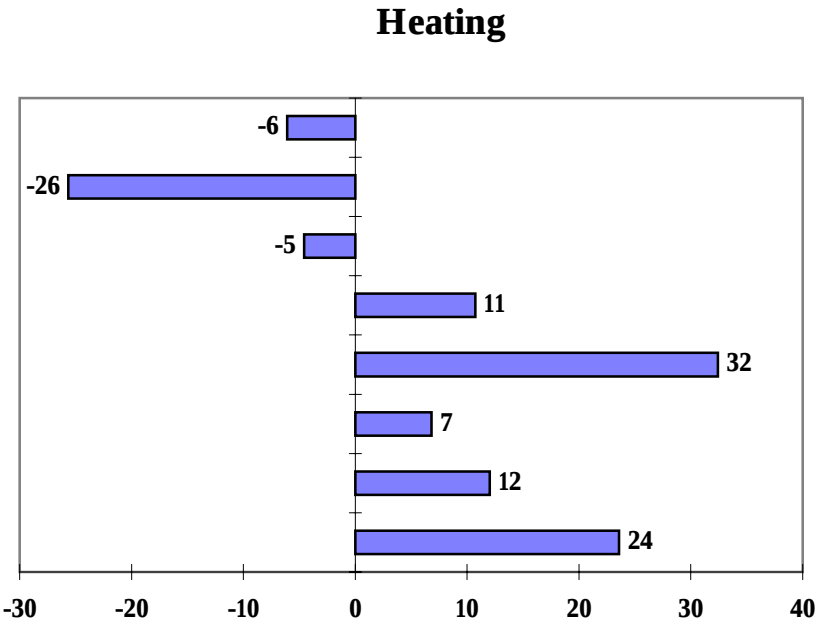



**Figure B-10. Aggregate Component Loads for New Multi-Family Buildings (Trillion Btu's)**



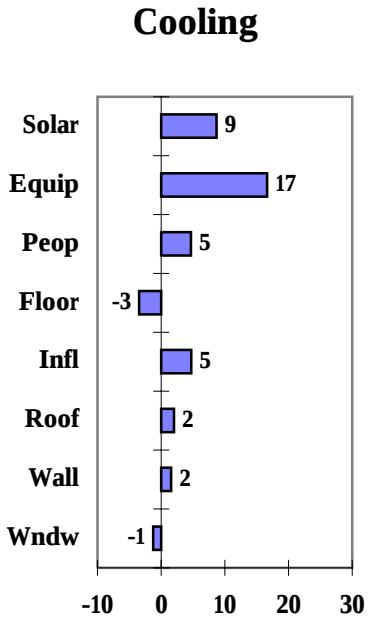



**Figure B-11. Aggregate Component Loads for Old Single-Family Attached and Mobile Home Buildings (Trillion Btu's)**

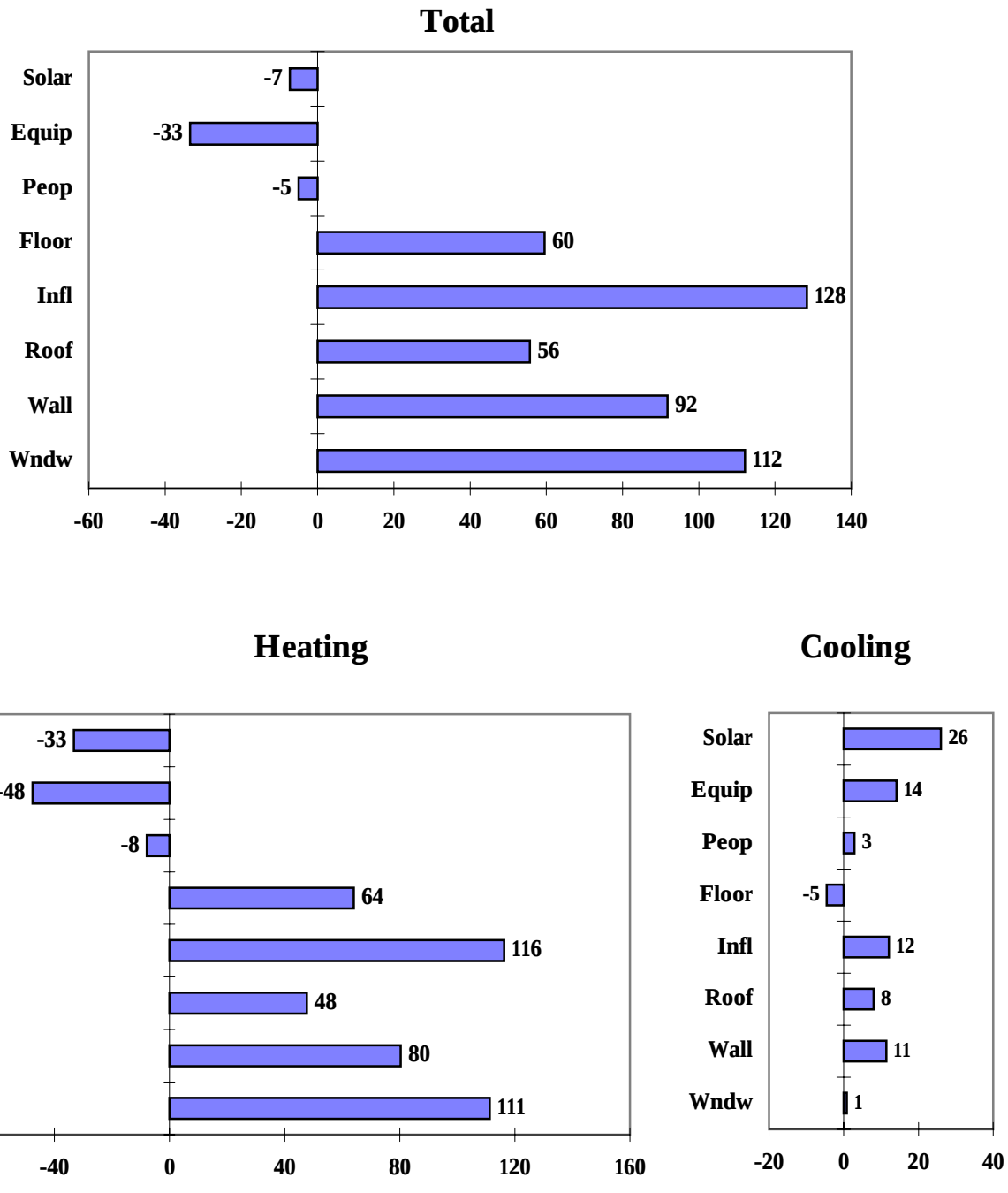
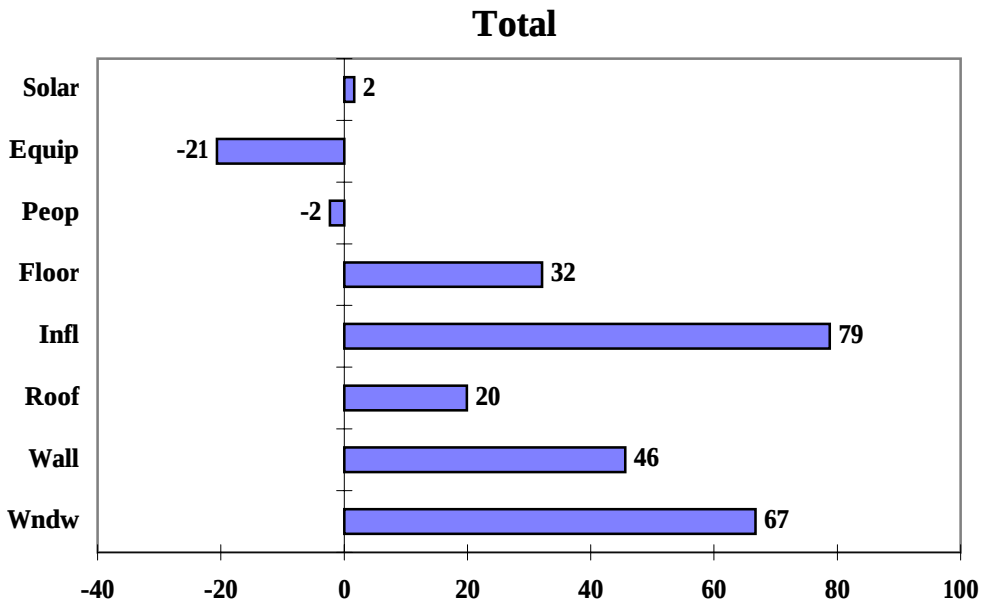
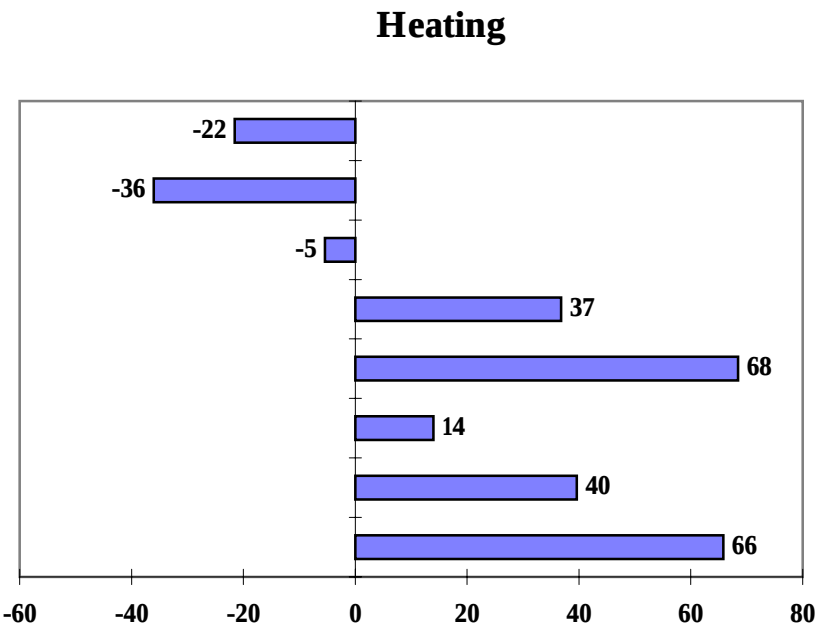


**Figure B-12. Aggregate Component Loads for New Single-Family Attached and Mobile Home Buildings (Trillion Btu's)**



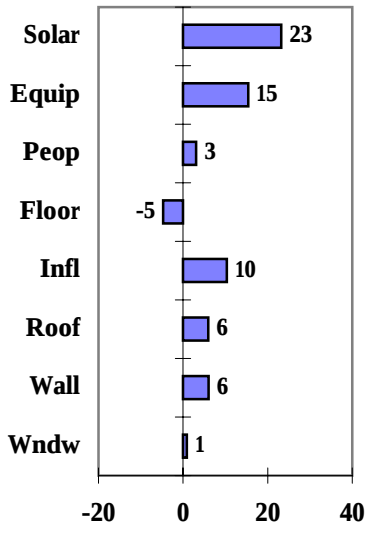
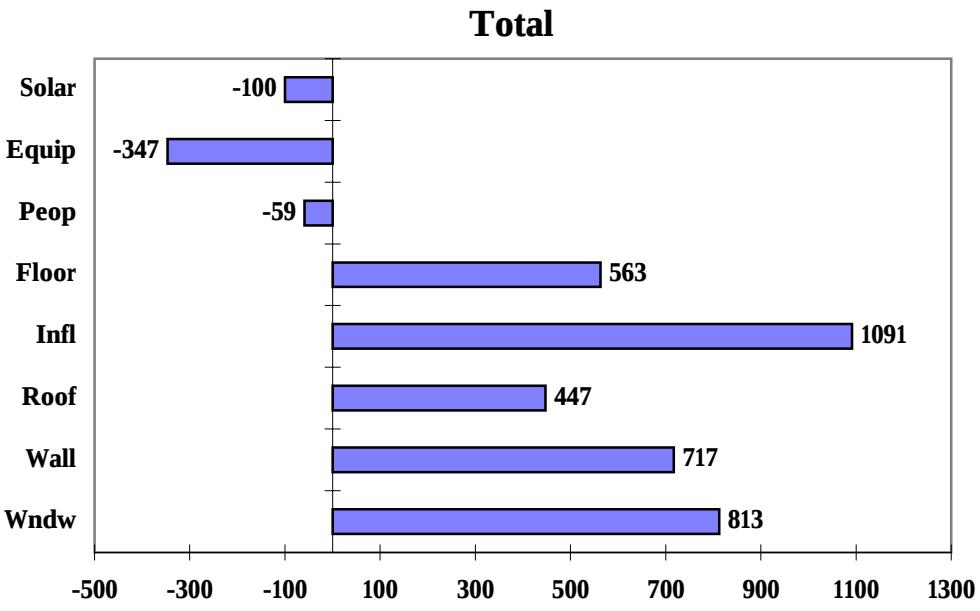
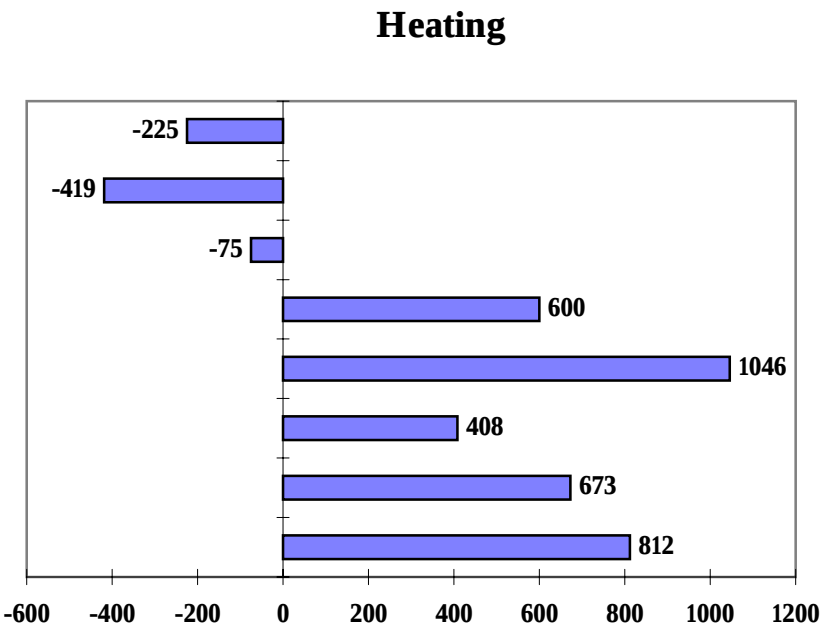



**Figure B-13. Aggregate Component Loads for All North Buildings (Trillion Btu's)**



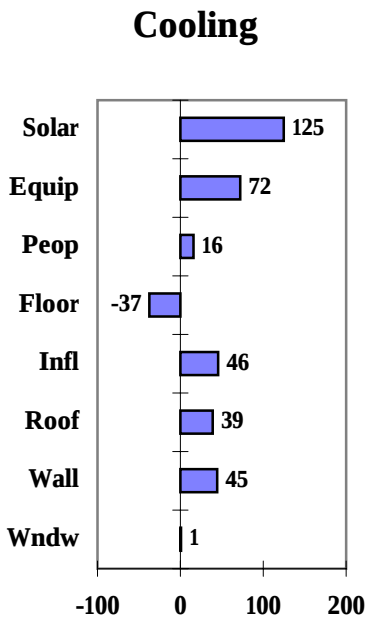
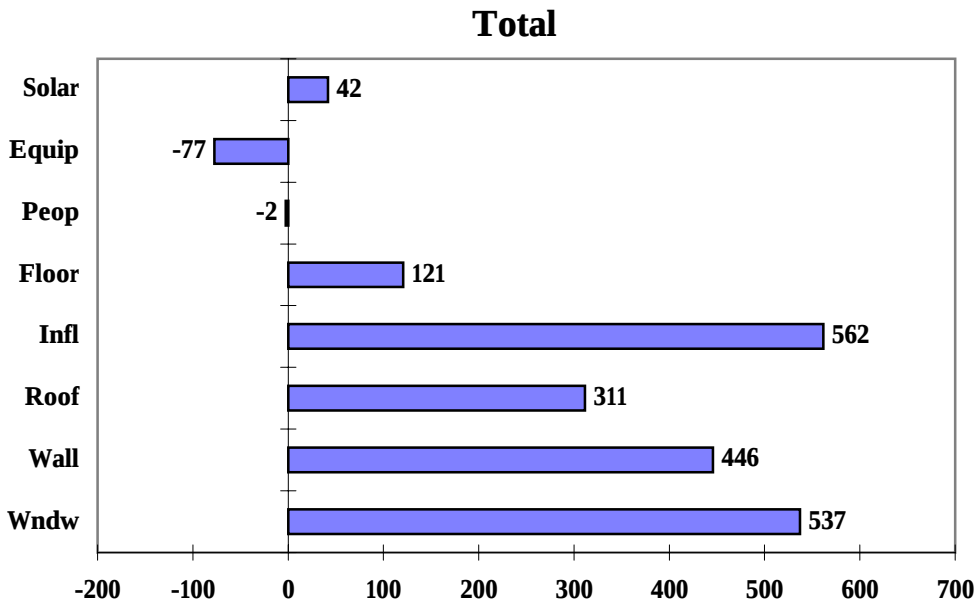
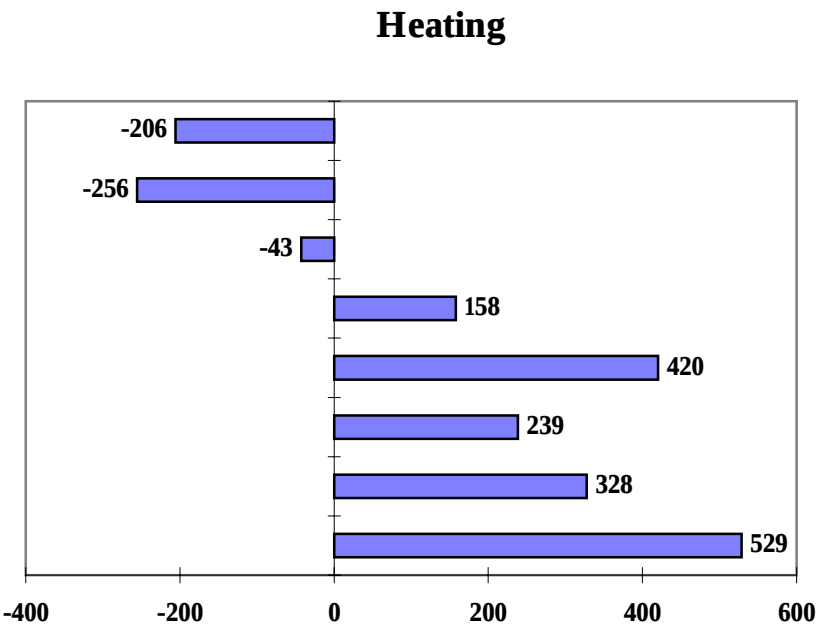



**Figure B-14. Aggregate Component Loads for All South Buildings (Trillion Btu's)**



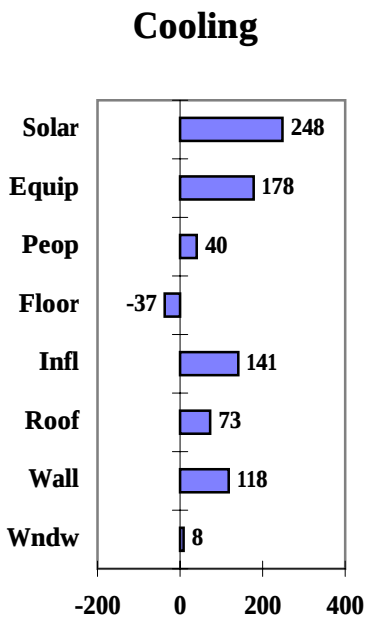
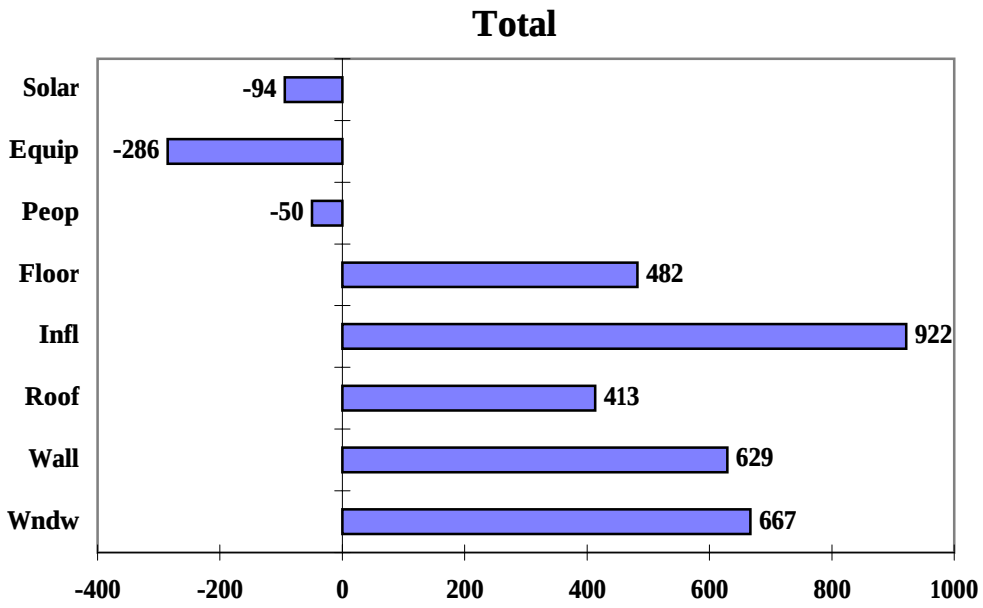
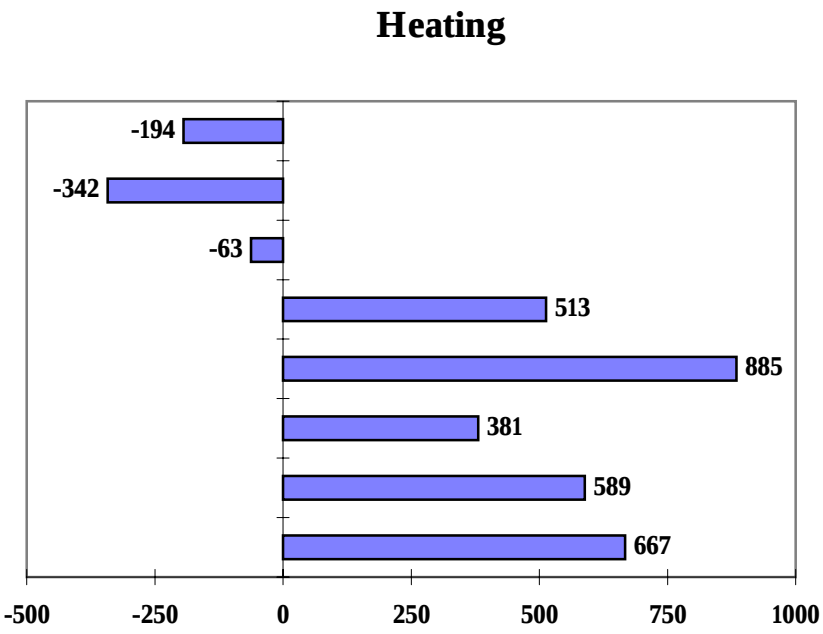



**Figure B-15. Aggregate Component Loads for North Old Residential Buildings (Trillion Btu's)**



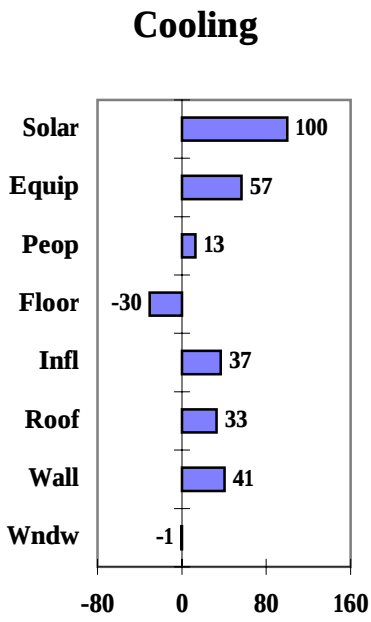
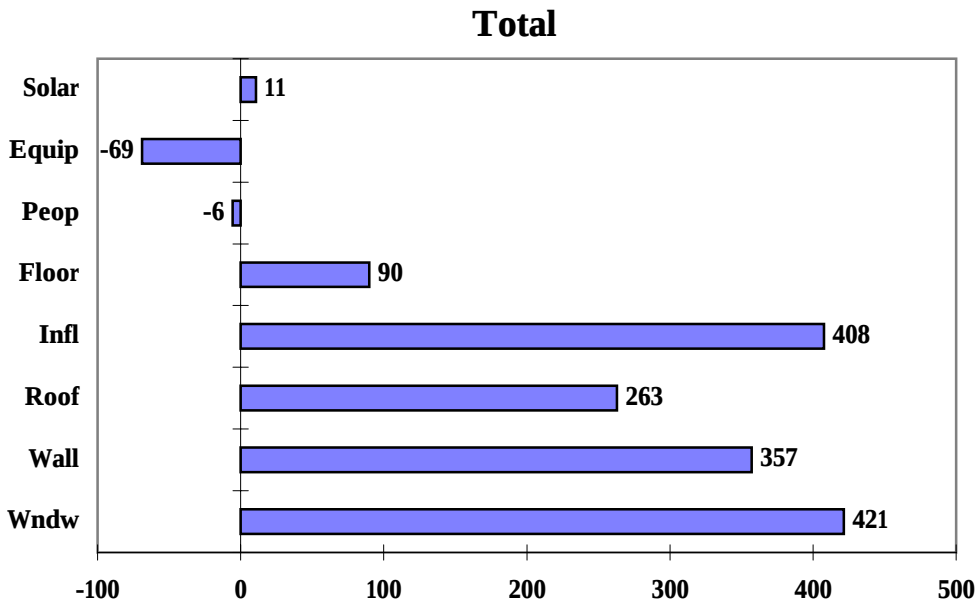
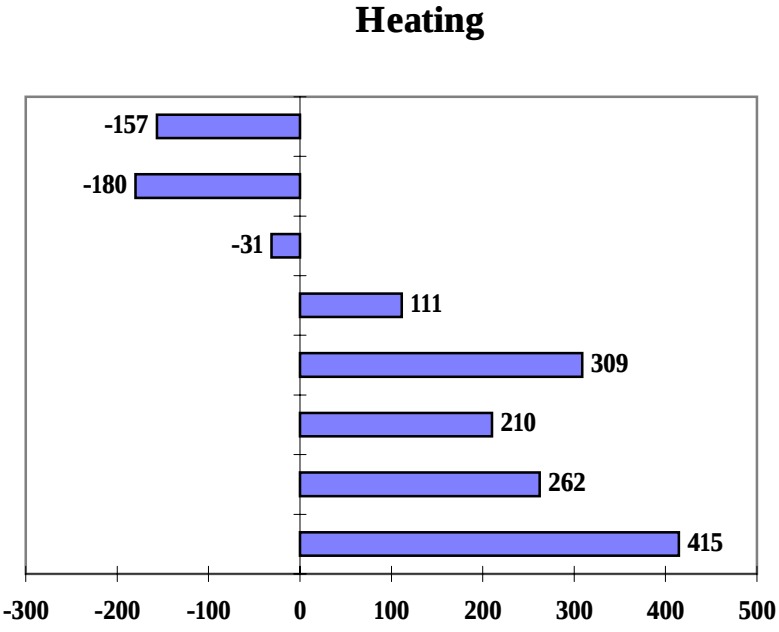



**Figure B-16. Aggregate Component Loads for South Old Residential Buildings (Trillion Btu's)**



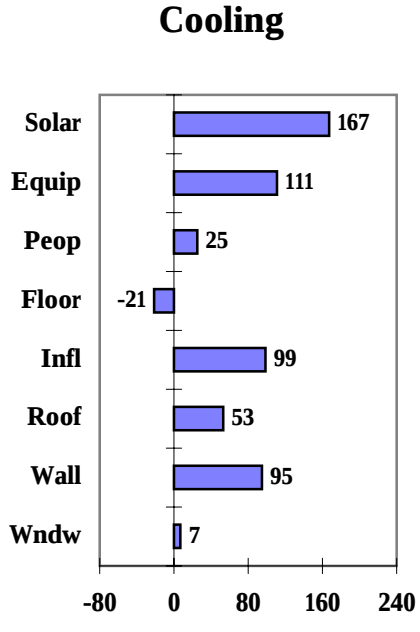
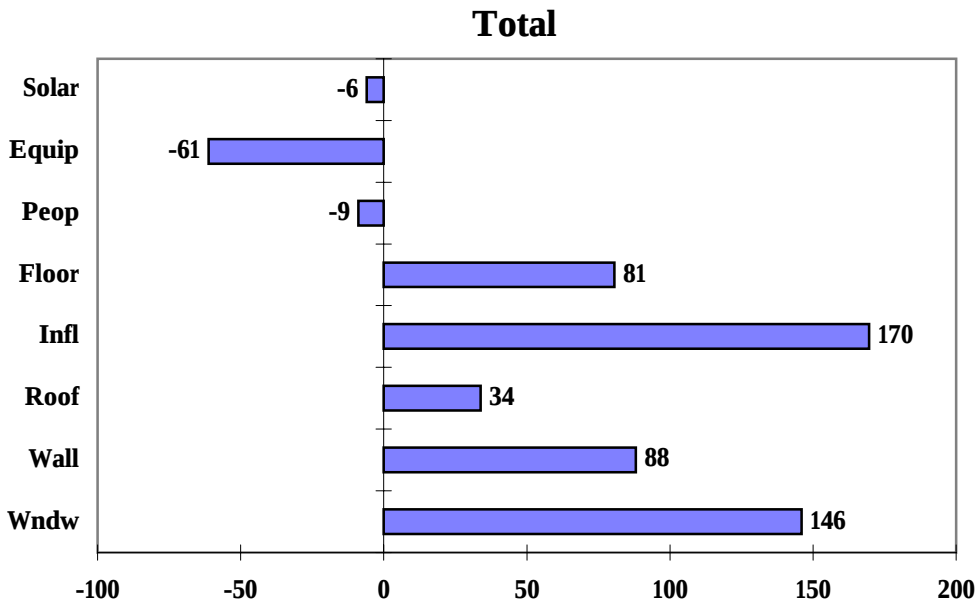
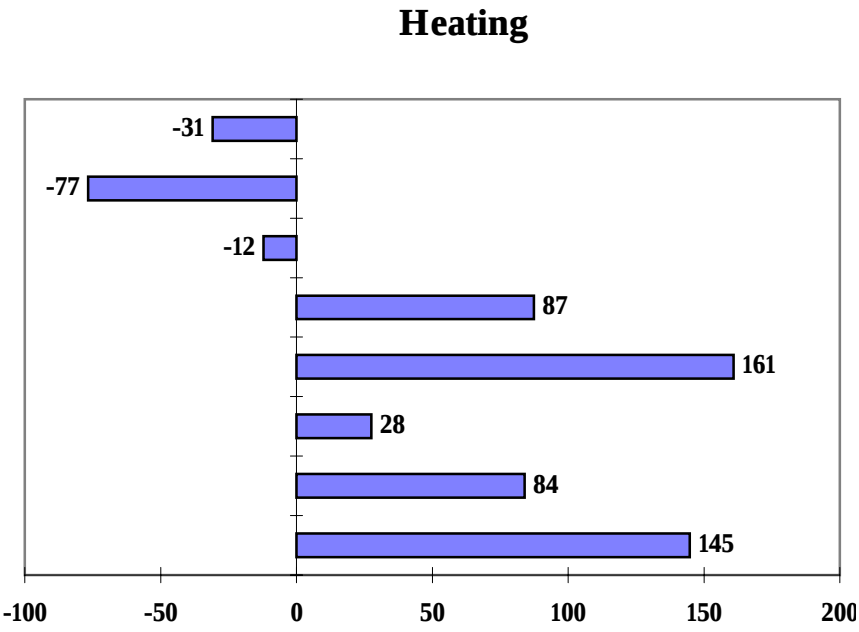



**Figure B-17. Aggregate Component Loads for North New Residential Buildings (Trillion Btu's)**



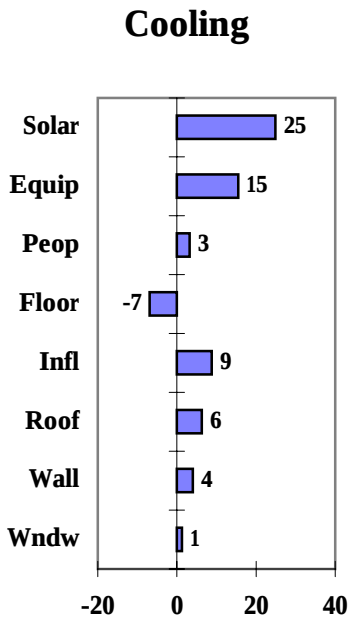
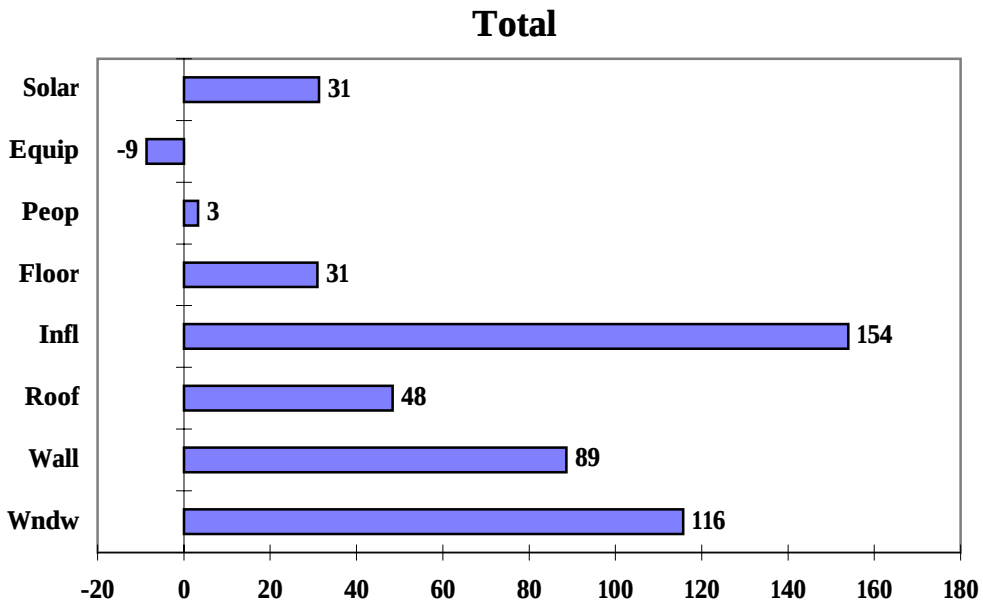
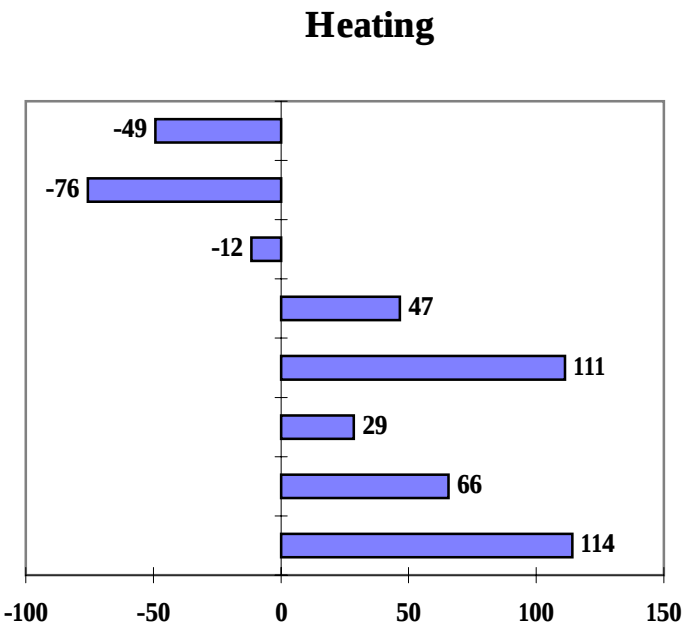



**Figure B-18. Aggregate Component Loads for South New Residential Buildings (Trillion Btu's)**



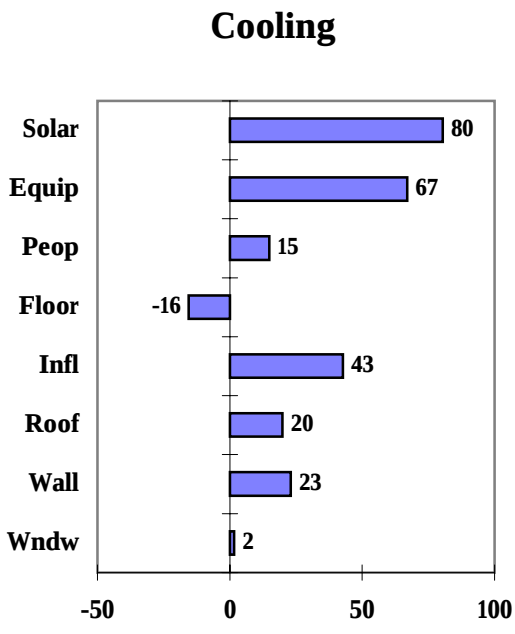
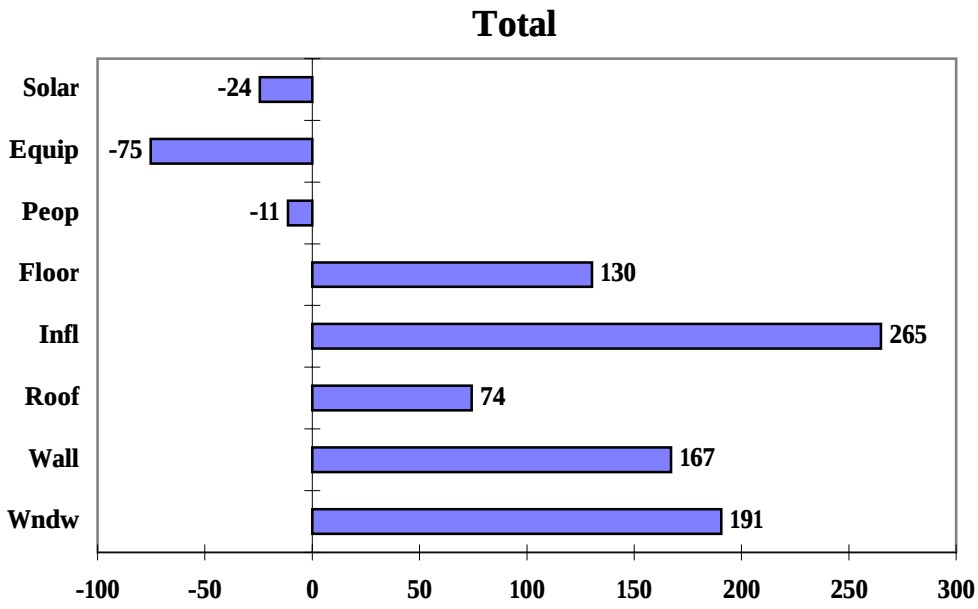
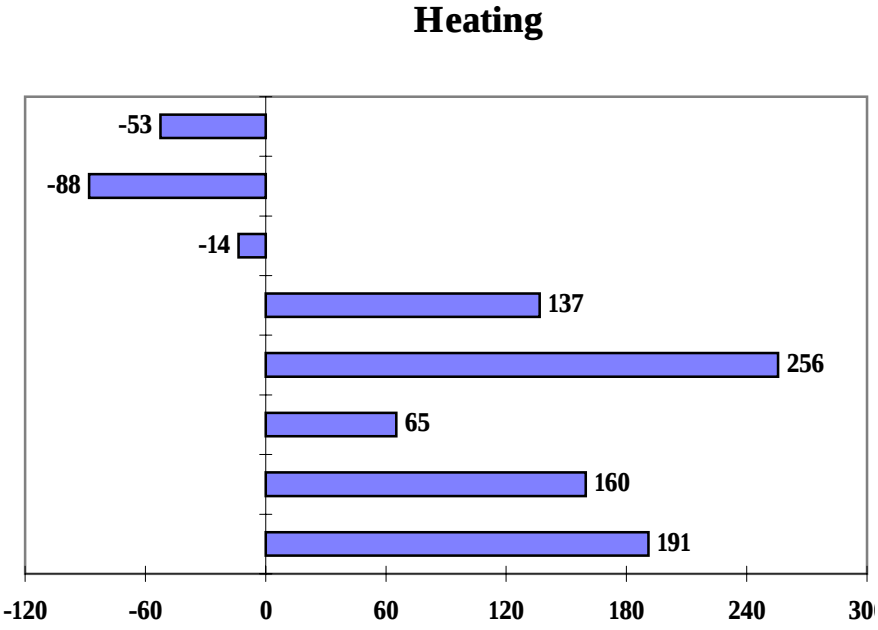



**Figure B-19. Aggregate Component Loads for Single-Family Detached Buildings in Northeast US (Trillion Btu's)**



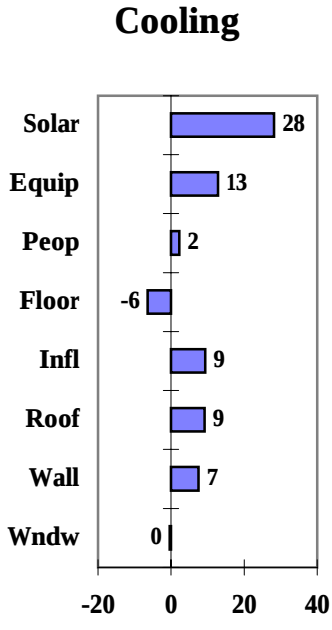
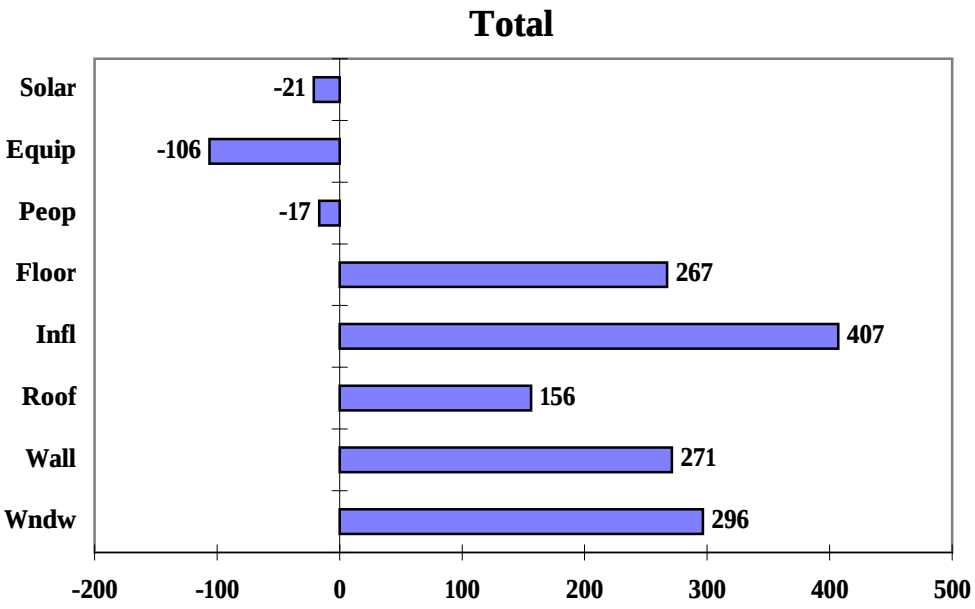
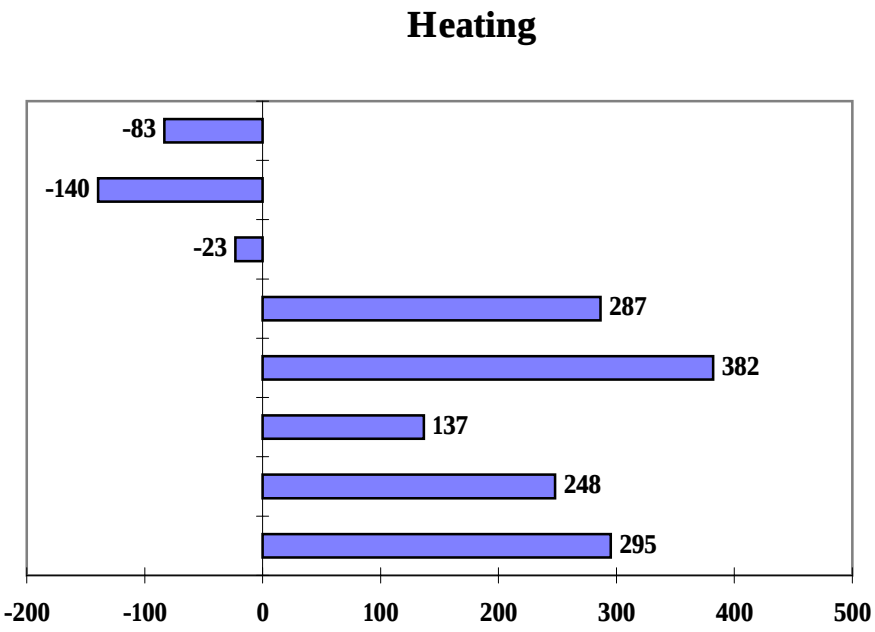



**Figure B-20. Aggregate Component Loads for Single-Family Detached Buildings in North Central US (Trillion Btu's)**



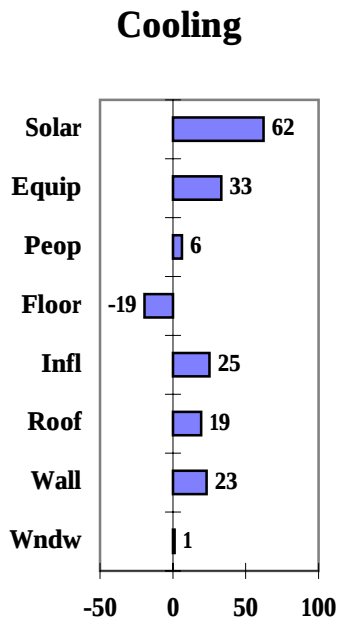
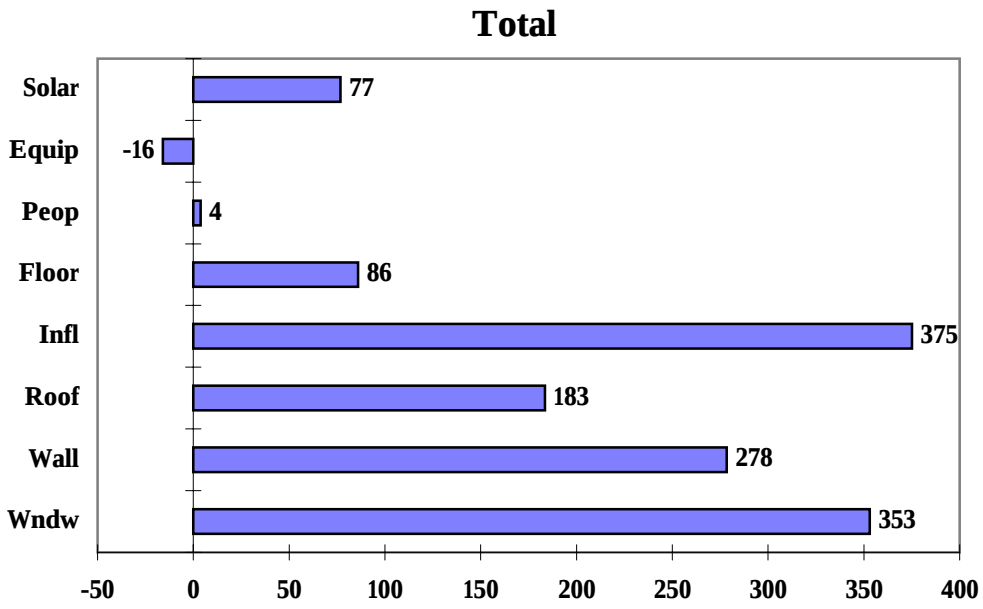
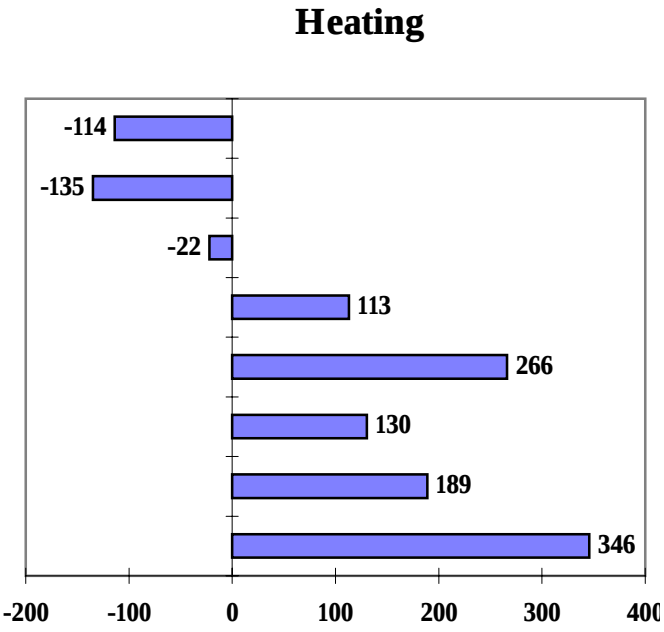



**Figure B-21. Aggregate Component Loads for Single-Family Detached Buildings in South US (Trillion Btu's)**



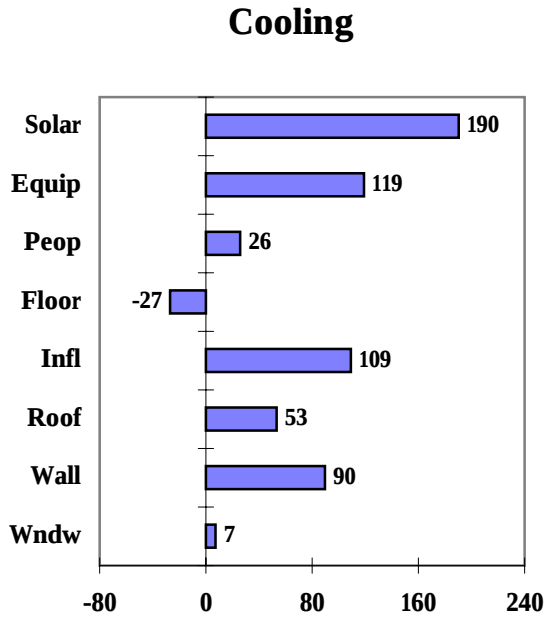
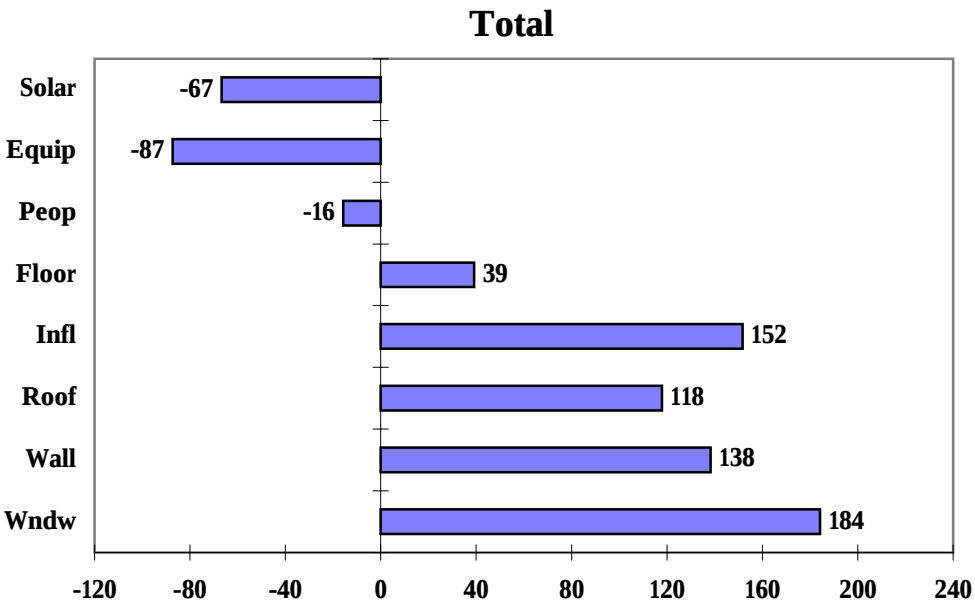
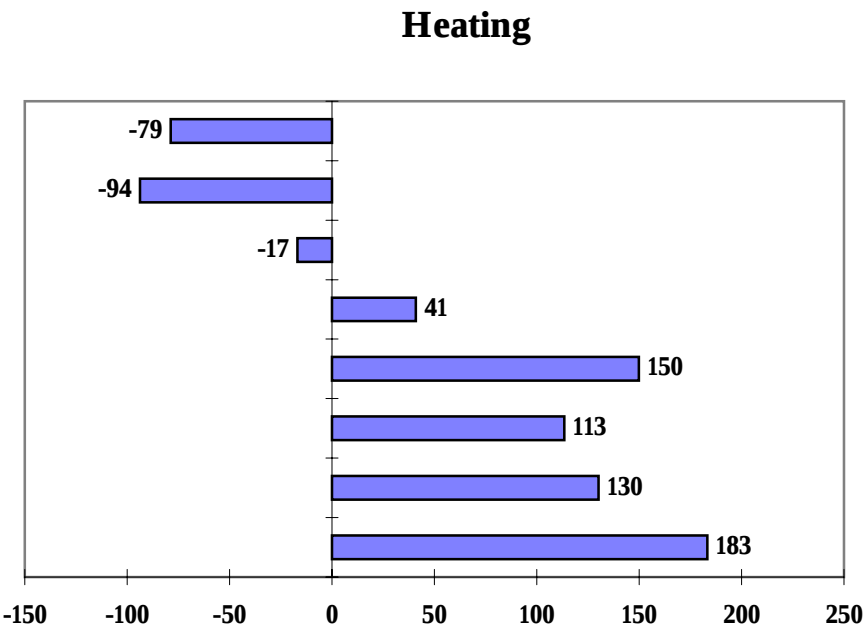



**Figure B-22. Aggregate Component Loads for Single-Family Detached Buildings in West US (Trillion Btu's)**



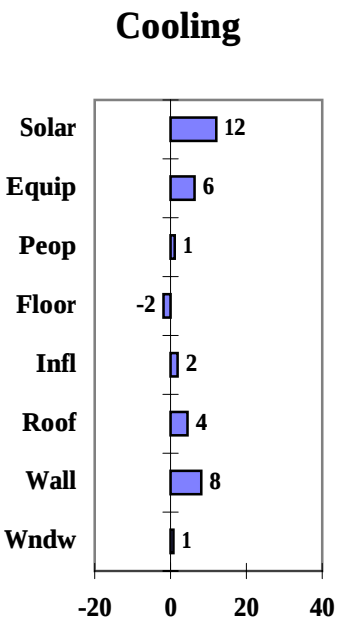
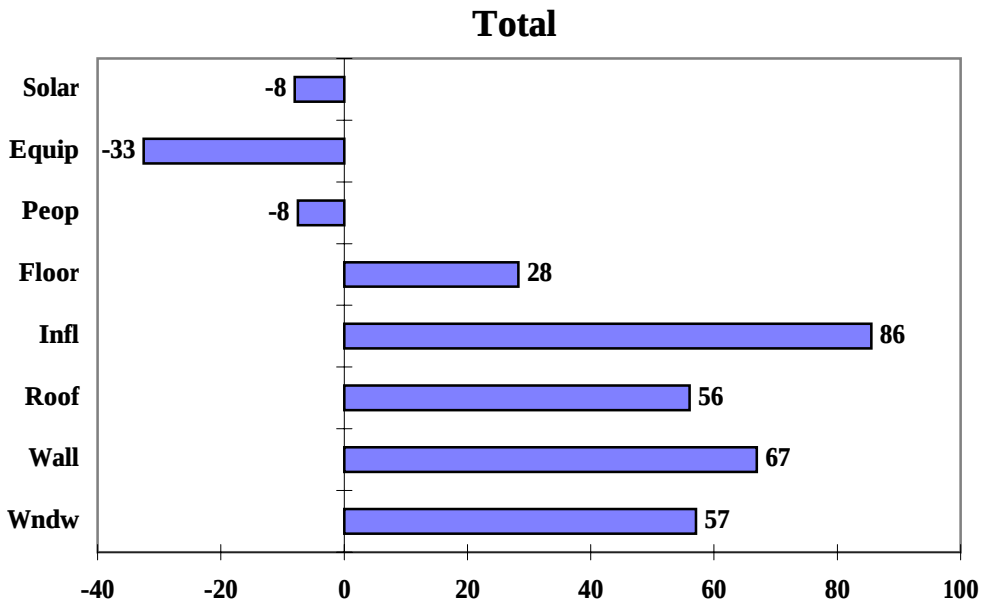
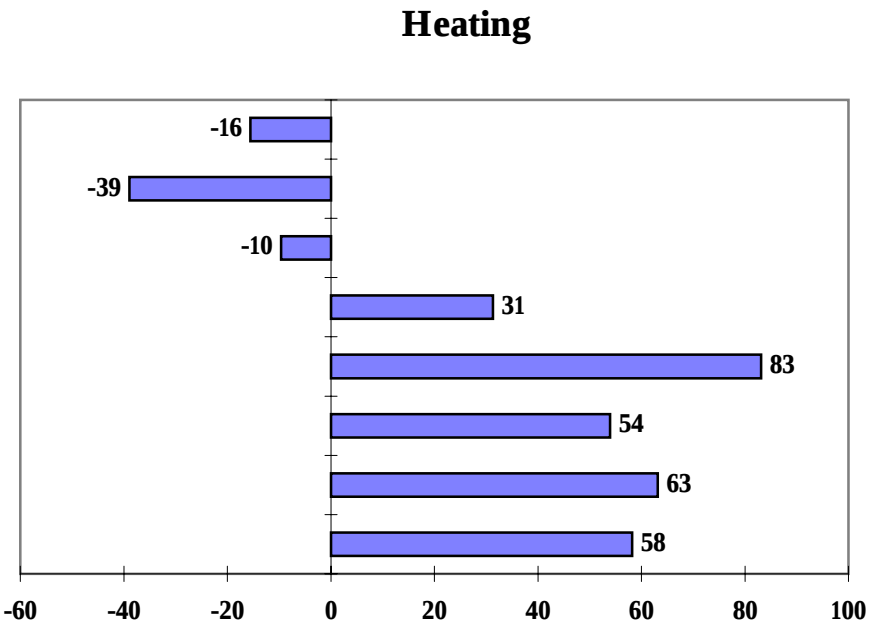



**Figure B-23. Aggregate Component Loads for Multi-Family Buildings in Northeast US (Trillion Btu's)**



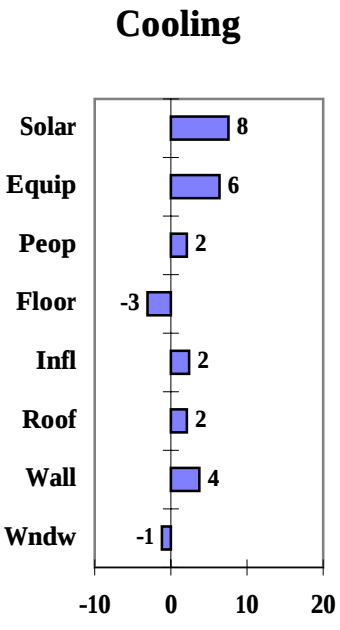
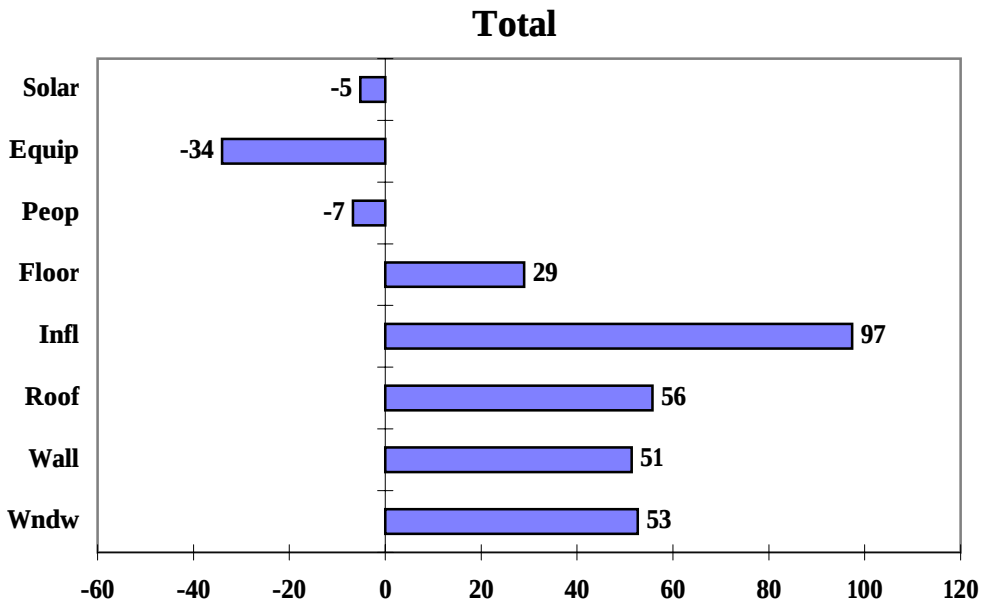
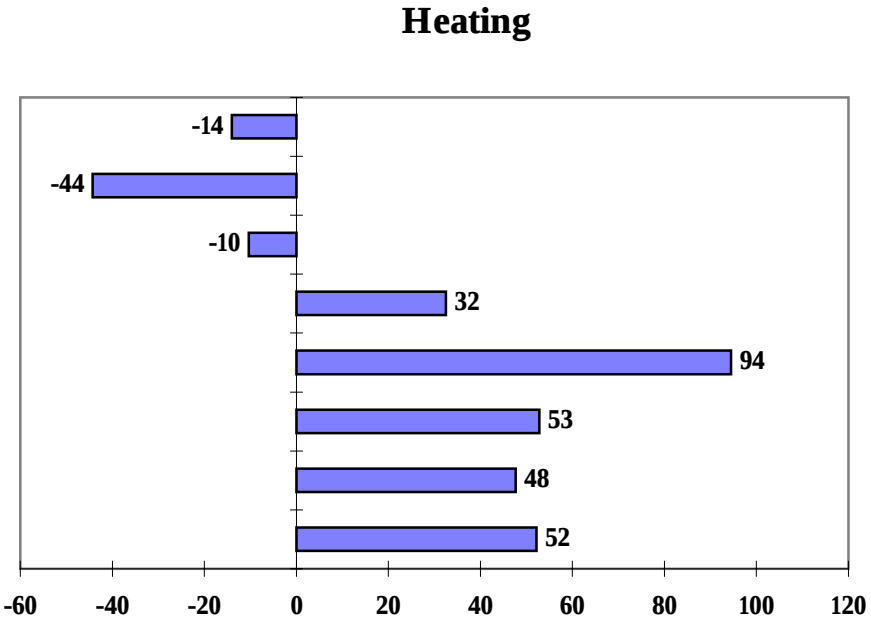



**Figure B-24. Aggregate Component Loads for Multi-Family Buildings in North Central US (Trillion Btu's)**



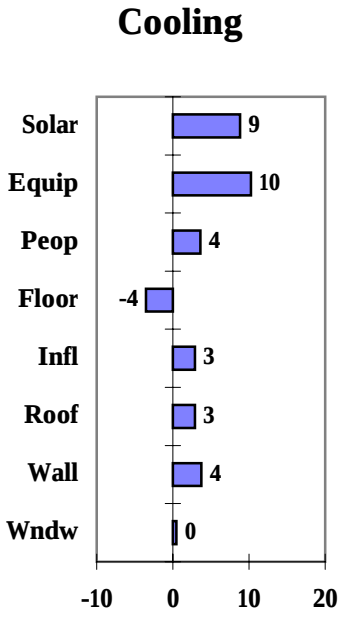
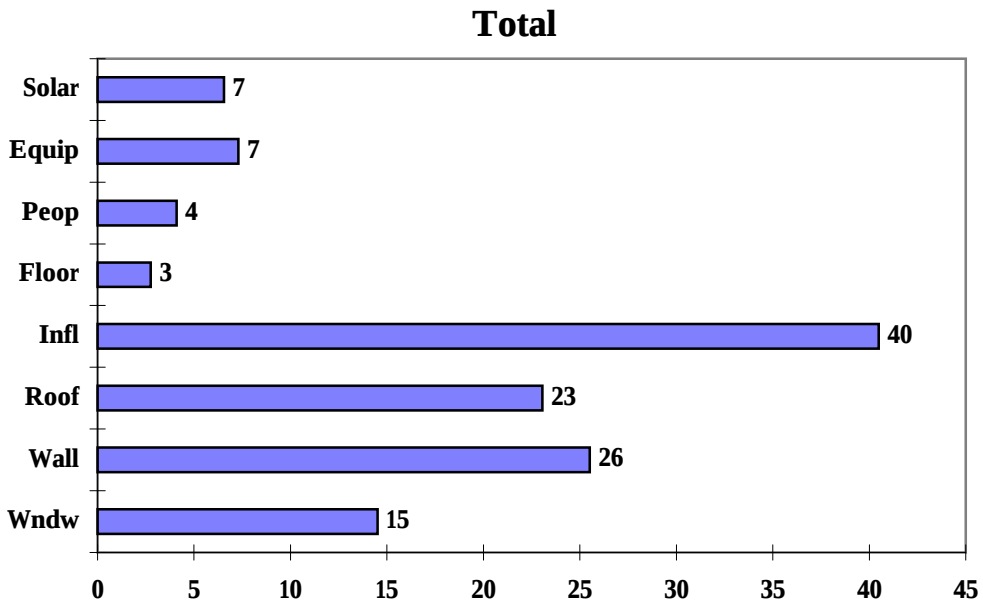
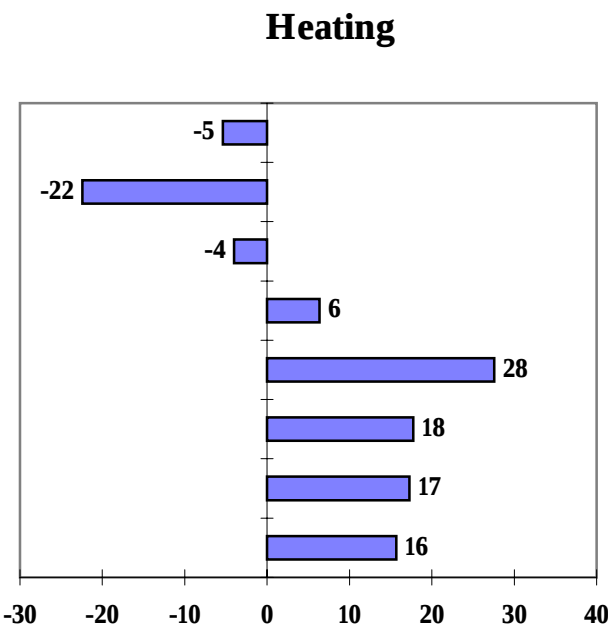



**Figure B-25. Aggregate Component Loads for Multi-Family Buildings in South US (Trillion Btu's)**



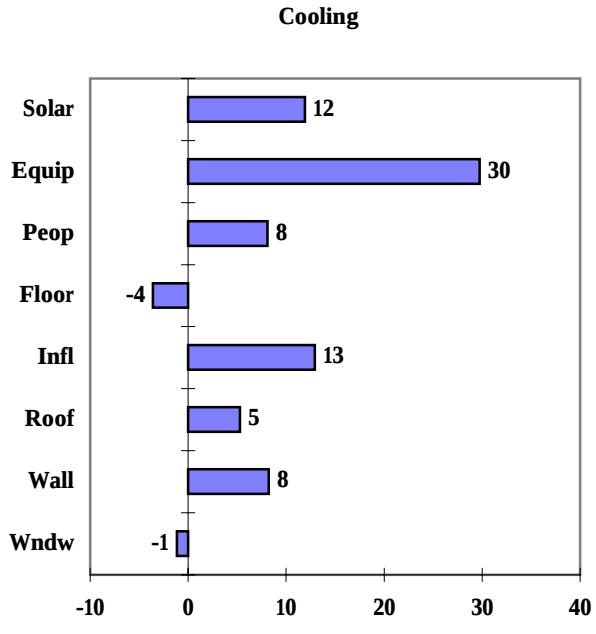
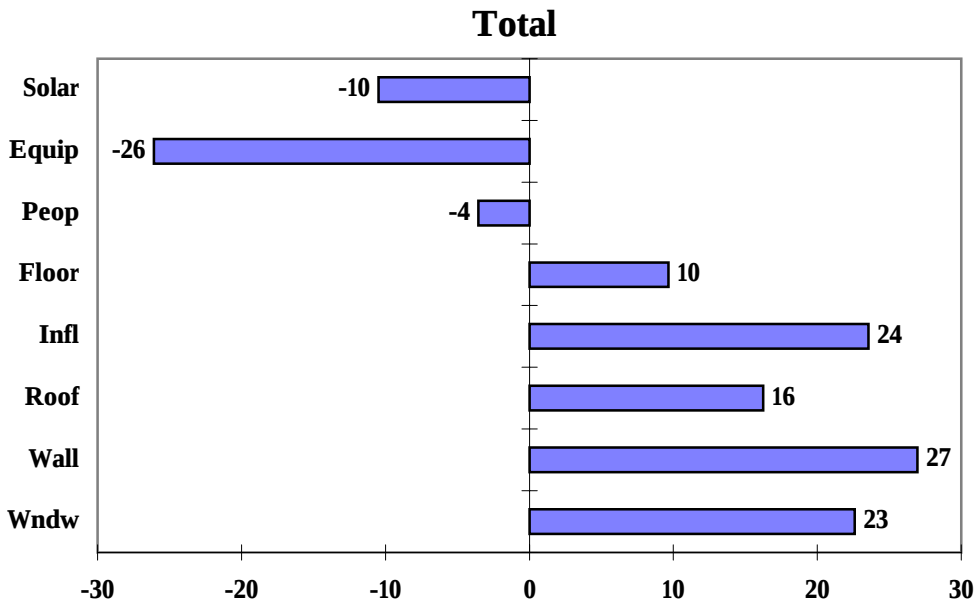
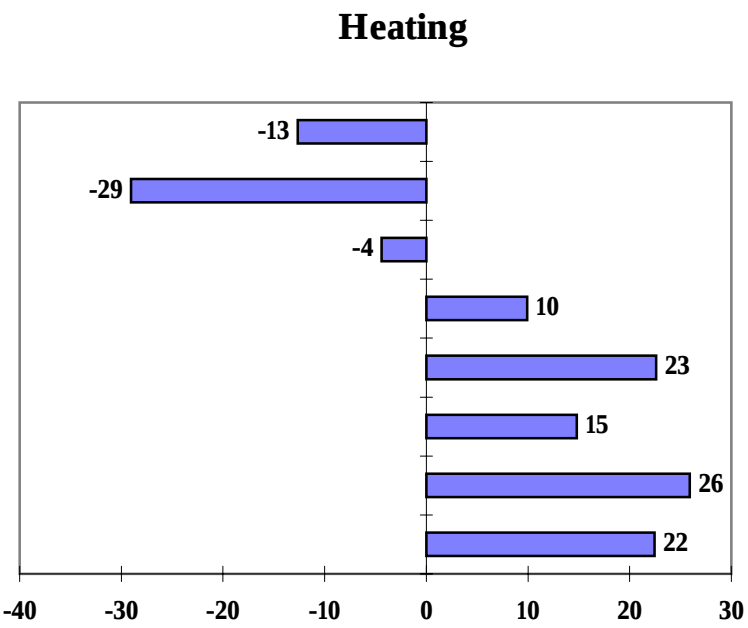



**Figure B-26. Aggregate Component Loads for Multi-Family Buildings in West US (Trillion Btu's)**



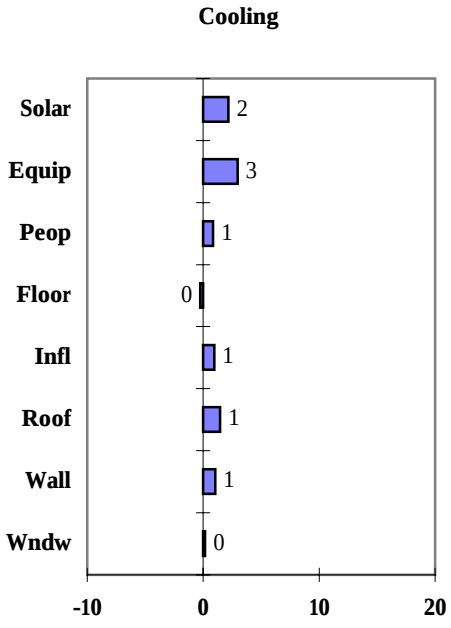
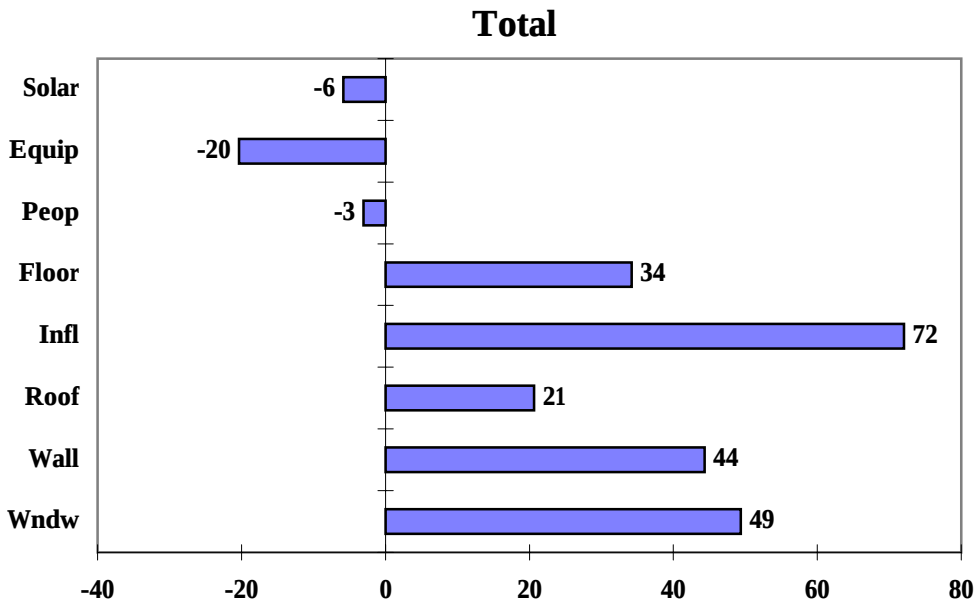
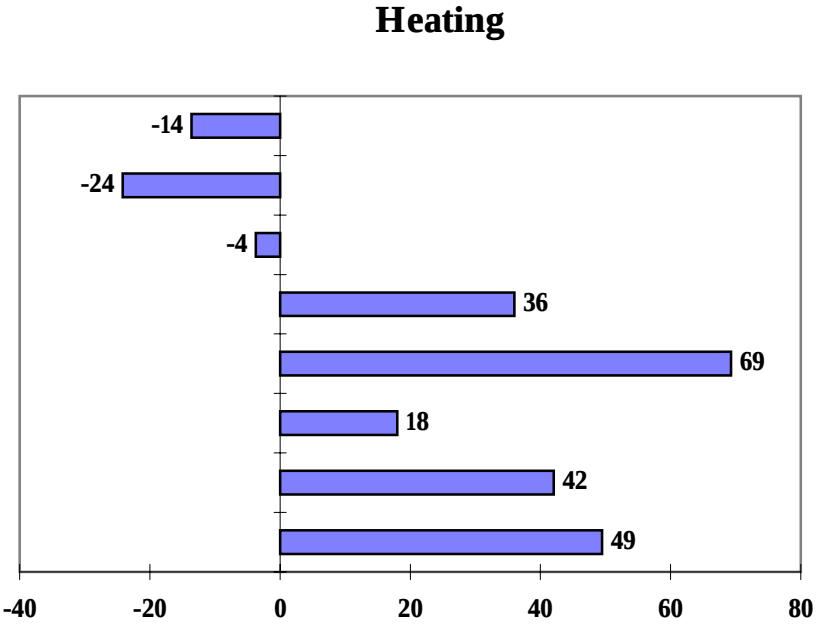



**Figure B-27. Aggregate Component Loads for Single-Family Attached and Mobile Home Buildings in Northeast US (Trillion Btu's)**



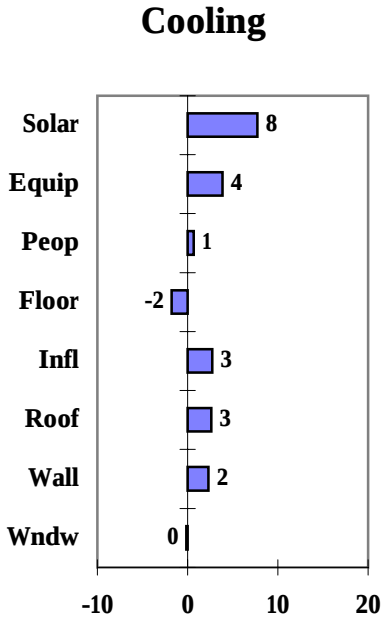
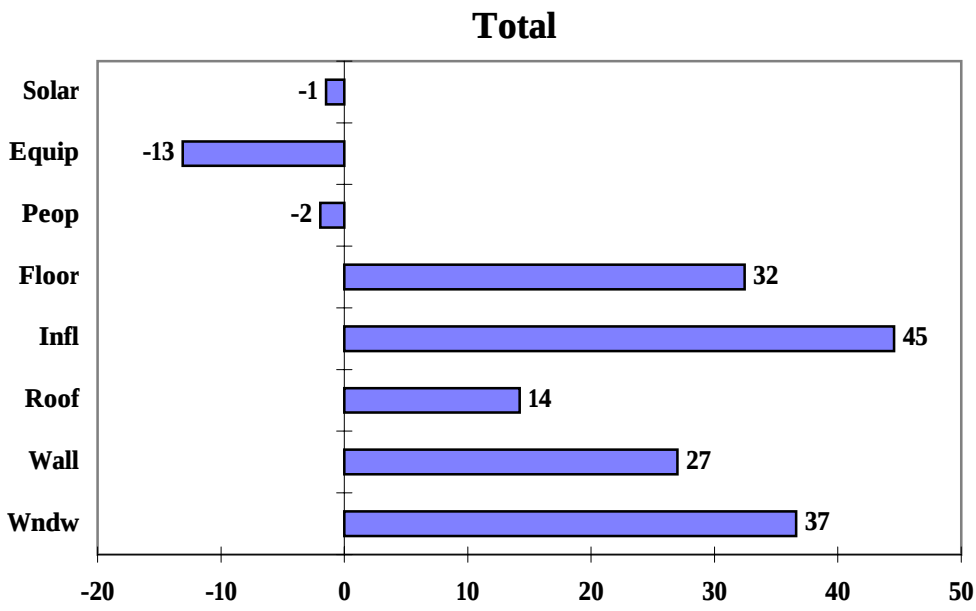
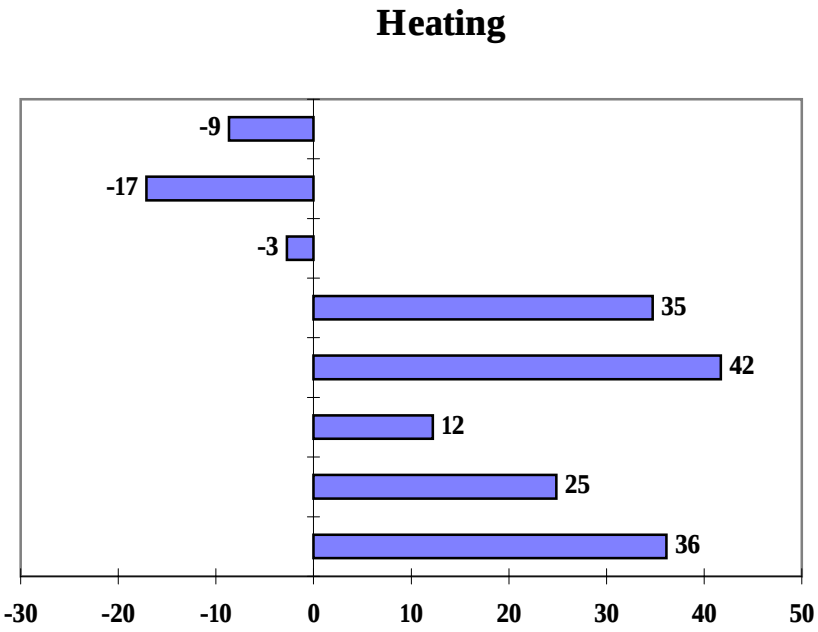



**Figure B-28. Aggregate Component Loads for Single-Family Attached and Mobile Home Buildings in North Central US (Trillion Btu's)**



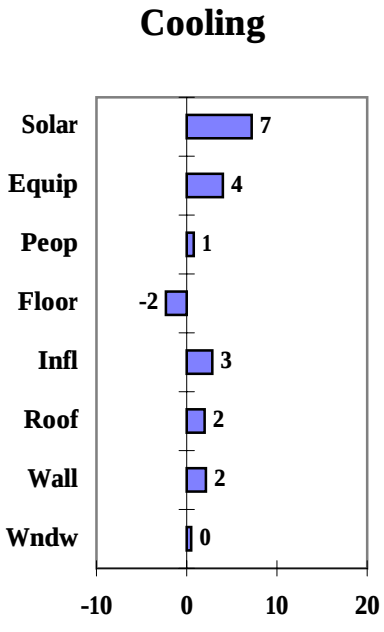
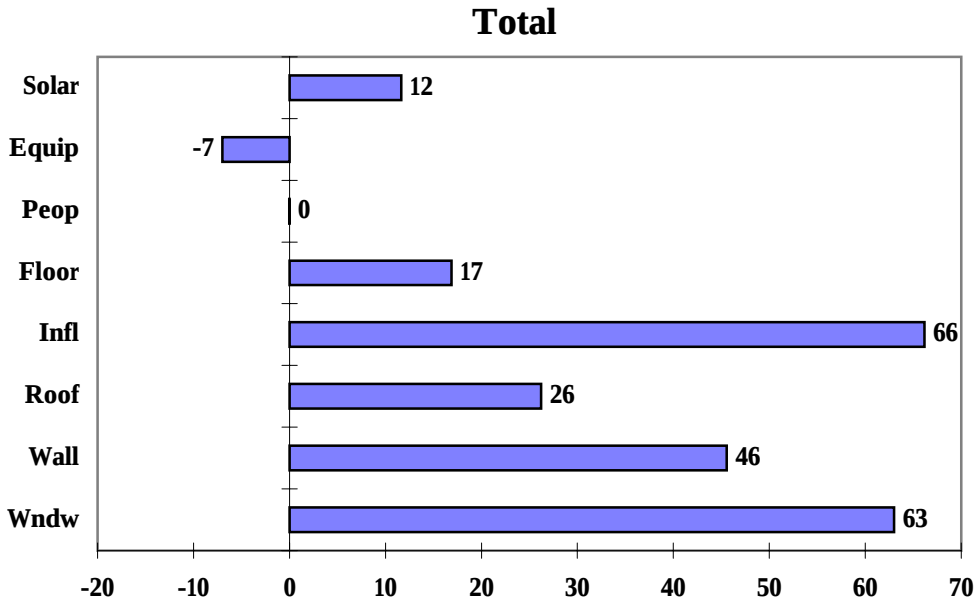
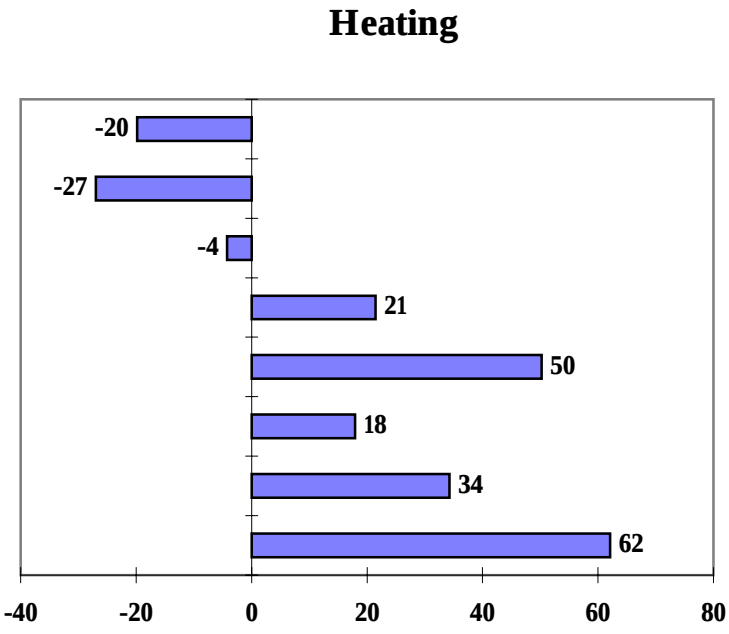



**Figure B-29. Aggregate Component Loads for Single-Family Attached and Mobile Home Buildings in South US (Trillion Btu's)**



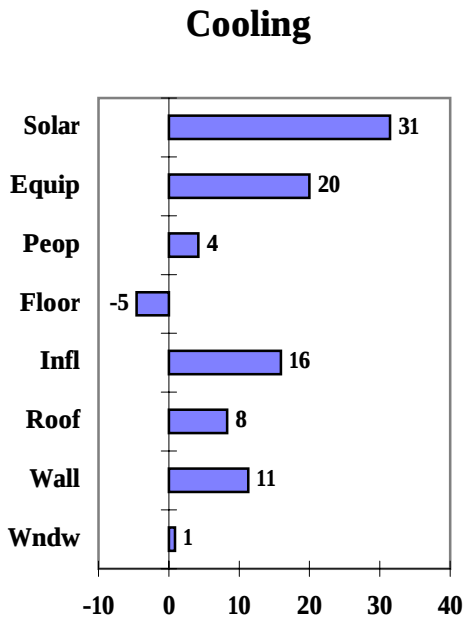
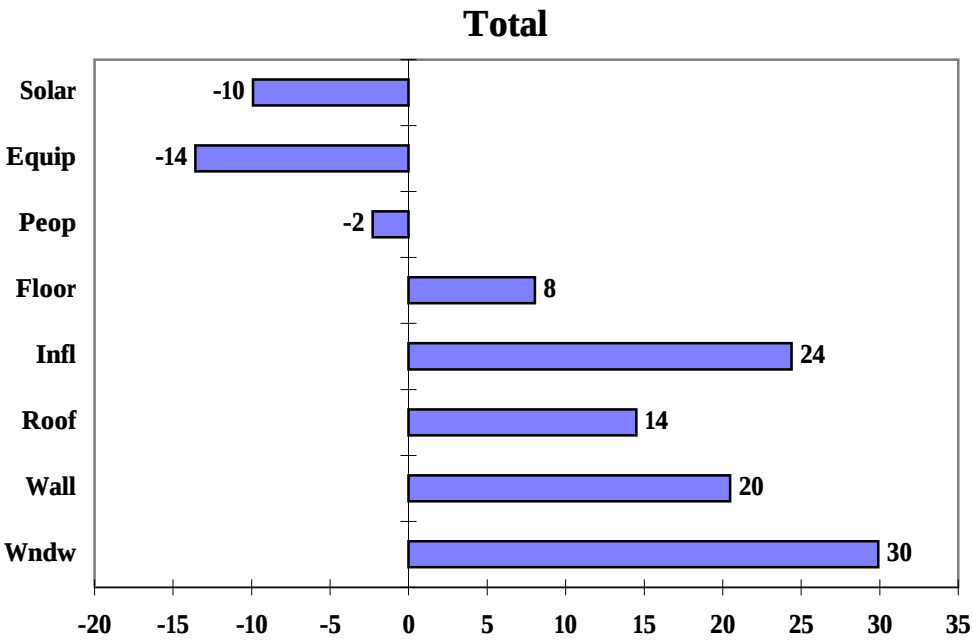
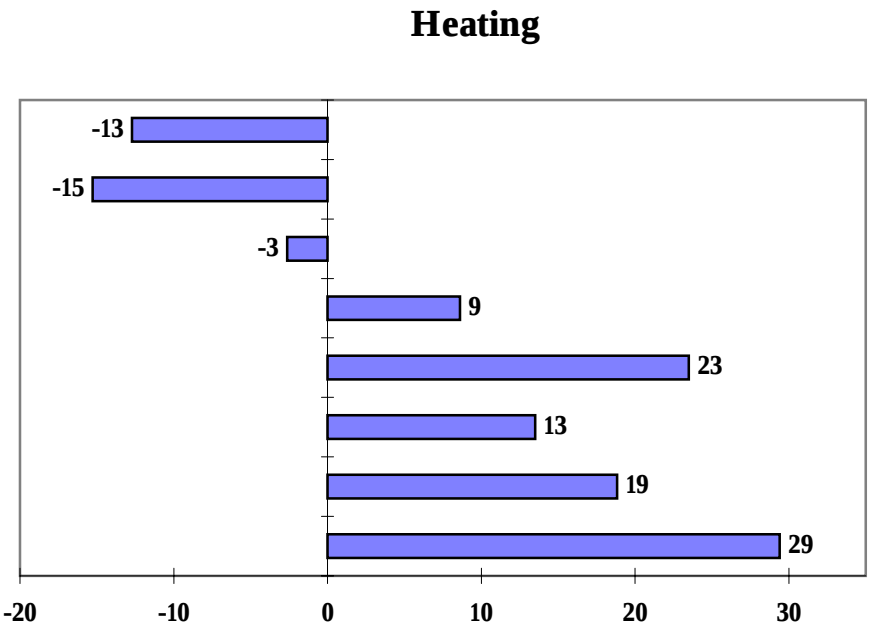
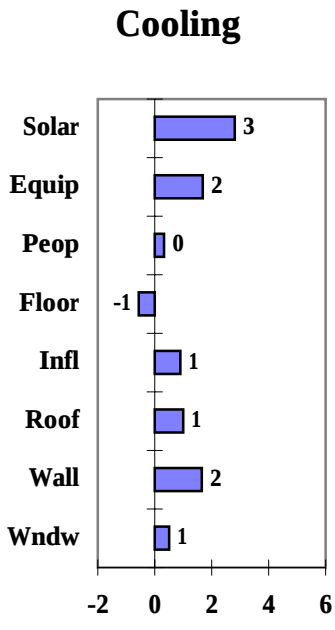



**Figure B-30. Aggregate Component Loads for Single-Family Attached and Mobile Home Buildings in West US (Trillion Btu's)**



# APPENDIX C: COMPONENT LOADS DATA TABLES

| | | | | | Aggregated Heating Component Loads (Trillion Btus) | | | | | | | | | Aggregated Cooling Component Loads (Trillion Btus) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Reg | Loc | YearMade | Number of Bldgs (thous.) | roof | wall | wndw solar | wndw cond. | infilt | peop | equip. | ground | total | roof | wall | wndw solar | wndw cond. | infilt | peop | equip. | ground | total |
| Mobile Home | 1 | 1 | Before 1950 | 13.2 | -0.07 | -0.17 | 0.06 | -0.13 | -0.25 | 0.01 | 0.08 | -0.13 | -0.60 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mobile Home | 1 | 1 | 1950-1979 | 126.5 | -0.44 | -1.85 | 0.71 | -2.80 | -2.90 | 0.14 | 0.96 | -1.86 | -8.04 | 0.03 | 0.06 | 0.27 | -0.01 | 0.07 | 0.01 | 0.08 | -0.06 | 0.46 |
| Mobile Home | 1 | 1 | 1980-1989 | 82.3 | -0.23 | -0.70 | 0.31 | -1.18 | -1.47 | 0.09 | 0.64 | -1.27 | -3.81 | 0.00 | 0.01 | 0.03 | 0.00 | 0.01 | 0.00 | 0.01 | -0.01 | 0.05 |
| Mobile Home | 1 | 1 | After 1989 | 3.3 | -0.01 | -0.03 | 0.00 | -0.04 | -0.06 | 0.00 | 0.02 | -0.02 | -0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mobile Home | 1 | 2 | Before 1950 | 11.1 | -0.07 | -0.12 | 0.04 | -0.10 | -0.19 | 0.01 | 0.06 | -0.09 | -0.45 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mobile Home | 1 | 2 | 1950-1979 | 97.7 | -0.47 | -1.21 | 0.39 | -1.67 | -1.85 | 0.10 | 0.65 | -1.07 | -5.13 | 0.03 | 0.04 | 0.13 | 0.00 | 0.04 | 0.01 | 0.05 | -0.03 | 0.28 |
| Mobile Home | 1 | 2 | 1980-1989 | 179.5 | -0.45 | -1.34 | 0.45 | -2.06 | -2.91 | 0.17 | 1.22 | -0.97 | -5.87 | 0.04 | 0.06 | 0.24 | 0.00 | 0.09 | 0.03 | 0.16 | -0.05 | 0.56 |
| Mobile Home | 1 | 2 | After 1989 | 28.9 | -0.07 | -0.20 | 0.00 | -0.32 | -0.45 | 0.03 | 0.19 | -0.16 | -0.99 | 0.01 | 0.01 | 0.05 | 0.00 | 0.02 | 0.01 | 0.03 | -0.01 | 0.12 |
| Mobile Home | 2 | 3 | 1950-1979 | 203.2 | -1.10 | -1.50 | 0.54 | -2.77 | -2.72 | 0.21 | 1.23 | -2.94 | -9.05 | 0.11 | 0.05 | 0.26 | 0.01 | 0.09 | 0.03 | 0.15 | -0.14 | 0.56 |
| Mobile Home | 2 | 3 | 1980-1989 | 114.8 | -0.31 | -1.15 | 0.47 | -1.80 | -2.07 | 0.12 | 0.85 | -1.87 | -5.76 | 0.02 | 0.04 | 0.13 | 0.03 | 0.04 | 0.01 | 0.07 | -0.06 | 0.28 |
| Mobile Home | 2 | 4 | 1950-1979 | 297.8 | -1.55 | -2.12 | 0.77 | -3.92 | -3.85 | 0.29 | 1.74 | -4.16 | -12.80 | 0.25 | 0.11 | 0.59 | 0.03 | 0.20 | 0.07 | 0.35 | -0.32 | 1.29 |
| Mobile Home | 2 | 4 | 1980-1989 | 293.6 | -0.77 | -2.84 | 1.16 | -4.44 | -5.11 | 0.30 | 2.09 | -4.63 | -14.24 | 0.10 | 0.18 | 0.62 | 0.13 | 0.21 | 0.06 | 0.34 | -0.27 | 1.36 |
| Mobile Home | 2 | 4 | After 1989 | 36.0 | -0.10 | -0.32 | 0.01 | -0.52 | -0.61 | 0.04 | 0.24 | -0.25 | -1.51 | 0.02 | 0.03 | 0.10 | 0.01 | 0.03 | 0.01 | 0.05 | -0.02 | 0.23 |
| Mobile Home | 2 | 5 | Before 1950 | 19.7 | -0.21 | -0.36 | 0.11 | -0.31 | -0.52 | 0.02 | 0.14 | -0.30 | -1.44 | 0.02 | 0.02 | 0.06 | 0.00 | 0.02 | 0.00 | 0.03 | -0.02 | 0.14 |
| Mobile Home | 2 | 5 | 1950-1979 | 100.4 | -0.55 | -0.92 | 0.19 | -1.39 | -1.34 | 0.11 | 0.64 | -1.60 | -4.86 | 0.06 | 0.05 | 0.18 | 0.01 | 0.06 | 0.02 | 0.11 | -0.10 | 0.39 |
| Mobile Home | 2 | 5 | 1980-1989 | 55.5 | -0.20 | -0.55 | 0.20 | -0.95 | -1.22 | 0.06 | 0.45 | -0.83 | -3.03 | 0.02 | 0.03 | 0.11 | 0.00 | 0.04 | 0.01 | 0.07 | -0.08 | 0.20 |
| Mobile Home | 2 | 6 | Before 1950 | 19.7 | -0.13 | -0.22 | 0.10 | -0.20 | -0.30 | 0.02 | 0.11 | -0.16 | -0.79 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mobile Home | 2 | 6 | 1950-1979 | 144.4 | -0.49 | -0.81 | 0.33 | -1.24 | -1.10 | 0.13 | 0.71 | -1.20 | -3.67 | 0.19 | 0.14 | 0.49 | 0.04 | 0.24 | 0.08 | 0.35 | -0.11 | 1.42 |
| Mobile Home | 2 | 6 | 1980-1989 | 89.5 | -0.22 | -0.77 | 0.40 | -1.11 | -1.15 | 0.08 | 0.57 | -1.02 | -3.22 | 0.08 | 0.15 | 0.50 | 0.03 | 0.24 | 0.06 | 0.27 | -0.04 | 1.29 |
| Mobile Home | 2 | 6 | After 1989 | 39.6 | -0.10 | -0.25 | 0.05 | -0.44 | -0.46 | 0.03 | 0.22 | -0.19 | -1.14 | 0.04 | 0.05 | 0.22 | 0.02 | 0.10 | 0.02 | 0.11 | -0.02 | 0.54 |
| Mobile Home | 3 | 7 | Before 1950 | 45.6 | -0.30 | -0.51 | 0.24 | -0.62 | -0.59 | 0.04 | 0.24 | -0.34 | -1.84 | 0.03 | 0.02 | 0.05 | 0.00 | 0.02 | 0.01 | 0.02 | -0.01 | 0.14 |
| Mobile Home | 3 | 7 | 1950-1979 | 341.3 | -1.50 | -4.02 | 2.17 | -7.10 | -4.42 | 0.30 | 1.95 | -3.14 | -15.77 | 0.57 | 0.70 | 2.07 | 0.07 | 0.58 | 0.14 | 0.75 | -0.29 | 4.58 |
| Mobile Home | 3 | 7 | 1980-1989 | 280.3 | -0.60 | -1.95 | 0.99 | -3.15 | -3.11 | 0.26 | 1.72 | -1.31 | -7.17 | 0.15 | 0.22 | 0.89 | -0.03 | 0.25 | 0.11 | 0.54 | -0.11 | 2.02 |
| Mobile Home | 3 | 7 | After 1989 | 154.7 | -0.34 | -0.95 | 0.14 | -1.67 | -1.77 | 0.15 | 0.89 | -0.74 | -4.28 | 0.12 | 0.16 | 0.62 | 0.01 | 0.18 | 0.07 | 0.34 | -0.09 | 1.42 |
| Mobile Home | 3 | 8 | 1950-1979 | 223.1 | -1.28 | -1.24 | 0.69 | -2.78 | -1.92 | 0.16 | 0.90 | -0.10 | -5.57 | 0.44 | 0.16 | 0.72 | -0.02 | 0.35 | 0.09 | 0.44 | 0.01 | 2.19 |
| Mobile Home | 3 | 8 | 1980-1989 | 134.3 | -0.21 | -0.70 | 0.37 | -0.90 | -0.95 | 0.09 | 0.59 | -0.35 | -2.06 | 0.11 | 0.16 | 0.58 | -0.04 | 0.19 | 0.06 | 0.37 | -0.05 | 1.39 |
| Mobile Home | 3 | 8 | After 1989 | 25.8 | -0.05 | -0.12 | 0.09 | -0.18 | -0.21 | 0.02 | 0.12 | -0.08 | -0.41 | 0.03 | 0.03 | 0.13 | -0.01 | 0.04 | 0.01 | 0.07 | -0.01 | 0.29 |
| Mobile Home | 3 | 9 | 1950-1979 | 156.2 | -0.06 | -0.04 | 0.03 | -0.08 | -0.05 | 0.01 | 0.05 | 0.01 | -0.13 | 0.34 | 0.19 | 0.73 | 0.04 | 0.60 | 0.13 | 0.60 | 0.12 | 2.75 |
| Mobile Home | 3 | 9 | 1980-1989 | 68.9 | -0.01 | -0.02 | 0.01 | -0.03 | -0.02 | 0.00 | 0.03 | 0.00 | -0.04 | 0.14 | 0.11 | 0.45 | -0.02 | 0.31 | 0.09 | 0.44 | -0.04 | 1.48 |
| Mobile Home | 3 | 9 | After 1989 | 10.7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.01 | 0.09 | 0.00 | 0.06 | 0.02 | 0.07 | -0.01 | 0.28 |
| Mobile Home | 3 | 10 | Before 1950 | 22.5 | -0.18 | -0.12 | 0.05 | -0.17 | -0.18 | 0.01 | 0.08 | -0.01 | -0.52 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mobile Home | 3 | 10 | 1950-1979 | 250.0 | -1.52 | -1.47 | 0.82 | -3.29 | -2.28 | 0.19 | 1.06 | -0.11 | -6.59 | 0.53 | 0.19 | 0.86 | -0.02 | 0.41 | 0.11 | 0.53 | 0.01 | 2.62 |
| Mobile Home | 3 | 10 | 1980-1989 | 239.8 | -0.40 | -1.32 | 0.70 | -1.70 | -1.79 | 0.16 | 1.12 | -0.66 | -3.88 | 0.19 | 0.27 | 0.96 | -0.06 | 0.32 | 0.11 | 0.61 | -0.09 | 2.31 |
| Mobile Home | 3 | 10 | After 1989 | 96.6 | -0.18 | -0.43 | 0.32 | -0.67 | -0.80 | 0.07 | 0.43 | -0.29 | -1.55 | 0.10 | 0.10 | 0.48 | -0.04 | 0.15 | 0.05 | 0.27 | -0.04 | 1.08 |
| Mobile Home | 3 | 11 | 1950-1979 | 26.7 | -0.05 | -0.06 | 0.06 | -0.15 | -0.09 | 0.01 | 0.07 | -0.03 | -0.22 | 0.07 | 0.04 | 0.20 | -0.01 | 0.11 | 0.03 | 0.13 | -0.06 | 0.50 |
| Mobile Home | 3 | 11 | 1980-1989 | 44.4 | -0.08 | -0.07 | 0.08 | -0.20 | -0.14 | 0.02 | 0.14 | -0.06 | -0.30 | 0.08 | 0.03 | 0.15 | 0.00 | 0.10 | 0.03 | 0.14 | -0.06 | 0.47 |
| Mobile Home | 3 | 11 | After 1989 | 4.1 | -0.01 | -0.01 | 0.01 | -0.02 | -0.01 | 0.00 | 0.01 | 0.00 | -0.03 | 0.01 | 0.00 | 0.02 | 0.00 | 0.01 | 0.00 | 0.02 | -0.01 | 0.06 |
| Mobile Home | 3 | 12 | Before 1950 | 19.6 | -0.13 | -0.08 | 0.05 | -0.11 | -0.12 | 0.01 | 0.06 | -0.04 | -0.36 | 0.12 | 0.04 | 0.09 | 0.01 | 0.10 | 0.02 | 0.07 | -0.02 | 0.41 |
| Mobile Home | 3 | 12 | 1950-1979 | 38.6 | -0.11 | -0.13 | 0.14 | -0.35 | -0.23 | 0.02 | 0.14 | -0.11 | -0.61 | 0.11 | 0.06 | 0.25 | 0.04 | 0.18 | 0.04 | 0.15 | -0.06 | 0.77 |
| Mobile Home | 3 | 12 | 1980-1989 | 298.7 | -0.56 | -0.76 | 0.86 | -2.12 | -1.61 | 0.18 | 1.18 | -0.66 | -3.49 | 0.55 | 0.38 | 1.43 | 0.30 | 1.11 | 0.25 | 1.12 | -0.50 | 4.65 |
| Mobile Home | 3 | 12 | After 1989 | 25.9 | -0.05 | -0.05 | 0.09 | -0.20 | -0.16 | 0.02 | 0.10 | -0.07 | -0.33 | 0.05 | 0.03 | 0.13 | 0.03 | 0.11 | 0.02 | 0.09 | -0.05 | 0.42 |

| | | | | | Aggregated Heating Component Loads (Trillion Btus) | | | | | | | | | Aggregated Cooling Component Loads (Trillion Btus) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Reg | Loc | YearMade | Number of Bldgs (thous.) | roof | wall | wndw solar | wndw cond. | infilt | peop | equip. | ground | total | roof | wall | wndw solar | wndw cond. | infilt | peop | equip. | ground | total |
| Mobile Home | 3 | 13 | 1950-1979 | 39.3 | -0.08 | -0.08 | 0.09 | -0.22 | -0.13 | 0.02 | 0.11 | -0.04 | -0.33 | 0.10 | 0.05 | 0.29 | -0.02 | 0.17 | 0.04 | 0.19 | -0.09 | 0.74 |
| Mobile Home | 3 | 13 | 1980-1989 | 40.6 | -0.07 | -0.06 | 0.08 | -0.18 | -0.13 | 0.02 | 0.13 | -0.05 | -0.27 | 0.11 | 0.04 | 0.22 | 0.00 | 0.14 | 0.04 | 0.19 | -0.08 | 0.67 |
| Mobile Home | 3 | 13 | After 1989 | 19.6 | -0.03 | -0.03 | 0.04 | -0.09 | -0.07 | 0.01 | 0.06 | -0.02 | -0.13 | 0.04 | 0.02 | 0.11 | 0.00 | 0.07 | 0.02 | 0.08 | -0.04 | 0.30 |
| Mobile Home | 4 | 14 | 1950-1979 | 90.8 | -0.49 | -0.56 | 0.46 | -1.21 | -0.70 | 0.09 | 0.47 | -0.51 | -2.45 | 0.02 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | 0.02 | -0.01 | 0.07 |
| Mobile Home | 4 | 14 | 1980-1989 | 29.9 | -0.08 | -0.25 | 0.21 | -0.40 | -0.33 | 0.03 | 0.19 | -0.23 | -0.86 | 0.01 | 0.02 | 0.06 | 0.00 | 0.00 | 0.00 | 0.02 | -0.01 | 0.10 |
| Mobile Home | 4 | 14 | After 1989 | 3.6 | -0.01 | -0.03 | 0.01 | -0.04 | -0.04 | 0.00 | 0.02 | -0.02 | -0.10 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 |
| Mobile Home | 4 | 15 | 1950-1979 | 135.5 | -0.73 | -0.83 | 0.69 | -1.81 | -1.05 | 0.13 | 0.70 | -0.76 | -3.65 | 0.05 | 0.01 | 0.08 | 0.01 | 0.01 | 0.01 | 0.04 | -0.03 | 0.16 |
| Mobile Home | 4 | 15 | 1980-1989 | 28.0 | -0.07 | -0.23 | 0.20 | -0.37 | -0.31 | 0.03 | 0.18 | -0.22 | -0.80 | 0.01 | 0.01 | 0.03 | 0.00 | 0.00 | 0.00 | 0.01 | -0.01 | 0.05 |
| Mobile Home | 4 | 16 | 1950-1979 | 65.3 | -0.26 | -0.28 | 0.30 | -0.62 | -0.35 | 0.05 | 0.28 | -0.23 | -1.11 | 0.04 | 0.01 | 0.05 | 0.00 | 0.01 | 0.01 | 0.03 | -0.02 | 0.12 |
| Mobile Home | 4 | 16 | 1980-1989 | 103.5 | -0.30 | -0.39 | 0.39 | -0.67 | -0.67 | 0.08 | 0.54 | -0.44 | -1.46 | 0.08 | 0.04 | 0.13 | 0.02 | 0.02 | 0.02 | 0.10 | -0.08 | 0.32 |
| Mobile Home | 4 | 16 | After 1989 | 69.2 | -0.21 | -0.25 | 0.17 | -0.45 | -0.49 | 0.06 | 0.34 | -0.32 | -1.14 | 0.07 | 0.03 | 0.11 | 0.02 | 0.02 | 0.01 | 0.07 | -0.08 | 0.25 |
| Mobile Home | 4 | 17 | 1950-1979 | 93.8 | -0.14 | -0.11 | 0.15 | -0.25 | -0.14 | 0.03 | 0.17 | -0.06 | -0.36 | 0.26 | 0.16 | 0.39 | 0.14 | 0.20 | 0.06 | 0.25 | -0.05 | 1.40 |
| Mobile Home | 4 | 17 | 1980-1989 | 13.9 | -0.02 | -0.02 | 0.02 | -0.03 | -0.02 | 0.00 | 0.03 | -0.01 | -0.04 | 0.05 | 0.03 | 0.07 | 0.02 | 0.05 | 0.01 | 0.06 | -0.01 | 0.29 |
| Mobile Home | 4 | 17 | After 1989 | 21.5 | -0.03 | -0.02 | 0.03 | -0.04 | -0.04 | 0.01 | 0.04 | -0.02 | -0.07 | 0.08 | 0.05 | 0.12 | 0.04 | 0.09 | 0.02 | 0.08 | -0.02 | 0.44 |
| Mobile Home | 4 | 18 | 1950-1979 | 251.2 | -1.79 | -2.78 | 0.60 | -3.90 | -3.67 | 0.32 | 1.81 | -0.56 | -9.97 | 0.02 | 0.01 | 0.03 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.07 |
| Mobile Home | 4 | 18 | 1980-1989 | 55.9 | -0.14 | -0.52 | 0.23 | -1.03 | -0.71 | 0.06 | 0.42 | -0.03 | -1.70 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| Mobile Home | 4 | 19 | 1980-1989 | 9.0 | -0.02 | -0.06 | 0.09 | -0.09 | -0.07 | 0.01 | 0.06 | -0.05 | -0.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mobile Home | 4 | 19 | After 1989 | 4.8 | -0.01 | -0.02 | 0.05 | -0.05 | -0.04 | 0.00 | 0.03 | -0.02 | -0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mobile Home | 4 | 20 | 1980-1989 | 21.1 | -0.02 | -0.08 | 0.11 | -0.10 | -0.07 | 0.01 | 0.08 | -0.04 | -0.11 | 0.01 | 0.01 | 0.03 | 0.00 | -0.01 | 0.00 | 0.01 | -0.01 | 0.04 |
| Single-Family Det | 1 | 1 | Before 1950 | 1217.5 | -9.77 | -23.26 | 7.65 | -18.30 | -34.15 | 1.82 | 10.71 | -17.60 | -82.91 | 0.66 | 0.75 | 2.04 | -0.10 | 0.69 | 0.15 | 0.91 | -0.50 | 4.60 |
| Single-Family Det | 1 | 1 | 1950-1979 | 1031.1 | -4.97 | -20.92 | 8.04 | -31.59 | -32.72 | 1.60 | 10.80 | -20.99 | -90.75 | 0.31 | 0.66 | 2.80 | -0.07 | 0.69 | 0.12 | 0.85 | -0.63 | 4.73 |
| Single-Family Det | 1 | 1 | 1980-1989 | 326.0 | -1.27 | -3.80 | 1.69 | -6.36 | -7.95 | 0.51 | 3.44 | -6.87 | -20.62 | 0.11 | 0.14 | 0.59 | 0.01 | 0.18 | 0.06 | 0.31 | -0.24 | 1.15 |
| Single-Family Det | 1 | 1 | After 1989 | 135.2 | -0.52 | -1.39 | 0.04 | -2.41 | -3.04 | 0.21 | 1.28 | -1.21 | -7.05 | 0.04 | 0.05 | 0.25 | 0.01 | 0.07 | 0.02 | 0.12 | -0.05 | 0.51 |
| Single-Family Det | 1 | 2 | Before 1950 | 2360.9 | -21.13 | -38.14 | 12.34 | -30.28 | -59.96 | 3.11 | 19.02 | -27.65 | -142.69 | 2.24 | 2.04 | 4.56 | -0.29 | 1.98 | 0.50 | 2.69 | -1.08 | 12.63 |
| Single-Family Det | 1 | 2 | 1950-1979 | 3477.5 | -23.74 | -61.31 | 19.83 | -85.15 | -94.00 | 4.90 | 32.94 | -54.30 | -260.82 | 3.63 | 4.77 | 15.24 | 0.06 | 4.75 | 1.09 | 6.15 | -3.31 | 32.39 |
| Single-Family Det | 1 | 2 | 1980-1989 | 788.8 | -2.95 | -8.76 | 2.95 | -13.47 | -19.04 | 1.13 | 8.00 | -6.36 | -38.49 | 0.42 | 0.61 | 2.31 | -0.03 | 0.86 | 0.25 | 1.56 | -0.48 | 5.48 |
| Single-Family Det | 1 | 2 | After 1989 | 212.6 | -0.77 | -2.05 | 0.00 | -3.34 | -4.78 | 0.30 | 1.96 | -1.71 | -10.38 | 0.09 | 0.12 | 0.41 | 0.03 | 0.16 | 0.04 | 0.26 | -0.09 | 1.00 |
| Single-Family Det | 2 | 3 | Before 1950 | 961.6 | -10.76 | -21.41 | 7.23 | -17.71 | -30.31 | 1.47 | 8.86 | -16.49 | -79.10 | 1.23 | 1.22 | 2.90 | -0.16 | 1.14 | 0.23 | 1.39 | -0.77 | 7.18 |
| Single-Family Det | 2 | 3 | 1950-1979 | 1238.4 | -9.57 | -13.06 | 4.75 | -24.12 | -23.72 | 1.81 | 10.71 | -25.63 | -78.84 | 1.33 | 0.58 | 3.11 | 0.14 | 1.05 | 0.35 | 1.82 | -1.66 | 6.71 |
| Single-Family Det | 2 | 3 | 1980-1989 | 355.9 | -1.33 | -4.87 | 2.00 | -7.62 | -8.77 | 0.52 | 3.59 | -7.93 | -24.43 | 0.22 | 0.39 | 1.36 | 0.27 | 0.45 | 0.13 | 0.74 | -0.60 | 2.97 |
| Single-Family Det | 2 | 3 | After 1989 | 203.8 | -0.82 | -2.57 | 0.08 | -4.19 | -4.87 | 0.30 | 1.93 | -2.04 | -12.17 | 0.16 | 0.25 | 0.96 | 0.06 | 0.31 | 0.09 | 0.48 | -0.22 | 2.08 |
| Single-Family Det | 2 | 4 | Before 1950 | 3409.1 | -38.03 | -75.68 | 25.57 | -62.60 | -107.15 | 5.19 | 31.33 | -58.28 | -279.66 | 4.93 | 4.92 | 11.67 | -0.65 | 4.58 | 0.93 | 5.60 | -3.10 | 28.89 |
| Single-Family Det | 2 | 4 | 1950-1979 | 3757.0 | -29.69 | -40.50 | 14.71 | -74.78 | -73.54 | 5.61 | 33.21 | -79.47 | -244.44 | 5.10 | 2.22 | 11.90 | 0.52 | 4.03 | 1.35 | 6.96 | -6.37 | 25.71 |
| Single-Family Det | 2 | 4 | 1980-1989 | 591.8 | -2.30 | -8.44 | 3.46 | -13.21 | -15.20 | 0.90 | 6.21 | -13.75 | -42.34 | 0.41 | 0.72 | 2.51 | 0.51 | 0.83 | 0.24 | 1.38 | -1.11 | 5.49 |
| Single-Family Det | 2 | 4 | After 1989 | 276.4 | -1.17 | -3.66 | 0.11 | -5.96 | -6.93 | 0.43 | 2.75 | -2.91 | -17.33 | 0.19 | 0.29 | 1.14 | 0.08 | 0.37 | 0.10 | 0.57 | -0.26 | 2.48 |
| Single-Family Det | 2 | 5 | Before 1950 | 1414.6 | -20.88 | -36.38 | 10.76 | -31.53 | -52.10 | 2.23 | 13.60 | -30.44 | -144.75 | 2.15 | 1.79 | 5.54 | -0.27 | 1.96 | 0.38 | 2.28 | -1.69 | 12.14 |
| Single-Family Det | 2 | 5 | 1950-1979 | 772.0 | -6.29 | -10.63 | 2.15 | -16.02 | -15.45 | 1.30 | 7.33 | -18.47 | -56.07 | 0.70 | 0.54 | 1.94 | 0.10 | 0.62 | 0.21 | 1.17 | -1.11 | 4.16 |
| Single-Family Det | 2 | 5 | 1980-1989 | 47.3 | -0.23 | -0.63 | 0.23 | -1.09 | -1.41 | 0.07 | 0.52 | -0.95 | -3.49 | 0.03 | 0.04 | 0.16 | 0.00 | 0.05 | 0.02 | 0.10 | -0.11 | 0.29 |
| Single-Family Det | 2 | 5 | After 1989 | 103.6 | -0.36 | -1.17 | -0.06 | -2.28 | -2.10 | 0.16 | 1.06 | -1.33 | -6.08 | 0.04 | 0.06 | 0.34 | 0.02 | 0.09 | 0.04 | 0.19 | -0.11 | 0.67 |
| Single-Family Det | 2 | 6 | Before 1950 | 1051.2 | -9.15 | -15.65 | 6.87 | -13.92 | -20.94 | 1.24 | 7.46 | -11.22 | -55.31 | 3.87 | 3.46 | 8.37 | -0.16 | 4.79 | 0.85 | 4.18 | -0.68 | 24.69 |
| Single-Family Det | 2 | 6 | 1950-1979 | 901.4 | -4.35 | -7.24 | 2.93 | -11.03 | -9.83 | 1.12 | 6.32 | -10.67 | -32.76 | 2.01 | 1.52 | 5.28 | 0.41 | 2.51 | 0.87 | 3.75 | -1.22 | 15.12 |

| | | | | | Aggregated Heating Component Loads (Trillion Btus) | | | | | | | | | Aggregated Cooling Component Loads (Trillion Btus) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Reg | Loc | YearMade | Number of Bldgs (thous.) | roof | wall | wndw solar | wndw cond. | infilt | peop | equip. | ground | total | roof | wall | wndw solar | wndw cond. | infilt | peop | equip. | ground | total |
| Single-Family Det | 2 | 6 | 1980-1989 | 350.6 | -1.22 | -4.36 | 2.23 | -6.24 | -6.50 | 0.46 | 3.20 | -5.73 | -18.17 | 0.54 | 0.98 | 3.25 | 0.19 | 1.52 | 0.36 | 1.75 | -0.26 | 8.32 |
| Single-Family Det | 2 | 6 | After 1989 | 196.6 | -0.64 | -1.67 | 0.32 | -2.93 | -3.07 | 0.23 | 1.47 | -1.25 | -7.55 | 0.33 | 0.44 | 1.79 | 0.18 | 0.79 | 0.18 | 0.87 | -0.13 | 4.46 |
| Single-Family Det | 3 | 7 | Before 1950 | 1655.3 | -15.36 | -26.12 | 12.24 | -32.18 | -30.52 | 2.08 | 12.39 | -17.46 | -94.94 | 5.27 | 3.75 | 9.38 | -0.41 | 3.80 | 0.95 | 3.94 | -1.37 | 25.30 |
| Single-Family Det | 3 | 7 | 1950-1979 | 3556.0 | -23.93 | -63.93 | 34.47 | -113.07 | -70.39 | 4.74 | 31.08 | -49.96 | -250.98 | 9.56 | 11.65 | 34.55 | 1.24 | 9.61 | 2.29 | 12.46 | -4.80 | 76.56 |
| Single-Family Det | 3 | 7 | 1980-1989 | 1058.5 | -3.29 | -10.65 | 5.42 | -17.25 | -17.03 | 1.41 | 9.38 | -7.18 | -39.19 | 1.31 | 1.90 | 7.74 | -0.28 | 2.14 | 0.93 | 4.69 | -0.94 | 17.49 |
| Single-Family Det | 3 | 7 | After 1989 | 551.5 | -1.75 | -4.90 | 0.72 | -8.61 | -9.15 | 0.76 | 4.63 | -3.84 | -22.14 | 0.72 | 0.94 | 3.77 | 0.07 | 1.11 | 0.44 | 2.08 | -0.55 | 8.58 |
| Single-Family Det | 3 | 8 | Before 1950 | 166.3 | -2.32 | -1.51 | 0.65 | -2.19 | -2.36 | 0.19 | 0.97 | -0.09 | -6.66 | 1.08 | 0.30 | 0.77 | -0.06 | 0.49 | 0.12 | 0.58 | 0.01 | 3.30 |
| Single-Family Det | 3 | 8 | 1950-1979 | 806.5 | -7.52 | -7.27 | 4.08 | -16.31 | -11.30 | 0.92 | 5.26 | -0.56 | -32.70 | 3.20 | 1.13 | 5.24 | -0.12 | 2.52 | 0.68 | 3.20 | 0.07 | 15.91 |
| Single-Family Det | 3 | 8 | 1980-1989 | 189.9 | -0.48 | -1.57 | 0.83 | -2.03 | -2.13 | 0.19 | 1.33 | -0.78 | -4.62 | 0.31 | 0.43 | 1.55 | -0.10 | 0.51 | 0.17 | 0.99 | -0.14 | 3.72 |
| Single-Family Det | 3 | 8 | After 1989 | 585.4 | -1.39 | -3.40 | 2.54 | -5.27 | -6.30 | 0.53 | 3.40 | -2.28 | -12.17 | 0.97 | 1.05 | 4.88 | -0.38 | 1.56 | 0.53 | 2.73 | -0.43 | 10.90 |
| Single-Family Det | 3 | 9 | Before 1950 | 114.1 | -0.18 | -0.11 | 0.04 | -0.11 | -0.11 | 0.02 | 0.11 | 0.02 | -0.31 | 1.52 | 0.47 | 1.31 | -0.09 | 1.52 | 0.22 | 1.39 | 0.24 | 6.59 |
| Single-Family Det | 3 | 9 | 1950-1979 | 924.1 | -0.85 | -0.58 | 0.41 | -1.18 | -0.74 | 0.15 | 0.77 | 0.17 | -1.86 | 6.38 | 3.61 | 13.58 | 0.78 | 11.13 | 2.46 | 11.23 | 2.16 | 51.32 |
| Single-Family Det | 3 | 9 | 1980-1989 | 803.8 | -0.21 | -0.30 | 0.23 | -0.57 | -0.38 | 0.08 | 0.47 | 0.03 | -0.64 | 3.41 | 2.50 | 10.81 | -0.42 | 7.40 | 2.17 | 10.35 | -1.05 | 35.16 |
| Single-Family Det | 3 | 9 | After 1989 | 185.7 | -0.05 | -0.04 | 0.06 | -0.13 | -0.09 | 0.02 | 0.09 | 0.01 | -0.13 | 0.82 | 0.41 | 2.68 | -0.11 | 1.74 | 0.49 | 2.16 | -0.19 | 8.01 |
| Single-Family Det | 3 | 10 | Before 1950 | 1110.1 | -15.32 | -9.94 | 4.29 | -14.43 | -15.54 | 1.22 | 6.39 | -0.59 | -43.91 | 7.10 | 1.97 | 5.07 | -0.42 | 3.19 | 0.81 | 3.83 | 0.07 | 21.62 |
| Single-Family Det | 3 | 10 | 1950-1979 | 2023.3 | -18.59 | -17.96 | 10.08 | -40.29 | -27.93 | 2.27 | 13.00 | -1.38 | -80.79 | 8.02 | 2.84 | 13.14 | -0.29 | 6.32 | 1.70 | 8.02 | 0.18 | 39.93 |
| Single-Family Det | 3 | 10 | 1980-1989 | 540.1 | -1.33 | -4.33 | 2.30 | -5.59 | -5.87 | 0.53 | 3.68 | -2.16 | -12.77 | 0.84 | 1.16 | 4.21 | -0.28 | 1.39 | 0.47 | 2.68 | -0.37 | 10.10 |
| Single-Family Det | 3 | 10 | After 1989 | 259.5 | -0.68 | -1.66 | 1.24 | -2.57 | -3.08 | 0.26 | 1.66 | -1.11 | -5.94 | 0.42 | 0.45 | 2.12 | -0.17 | 0.68 | 0.23 | 1.18 | -0.19 | 4.73 |
| Single-Family Det | 3 | 11 | Before 1950 | 62.9 | -0.48 | -0.28 | 0.15 | -0.37 | -0.37 | 0.05 | 0.26 | -0.07 | -1.10 | 0.64 | 0.17 | 0.46 | -0.04 | 0.44 | 0.09 | 0.41 | -0.15 | 2.02 |
| Single-Family Det | 3 | 11 | 1950-1979 | 380.6 | -1.14 | -1.20 | 1.28 | -3.15 | -1.91 | 0.26 | 1.58 | -0.55 | -4.83 | 1.67 | 0.88 | 4.64 | -0.25 | 2.69 | 0.63 | 3.04 | -1.39 | 11.91 |
| Single-Family Det | 3 | 11 | 1980-1989 | 104.9 | -0.29 | -0.24 | 0.31 | -0.72 | -0.50 | 0.07 | 0.50 | -0.21 | -1.08 | 0.46 | 0.19 | 0.93 | 0.00 | 0.62 | 0.19 | 0.82 | -0.34 | 2.87 |
| Single-Family Det | 3 | 11 | After 1989 | 23.8 | -0.05 | -0.05 | 0.08 | -0.17 | -0.13 | 0.02 | 0.10 | -0.04 | -0.23 | 0.08 | 0.04 | 0.22 | 0.01 | 0.14 | 0.04 | 0.16 | -0.08 | 0.61 |
| Single-Family Det | 3 | 12 | Before 1950 | 1449.4 | -14.04 | -8.64 | 5.20 | -12.34 | -13.65 | 1.31 | 7.06 | -4.62 | -39.71 | 12.53 | 4.03 | 9.15 | 0.56 | 10.10 | 1.92 | 7.39 | -2.38 | 43.28 |
| Single-Family Det | 3 | 12 | 1950-1979 | 3268.1 | -13.55 | -15.50 | 17.00 | -42.72 | -28.18 | 2.91 | 17.36 | -13.09 | -75.78 | 14.07 | 8.08 | 32.50 | 5.19 | 24.03 | 4.61 | 19.39 | -7.99 | 99.87 |
| Single-Family Det | 3 | 12 | 1980-1989 | 1424.8 | -3.91 | -5.36 | 6.05 | -14.89 | -11.29 | 1.28 | 8.28 | -4.65 | -24.49 | 4.40 | 3.10 | 11.54 | 2.40 | 8.94 | 2.05 | 9.01 | -3.99 | 37.45 |
| Single-Family Det | 3 | 12 | After 1989 | 427.5 | -1.27 | -1.32 | 2.11 | -4.83 | -3.84 | 0.40 | 2.31 | -1.58 | -8.02 | 1.45 | 0.79 | 3.65 | 0.83 | 2.88 | 0.59 | 2.39 | -1.29 | 11.28 |
| Single-Family Det | 3 | 13 | Before 1950 | 103.5 | -0.77 | -0.45 | 0.25 | -0.60 | -0.59 | 0.08 | 0.43 | -0.12 | -1.77 | 1.01 | 0.27 | 0.73 | -0.07 | 0.71 | 0.15 | 0.64 | -0.24 | 3.20 |
| Single-Family Det | 3 | 13 | 1950-1979 | 346.9 | -1.04 | -1.10 | 1.17 | -2.87 | -1.75 | 0.23 | 1.44 | -0.50 | -4.40 | 1.53 | 0.80 | 4.23 | -0.23 | 2.45 | 0.58 | 2.77 | -1.27 | 10.85 |
| Single-Family Det | 3 | 13 | 1980-1989 | 180.2 | -0.50 | -0.42 | 0.54 | -1.25 | -0.87 | 0.13 | 0.87 | -0.36 | -1.88 | 0.79 | 0.32 | 1.60 | 0.00 | 1.07 | 0.32 | 1.42 | -0.58 | 4.93 |
| Single-Family Det | 4 | 14 | Before 1950 | 383.6 | -5.36 | -4.42 | 3.06 | -6.65 | -5.69 | 0.63 | 3.18 | -6.56 | -21.82 | 0.41 | 0.15 | 0.32 | 0.00 | 0.04 | 0.02 | 0.18 | -0.15 | 0.97 |
| Single-Family Det | 4 | 14 | 1950-1979 | 586.3 | -4.79 | -5.47 | 4.56 | -11.93 | -6.92 | 0.86 | 4.65 | -5.00 | -24.07 | 0.24 | 0.05 | 0.39 | 0.04 | 0.05 | 0.03 | 0.21 | -0.18 | 0.83 |
| Single-Family Det | 4 | 14 | 1980-1989 | 142.7 | -0.57 | -1.81 | 1.54 | -2.92 | -2.44 | 0.22 | 1.42 | -1.69 | -6.24 | 0.02 | 0.02 | 0.08 | 0.00 | 0.01 | 0.00 | 0.03 | -0.02 | 0.14 |
| Single-Family Det | 4 | 14 | After 1989 | 94.1 | -0.39 | -1.07 | 0.58 | -1.83 | -1.55 | 0.15 | 0.88 | -0.90 | -4.12 | 0.01 | 0.02 | 0.07 | 0.01 | 0.01 | 0.00 | 0.02 | -0.01 | 0.13 |
| Single-Family Det | 4 | 15 | Before 1950 | 202.6 | -2.74 | -2.26 | 1.56 | -3.40 | -2.91 | 0.32 | 1.63 | -3.36 | -11.16 | 0.26 | 0.09 | 0.20 | 0.00 | 0.03 | 0.01 | 0.11 | -0.09 | 0.61 |
| Single-Family Det | 4 | 15 | 1950-1979 | 535.1 | -4.04 | -4.61 | 3.84 | -10.05 | -5.83 | 0.72 | 3.92 | -4.21 | -20.26 | 0.23 | 0.05 | 0.37 | 0.04 | 0.05 | 0.03 | 0.20 | -0.17 | 0.78 |
| Single-Family Det | 4 | 15 | 1980-1989 | 34.6 | -0.12 | -0.38 | 0.32 | -0.61 | -0.51 | 0.05 | 0.30 | -0.35 | -1.30 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.03 |
| Single-Family Det | 4 | 15 | After 1989 | 75.8 | -0.26 | -0.72 | 0.39 | -1.24 | -1.05 | 0.10 | 0.60 | -0.61 | -2.79 | 0.03 | 0.04 | 0.15 | 0.02 | 0.01 | 0.01 | 0.05 | -0.03 | 0.29 |
| Single-Family Det | 4 | 16 | Before 1950 | 70.4 | -0.77 | -0.61 | 0.50 | -0.91 | -0.74 | 0.10 | 0.49 | -0.81 | -2.74 | 0.12 | 0.04 | 0.09 | 0.00 | 0.01 | 0.01 | 0.06 | -0.02 | 0.30 |
| Single-Family Det | 4 | 16 | 1950-1979 | 335.5 | -1.96 | -2.13 | 2.26 | -4.73 | -2.67 | 0.39 | 2.10 | -1.72 | -8.47 | 0.36 | 0.10 | 0.53 | 0.03 | 0.05 | 0.06 | 0.31 | -0.20 | 1.24 |
| Single-Family Det | 4 | 16 | 1980-1989 | 74.3 | -0.30 | -0.39 | 0.39 | -0.67 | -0.67 | 0.08 | 0.54 | -0.44 | -1.46 | 0.08 | 0.04 | 0.13 | 0.01 | 0.02 | 0.02 | 0.10 | -0.08 | 0.31 |
| Single-Family Det | 4 | 16 | After 1989 | 28.5 | -0.12 | -0.14 | 0.10 | -0.26 | -0.28 | 0.03 | 0.20 | -0.19 | -0.66 | 0.05 | 0.02 | 0.08 | 0.02 | 0.02 | 0.01 | 0.05 | -0.06 | 0.19 |

| | | | | | Aggregated Heating Component Loads (Trillion Btus) | | | | | | | | | Aggregated Cooling Component Loads (Trillion Btus) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Reg | Loc | YearMade | Number of Bldgs (thous.) | roof | wall | wndw solar | wndw cond. | infilt | peop | equip. | ground | total | roof | wall | wndw solar | wndw cond. | infilt | peop | equip. | ground | total |
| Single-Family Det | 4 | 17 | Before 1950 | 115.3 | -0.53 | -0.37 | 0.24 | -0.44 | -0.34 | 0.08 | 0.37 | -0.30 | -1.28 | 0.39 | 0.18 | 0.31 | 0.07 | 0.22 | 0.06 | 0.23 | 0.06 | 1.52 |
| Single-Family Det | 4 | 17 | 1950-1979 | 482.8 | -1.16 | -0.89 | 1.18 | -2.03 | -1.17 | 0.26 | 1.37 | -0.51 | -2.95 | 2.24 | 1.36 | 3.34 | 1.20 | 1.72 | 0.52 | 2.18 | -0.47 | 12.10 |
| Single-Family Det | 4 | 17 | 1980-1989 | 100.3 | -0.16 | -0.17 | 0.17 | -0.25 | -0.25 | 0.05 | 0.30 | -0.13 | -0.43 | 0.56 | 0.40 | 0.84 | 0.30 | 0.61 | 0.16 | 0.72 | -0.09 | 3.49 |
| Single-Family Det | 4 | 18 | Before 1950 | 997.4 | -22.56 | -16.43 | 4.42 | -16.96 | -28.53 | 1.84 | 10.44 | -3.20 | -70.99 | 0.30 | 0.08 | 0.24 | -0.03 | 0.01 | 0.01 | 0.09 | -0.02 | 0.69 |
| Single-Family Det | 4 | 18 | 1950-1979 | 966.9 | -10.71 | -16.65 | 3.60 | -23.37 | -22.00 | 1.89 | 10.85 | -3.37 | -59.76 | 0.14 | 0.09 | 0.28 | -0.01 | 0.02 | 0.02 | 0.11 | -0.02 | 0.64 |
| Single-Family Det | 4 | 18 | 1980-1989 | 531.7 | -1.85 | -6.89 | 3.08 | -13.82 | -9.44 | 0.86 | 5.63 | -0.35 | -22.78 | 0.03 | 0.05 | 0.25 | -0.02 | 0.00 | 0.01 | 0.06 | 0.00 | 0.38 |
| Single-Family Det | 4 | 18 | After 1989 | 205.6 | -0.71 | -1.93 | -0.01 | -5.05 | -3.65 | 0.34 | 2.05 | -0.13 | -9.09 | 0.02 | 0.02 | 0.15 | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 | 0.23 |
| Single-Family Det | 4 | 19 | Before 1950 | 690.0 | -16.65 | -9.26 | 7.00 | -12.44 | -12.43 | 1.29 | 6.64 | -0.33 | -36.19 | 0.06 | 0.02 | 0.04 | -0.01 | 0.00 | 0.00 | 0.02 | 0.00 | 0.13 |
| Single-Family Det | 4 | 19 | 1950-1979 | 1642.4 | -15.86 | -25.39 | 15.69 | -30.44 | -19.28 | 2.67 | 14.02 | -0.55 | -59.14 | 0.21 | 0.18 | 0.36 | -0.02 | 0.00 | 0.02 | 0.14 | -0.02 | 0.86 |
| Single-Family Det | 4 | 19 | 1980-1989 | 482.2 | -1.30 | -4.73 | 6.65 | -6.69 | -4.85 | 0.67 | 4.31 | -3.99 | -9.93 | 0.03 | 0.04 | 0.16 | 0.00 | 0.01 | 0.01 | 0.05 | -0.04 | 0.26 |
| Single-Family Det | 4 | 19 | After 1989 | 75.9 | -0.20 | -0.49 | 1.05 | -0.95 | -0.77 | 0.09 | 0.56 | -0.50 | -1.20 | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.04 |
| Single-Family Det | 4 | 20 | Before 1950 | 592.0 | -7.57 | -3.92 | 2.91 | -4.67 | -4.01 | 0.69 | 3.53 | -0.20 | -13.25 | 0.67 | 0.16 | 0.47 | -0.12 | -0.12 | 0.02 | 0.18 | -0.01 | 1.25 |
| Single-Family Det | 4 | 20 | 1950-1979 | 1961.1 | -12.19 | -17.38 | 11.13 | -18.78 | -10.39 | 2.27 | 11.96 | -0.61 | -33.99 | 1.53 | 1.08 | 2.48 | -0.63 | -0.79 | 0.05 | 0.89 | -0.10 | 4.51 |
| Single-Family Det | 4 | 20 | 1980-1989 | 283.4 | -0.44 | -1.47 | 2.07 | -1.85 | -1.23 | 0.22 | 1.47 | -0.79 | -2.04 | 0.11 | 0.17 | 0.59 | -0.08 | -0.13 | 0.03 | 0.28 | -0.14 | 0.82 |
| Single-Family Det | 4 | 20 | After 1989 | 56.5 | -0.11 | -0.22 | 0.51 | -0.40 | -0.30 | 0.04 | 0.28 | -0.19 | -0.38 | 0.02 | 0.02 | 0.09 | -0.02 | -0.02 | 0.00 | 0.04 | -0.02 | 0.11 |
| Single-Family Att | 1 | 1 | Before 1950 | 112.1 | -0.95 | -2.27 | 0.75 | -1.79 | -3.34 | 0.18 | 1.05 | -1.72 | -8.10 | 0.06 | 0.07 | 0.18 | -0.01 | 0.06 | 0.01 | 0.08 | -0.04 | 0.41 |
| Single-Family Att | 1 | 1 | 1950-1979 | 139.8 | -0.65 | -2.75 | 1.06 | -4.15 | -4.29 | 0.21 | 1.42 | -2.76 | -11.91 | 0.02 | 0.05 | 0.22 | -0.01 | 0.05 | 0.01 | 0.07 | -0.05 | 0.36 |
| Single-Family Att | 1 | 1 | 1980-1989 | 105.1 | -0.37 | -1.10 | 0.49 | -1.84 | -2.30 | 0.15 | 1.00 | -1.99 | -5.96 | 0.05 | 0.06 | 0.26 | 0.01 | 0.08 | 0.02 | 0.14 | -0.10 | 0.51 |
| Single-Family Att | 1 | 1 | After 1989 | 28.0 | -0.11 | -0.28 | 0.01 | -0.49 | -0.62 | 0.04 | 0.26 | -0.25 | -1.43 | 0.01 | 0.01 | 0.05 | 0.00 | 0.02 | 0.00 | 0.03 | -0.01 | 0.11 |
| Single-Family Att | 1 | 2 | Before 1950 | 962.0 | -8.65 | -15.62 | 5.05 | -12.40 | -24.56 | 1.27 | 7.79 | -11.32 | -58.44 | 1.16 | 1.06 | 2.37 | -0.15 | 1.03 | 0.26 | 1.40 | -0.56 | 6.56 |
| Single-Family Att | 1 | 2 | 1950-1979 | 699.4 | -4.45 | -11.50 | 3.72 | -15.96 | -17.62 | 0.92 | 6.18 | -10.18 | -48.90 | 0.72 | 0.95 | 3.03 | 0.01 | 0.94 | 0.22 | 1.22 | -0.66 | 6.44 |
| Single-Family Att | 1 | 2 | 1980-1989 | 166.6 | -0.57 | -1.70 | 0.57 | -2.61 | -3.69 | 0.22 | 1.55 | -1.23 | -7.45 | 0.09 | 0.13 | 0.50 | -0.01 | 0.19 | 0.05 | 0.34 | -0.10 | 1.20 |
| Single-Family Att | 1 | 2 | After 1989 | 145.5 | -0.45 | -1.21 | 0.00 | -1.96 | -2.81 | 0.18 | 1.15 | -1.00 | -6.10 | 0.09 | 0.11 | 0.40 | 0.03 | 0.16 | 0.04 | 0.25 | -0.09 | 0.98 |
| Single-Family Att | 2 | 3 | Before 1950 | 43.6 | -0.50 | -0.99 | 0.34 | -0.82 | -1.41 | 0.07 | 0.41 | -0.76 | -3.67 | 0.05 | 0.05 | 0.12 | -0.01 | 0.05 | 0.01 | 0.06 | -0.03 | 0.30 |
| Single-Family Att | 2 | 3 | 1950-1979 | 34.0 | -0.24 | -0.33 | 0.12 | -0.61 | -0.60 | 0.05 | 0.27 | -0.64 | -1.98 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Single-Family Att | 2 | 3 | 1980-1989 | 22.6 | -0.09 | -0.34 | 0.14 | -0.53 | -0.61 | 0.04 | 0.25 | -0.55 | -1.70 | 0.02 | 0.03 | 0.09 | 0.02 | 0.03 | 0.01 | 0.05 | -0.04 | 0.20 |
| Single-Family Att | 2 | 3 | After 1989 | 14.9 | -0.06 | -0.20 | 0.01 | -0.32 | -0.37 | 0.02 | 0.15 | -0.16 | -0.94 | 0.01 | 0.01 | 0.05 | 0.00 | 0.02 | 0.00 | 0.02 | -0.01 | 0.10 |
| Single-Family Att | 2 | 4 | Before 1950 | 196.5 | -1.86 | -3.70 | 1.25 | -3.06 | -5.24 | 0.25 | 1.53 | -2.85 | -13.68 | 0.25 | 0.25 | 0.58 | -0.03 | 0.23 | 0.05 | 0.28 | -0.15 | 1.44 |
| Single-Family Att | 2 | 4 | 1950-1979 | 181.2 | -1.47 | -2.01 | 0.73 | -3.70 | -3.64 | 0.28 | 1.64 | -3.94 | -12.10 | 0.28 | 0.12 | 0.65 | 0.03 | 0.22 | 0.07 | 0.38 | -0.35 | 1.41 |
| Single-Family Att | 2 | 4 | 1980-1989 | 71.1 | -0.28 | -1.02 | 0.42 | -1.59 | -1.83 | 0.11 | 0.75 | -1.65 | -5.09 | 0.05 | 0.08 | 0.29 | 0.06 | 0.10 | 0.03 | 0.16 | -0.13 | 0.64 |
| Single-Family Att | 2 | 4 | After 1989 | 38.7 | -0.15 | -0.46 | 0.01 | -0.76 | -0.88 | 0.05 | 0.35 | -0.37 | -2.20 | 0.03 | 0.04 | 0.17 | 0.01 | 0.05 | 0.01 | 0.08 | -0.04 | 0.36 |
| Single-Family Att | 2 | 5 | Before 1950 | 25.1 | -0.40 | -0.69 | 0.20 | -0.60 | -0.99 | 0.04 | 0.26 | -0.58 | -2.76 | 0.01 | 0.01 | 0.04 | 0.00 | 0.01 | 0.00 | 0.02 | -0.01 | 0.08 |
| Single-Family Att | 2 | 5 | 1950-1979 | 22.6 | -0.19 | -0.31 | 0.06 | -0.47 | -0.46 | 0.04 | 0.22 | -0.55 | -1.66 | 0.02 | 0.02 | 0.06 | 0.00 | 0.02 | 0.01 | 0.04 | -0.03 | 0.13 |
| Single-Family Att | 2 | 5 | 1980-1989 | 60.6 | -0.33 | -0.90 | 0.33 | -1.56 | -2.00 | 0.10 | 0.74 | -1.35 | -4.96 | 0.03 | 0.04 | 0.18 | 0.00 | 0.06 | 0.02 | 0.11 | -0.12 | 0.33 |
| Single-Family Att | 2 | 5 | After 1989 | 12.9 | -0.04 | -0.12 | -0.01 | -0.24 | -0.22 | 0.02 | 0.11 | -0.14 | -0.64 | 0.00 | 0.01 | 0.04 | 0.00 | 0.01 | 0.00 | 0.02 | -0.01 | 0.07 |
| Single-Family Att | 2 | 6 | Before 1950 | 37.2 | -0.28 | -0.47 | 0.21 | -0.42 | -0.63 | 0.04 | 0.23 | -0.34 | -1.68 | 0.15 | 0.14 | 0.33 | -0.01 | 0.19 | 0.03 | 0.16 | -0.03 | 0.97 |
| Single-Family Att | 2 | 6 | 1950-1979 | 53.8 | -0.22 | -0.36 | 0.15 | -0.55 | -0.49 | 0.06 | 0.32 | -0.53 | -1.64 | 0.11 | 0.09 | 0.30 | 0.02 | 0.14 | 0.05 | 0.21 | -0.07 | 0.85 |
| Single-Family Att | 2 | 6 | 1980-1989 | 51.3 | -0.16 | -0.58 | 0.29 | -0.82 | -0.86 | 0.06 | 0.42 | -0.76 | -2.40 | 0.07 | 0.12 | 0.40 | 0.02 | 0.19 | 0.04 | 0.22 | -0.03 | 1.03 |
| Single-Family Att | 2 | 6 | After 1989 | 74.5 | -0.21 | -0.55 | 0.10 | -0.97 | -1.02 | 0.08 | 0.49 | -0.42 | -2.51 | 0.11 | 0.15 | 0.61 | 0.06 | 0.27 | 0.06 | 0.30 | -0.05 | 1.52 |
| Single-Family Att | 3 | 7 | Before 1950 | 104.1 | -0.93 | -1.58 | 0.74 | -1.95 | -1.85 | 0.13 | 0.75 | -1.06 | -5.74 | 0.37 | 0.27 | 0.66 | -0.03 | 0.27 | 0.07 | 0.28 | -0.10 | 1.79 |
| Single-Family Att | 3 | 7 | 1950-1979 | 314.9 | -2.07 | -5.52 | 2.98 | -9.76 | -6.08 | 0.41 | 2.68 | -4.31 | -21.67 | 0.78 | 0.95 | 2.82 | 0.10 | 0.78 | 0.19 | 1.02 | -0.39 | 6.24 |

| | | | | | Aggregated Heating Component Loads (Trillion Btus) | | | | | | | | | Aggregated Cooling Component Loads (Trillion Btus) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Reg | Loc | YearMade | Number of Bldgs (thous.) | roof | wall | wndw solar | wndw cond. | infilt | peop | equip. | ground | total | roof | wall | wndw solar | wndw cond. | infilt | peop | equip. | ground | total |
| Single-Family Att | 3 | 7 | 1980-1989 | 660.2 | -2.04 | -6.58 | 3.35 | -10.66 | -10.53 | 0.87 | 5.80 | -4.44 | -24.23 | 0.74 | 1.08 | 4.40 | -0.16 | 1.21 | 0.53 | 2.67 | -0.53 | 9.94 |
| Single-Family Att | 3 | 7 | After 1989 | 90.9 | -0.29 | -0.80 | 0.12 | -1.40 | -1.49 | 0.12 | 0.75 | -0.63 | -3.61 | 0.11 | 0.14 | 0.56 | 0.01 | 0.17 | 0.07 | 0.31 | -0.08 | 1.28 |
| Single-Family Att | 3 | 8 | Before 1950 | 13.1 | -0.19 | -0.12 | 0.05 | -0.18 | -0.19 | 0.02 | 0.08 | -0.01 | -0.55 | 0.09 | 0.03 | 0.06 | -0.01 | 0.04 | 0.01 | 0.05 | 0.00 | 0.28 |
| Single-Family Att | 3 | 8 | 1950-1979 | 95.2 | -0.88 | -0.85 | 0.48 | -1.90 | -1.32 | 0.11 | 0.61 | -0.06 | -3.81 | 0.20 | 0.07 | 0.33 | -0.01 | 0.16 | 0.04 | 0.20 | 0.00 | 0.99 |
| Single-Family Att | 3 | 8 | 1980-1989 | 82.1 | -0.21 | -0.69 | 0.37 | -0.89 | -0.94 | 0.09 | 0.59 | -0.35 | -2.04 | 0.12 | 0.17 | 0.60 | -0.04 | 0.20 | 0.07 | 0.38 | -0.05 | 1.45 |
| Single-Family Att | 3 | 9 | Before 1950 | 18.7 | -0.03 | -0.02 | 0.01 | -0.02 | -0.02 | 0.00 | 0.02 | 0.00 | -0.05 | 0.22 | 0.07 | 0.19 | -0.01 | 0.22 | 0.03 | 0.20 | 0.04 | 0.97 |
| Single-Family Att | 3 | 9 | 1950-1979 | 97.7 | -0.06 | -0.04 | 0.03 | -0.08 | -0.05 | 0.01 | 0.05 | 0.01 | -0.13 | 0.60 | 0.34 | 1.27 | 0.07 | 1.04 | 0.23 | 1.05 | 0.20 | 4.81 |
| Single-Family Att | 3 | 9 | 1980-1989 | 111.7 | -0.03 | -0.04 | 0.03 | -0.07 | -0.05 | 0.01 | 0.06 | 0.00 | -0.08 | 0.43 | 0.31 | 1.35 | -0.05 | 0.93 | 0.27 | 1.29 | -0.13 | 4.40 |
| Single-Family Att | 3 | 9 | After 1989 | 7.2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.01 | 0.09 | 0.00 | 0.06 | 0.02 | 0.08 | -0.01 | 0.28 |
| Single-Family Att | 3 | 10 | Before 1950 | 6.4 | -0.07 | -0.05 | 0.02 | -0.07 | -0.07 | 0.01 | 0.03 | 0.00 | -0.21 | 0.04 | 0.01 | 0.03 | 0.00 | 0.02 | 0.01 | 0.02 | 0.00 | 0.14 |
| Single-Family Att | 3 | 10 | 1950-1979 | 85.0 | -0.66 | -0.64 | 0.36 | -1.43 | -0.99 | 0.08 | 0.46 | -0.05 | -2.86 | 0.29 | 0.10 | 0.48 | -0.01 | 0.23 | 0.06 | 0.29 | 0.01 | 1.46 |
| Single-Family Att | 3 | 10 | 1980-1989 | 68.6 | -0.17 | -0.54 | 0.29 | -0.70 | -0.74 | 0.07 | 0.46 | -0.27 | -1.60 | 0.10 | 0.14 | 0.50 | -0.03 | 0.17 | 0.06 | 0.32 | -0.04 | 1.21 |
| Single-Family Att | 3 | 10 | After 1989 | 8.3 | -0.02 | -0.04 | 0.03 | -0.06 | -0.08 | 0.01 | 0.04 | -0.03 | -0.15 | 0.01 | 0.01 | 0.06 | 0.00 | 0.02 | 0.01 | 0.03 | -0.01 | 0.14 |
| Single-Family Att | 3 | 11 | 1980-1989 | 4.2 | -0.01 | -0.01 | 0.01 | -0.03 | -0.02 | 0.00 | 0.02 | -0.01 | -0.04 | 0.02 | 0.01 | 0.03 | 0.00 | 0.02 | 0.01 | 0.03 | -0.01 | 0.10 |
| Single-Family Att | 3 | 12 | Before 1950 | 42.1 | -0.36 | -0.22 | 0.13 | -0.31 | -0.35 | 0.03 | 0.18 | -0.12 | -1.01 | 0.38 | 0.12 | 0.28 | 0.02 | 0.31 | 0.06 | 0.23 | -0.07 | 1.33 |
| Single-Family Att | 3 | 12 | 1950-1979 | 268.5 | -1.01 | -1.15 | 1.26 | -3.17 | -2.09 | 0.22 | 1.29 | -0.97 | -5.63 | 1.12 | 0.65 | 2.60 | 0.41 | 1.92 | 0.37 | 1.55 | -0.64 | 7.98 |
| Single-Family Att | 3 | 12 | 1980-1989 | 161.6 | -0.38 | -0.52 | 0.59 | -1.45 | -1.10 | 0.13 | 0.81 | -0.45 | -2.38 | 0.46 | 0.32 | 1.21 | 0.25 | 0.93 | 0.21 | 0.94 | -0.42 | 3.91 |
| Single-Family Att | 3 | 12 | After 1989 | 98.2 | -0.26 | -0.27 | 0.43 | -0.99 | -0.79 | 0.08 | 0.48 | -0.33 | -1.65 | 0.29 | 0.16 | 0.74 | 0.17 | 0.58 | 0.12 | 0.49 | -0.26 | 2.29 |
| Single-Family Att | 3 | 13 | Before 1950 | 23.6 | -0.12 | -0.07 | 0.04 | -0.09 | -0.09 | 0.01 | 0.07 | -0.02 | -0.28 | 0.23 | 0.06 | 0.16 | -0.01 | 0.16 | 0.03 | 0.14 | -0.05 | 0.72 |
| Single-Family Att | 3 | 13 | 1950-1979 | 47.2 | -0.11 | -0.11 | 0.12 | -0.29 | -0.18 | 0.02 | 0.15 | -0.05 | -0.45 | 0.19 | 0.10 | 0.52 | -0.03 | 0.30 | 0.07 | 0.34 | -0.15 | 1.33 |
| Single-Family Att | 3 | 13 | 1980-1989 | 117.9 | -0.25 | -0.21 | 0.26 | -0.61 | -0.42 | 0.06 | 0.42 | -0.18 | -0.91 | 0.46 | 0.19 | 0.94 | 0.00 | 0.63 | 0.19 | 0.83 | -0.34 | 2.90 |
| Single-Family Att | 4 | 14 | Before 1950 | 10.5 | -0.11 | -0.09 | 0.06 | -0.13 | -0.11 | 0.01 | 0.06 | -0.13 | -0.44 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Single-Family Att | 4 | 14 | 1950-1979 | 49.9 | -0.35 | -0.40 | 0.34 | -0.88 | -0.51 | 0.06 | 0.34 | -0.37 | -1.77 | 0.02 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | 0.01 | -0.01 | 0.06 |
| Single-Family Att | 4 | 14 | 1980-1989 | 88.1 | -0.31 | -0.99 | 0.84 | -1.59 | -1.33 | 0.12 | 0.77 | -0.92 | -3.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Single-Family Att | 4 | 15 | Before 1950 | 5.7 | -0.08 | -0.06 | 0.04 | -0.10 | -0.08 | 0.01 | 0.05 | -0.10 | -0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Single-Family Att | 4 | 15 | 1950-1979 | 17.5 | -0.12 | -0.14 | 0.11 | -0.29 | -0.17 | 0.02 | 0.11 | -0.12 | -0.59 | 0.02 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | 0.02 | -0.01 | 0.07 |
| Single-Family Att | 4 | 15 | 1980-1989 | 43.4 | -0.16 | -0.52 | 0.44 | -0.84 | -0.70 | 0.06 | 0.41 | -0.48 | -1.79 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Single-Family Att | 4 | 16 | Before 1950 | 4.1 | -0.03 | -0.03 | 0.02 | -0.04 | -0.03 | 0.00 | 0.02 | -0.04 | -0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Single-Family Att | 4 | 17 | Before 1950 | 21.7 | -0.10 | -0.07 | 0.04 | -0.08 | -0.06 | 0.01 | 0.07 | -0.05 | -0.23 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Single-Family Att | 4 | 17 | 1950-1979 | 87.6 | -0.19 | -0.15 | 0.20 | -0.34 | -0.20 | 0.04 | 0.23 | -0.09 | -0.50 | 0.38 | 0.23 | 0.56 | 0.20 | 0.29 | 0.09 | 0.36 | -0.08 | 2.03 |
| Single-Family Att | 4 | 17 | 1980-1989 | 53.3 | -0.08 | -0.08 | 0.08 | -0.12 | -0.12 | 0.02 | 0.15 | -0.06 | -0.21 | 0.27 | 0.19 | 0.40 | 0.14 | 0.29 | 0.07 | 0.34 | -0.04 | 1.67 |
| Single-Family Att | 4 | 18 | Before 1950 | 7.5 | -0.18 | -0.13 | 0.03 | -0.13 | -0.23 | 0.01 | 0.08 | -0.03 | -0.56 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Single-Family Att | 4 | 18 | 1950-1979 | 235.7 | -2.24 | -3.49 | 0.75 | -4.90 | -4.61 | 0.40 | 2.27 | -0.71 | -12.53 | 0.01 | 0.01 | 0.03 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.06 |
| Single-Family Att | 4 | 18 | 1980-1989 | 97.9 | -0.28 | -1.03 | 0.46 | -2.07 | -1.42 | 0.13 | 0.84 | -0.05 | -3.42 | 0.02 | 0.03 | 0.15 | -0.01 | 0.00 | 0.00 | 0.04 | 0.00 | 0.23 |
| Single-Family Att | 4 | 19 | Before 1950 | 64.3 | -1.24 | -0.69 | 0.52 | -0.93 | -0.92 | 0.10 | 0.49 | -0.02 | -2.69 | 0.02 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 |
| Single-Family Att | 4 | 19 | 1950-1979 | 17.7 | -0.14 | -0.23 | 0.14 | -0.27 | -0.17 | 0.02 | 0.12 | 0.00 | -0.53 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Single-Family Att | 4 | 19 | 1980-1989 | 168.8 | -0.41 | -1.50 | 2.11 | -2.12 | -1.54 | 0.21 | 1.36 | -1.26 | -3.15 | 0.01 | 0.02 | 0.06 | 0.00 | 0.00 | 0.00 | 0.02 | -0.01 | 0.10 |
| Single-Family Att | 4 | 19 | After 1989 | 27.5 | -0.07 | -0.17 | 0.37 | -0.33 | -0.27 | 0.03 | 0.20 | -0.17 | -0.42 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 |
| Single-Family Att | 4 | 20 | Before 1950 | 172.0 | -2.36 | -1.22 | 0.91 | -1.46 | -1.25 | 0.22 | 1.10 | -0.06 | -4.14 | 0.13 | 0.03 | 0.09 | -0.02 | -0.02 | 0.00 | 0.03 | 0.00 | 0.24 |
| Single-Family Att | 4 | 20 | 1950-1979 | 99.4 | -0.51 | -0.73 | 0.47 | -0.79 | -0.44 | 0.10 | 0.50 | -0.03 | -1.43 | 0.07 | 0.05 | 0.12 | -0.03 | -0.04 | 0.00 | 0.04 | 0.00 | 0.21 |
| Single-Family Att | 4 | 20 | 1980-1989 | 129.9 | -0.18 | -0.61 | 0.86 | -0.77 | -0.51 | 0.09 | 0.61 | -0.33 | -0.84 | 0.02 | 0.04 | 0.12 | -0.02 | -0.03 | 0.01 | 0.06 | -0.03 | 0.17 |

| | | | | | Aggregated Heating Component Loads (Trillion Btus) | | | | | | | | | Aggregated Cooling Component Loads (Trillion Btus) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Reg | Loc | YearMade | Number of Bldgs (thous.) | roof | wall | wndw solar | wndw cond. | infilt | peop | equip. | ground | total | roof | wall | wndw solar | wndw cond. | infilt | peop | equip. | ground | total |
| Single-Family Att | 4 | 20 | After 1989 | 24.9 | -0.04 | -0.09 | 0.19 | -0.15 | -0.11 | 0.02 | 0.11 | -0.07 | -0.14 | 0.01 | 0.01 | 0.05 | -0.01 | -0.01 | 0.00 | 0.02 | -0.01 | 0.06 |
| Multi-Family 2-4 | 1 | 1 | Before 1950 | 747.6 | -14.98 | -18.57 | 2.94 | -7.21 | -13.37 | 1.69 | 5.86 | -7.51 | -51.15 | 0.63 | 0.43 | 0.67 | -0.07 | 0.24 | 0.18 | 0.46 | -0.38 | 2.17 |
| Multi-Family 2-4 | 1 | 1 | 1950-1979 | 118.0 | -0.93 | -1.25 | 0.43 | -1.84 | -2.68 | 0.29 | 0.99 | -1.06 | -6.05 | 0.06 | 0.01 | 0.19 | -0.01 | 0.06 | 0.04 | 0.11 | -0.08 | 0.38 |
| Multi-Family 2-4 | 1 | 1 | 1980-1989 | 16.1 | -0.04 | -0.04 | 0.03 | -0.17 | -0.17 | 0.02 | 0.10 | -0.11 | -0.38 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.01 | -0.01 | 0.01 |
| Multi-Family 2-4 | 1 | 1 | After 1989 | 19.1 | -0.05 | -0.04 | 0.04 | -0.21 | -0.21 | 0.02 | 0.12 | -0.13 | -0.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Multi-Family 2-4 | 1 | 2 | Before 1950 | 1185.1 | -18.47 | -22.65 | 3.40 | -8.93 | -15.22 | 2.12 | 7.40 | -8.64 | -61.00 | 1.62 | 1.09 | 1.31 | -0.16 | 0.53 | 0.45 | 1.11 | -0.74 | 5.21 |
| Multi-Family 2-4 | 1 | 2 | 1950-1979 | 675.9 | -4.31 | -5.79 | 1.77 | -8.60 | -12.11 | 1.35 | 4.69 | -4.57 | -27.55 | 0.40 | 0.19 | 1.17 | -0.14 | 0.39 | 0.32 | 0.83 | -0.52 | 2.64 |
| Multi-Family 2-4 | 1 | 2 | 1980-1989 | 146.5 | -0.43 | -0.34 | 0.28 | -1.64 | -1.58 | 0.18 | 0.97 | -0.93 | -3.50 | 0.04 | 0.01 | 0.33 | -0.11 | 0.07 | 0.09 | 0.33 | -0.26 | 0.50 |
| Multi-Family 2-4 | 1 | 2 | After 1989 | 15.4 | -0.03 | -0.02 | 0.02 | -0.11 | -0.10 | 0.01 | 0.06 | -0.06 | -0.23 | 0.00 | 0.00 | 0.00 | 0.03 | -0.01 | 0.01 | 0.01 | 0.07 | 0.11 |
| Multi-Family 2-4 | 2 | 3 | Before 1950 | 175.2 | -4.35 | -3.45 | 0.89 | -2.54 | -5.77 | 0.59 | 2.27 | -2.34 | -14.70 | 0.27 | 0.06 | 0.30 | -0.03 | 0.11 | 0.11 | 0.31 | -0.27 | 0.86 |
| Multi-Family 2-4 | 2 | 3 | 1980-1989 | 4.7 | -0.02 | -0.04 | 0.02 | -0.06 | -0.08 | 0.01 | 0.05 | -0.06 | -0.19 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.01 | -0.02 | 0.02 |
| Multi-Family 2-4 | 2 | 4 | Before 1950 | 866.6 | -21.85 | -17.31 | 4.45 | -12.73 | -28.98 | 2.97 | 11.41 | -11.76 | -73.80 | 1.62 | 0.38 | 1.77 | -0.18 | 0.66 | 0.65 | 1.84 | -1.62 | 5.12 |
| Multi-Family 2-4 | 2 | 4 | 1950-1979 | 335.4 | -8.19 | -6.49 | 1.67 | -4.77 | -10.86 | 1.11 | 4.27 | -4.41 | -27.66 | 0.00 | 0.81 | 0.19 | 0.89 | -0.09 | 0.33 | 0.33 | 0.92 | 3.38 |
| Multi-Family 2-4 | 2 | 4 | 1980-1989 | 98.0 | -0.34 | -0.79 | 0.30 | -1.11 | -1.57 | 0.19 | 0.90 | -1.18 | -3.61 | 0.04 | 0.06 | 0.21 | -0.02 | 0.06 | 0.07 | 0.23 | -0.28 | 0.37 |
| Multi-Family 2-4 | 2 | 4 | After 1989 | 12.6 | -0.06 | -0.14 | 0.05 | -0.20 | -0.29 | 0.04 | 0.16 | -0.21 | -0.66 | 0.00 | 0.01 | 0.01 | 0.04 | 0.00 | 0.01 | 0.01 | 0.06 | 0.14 |
| Multi-Family 2-4 | 2 | 5 | Before 1950 | 88.8 | -3.15 | -2.49 | 0.50 | -1.77 | -3.99 | 0.37 | 1.41 | -2.17 | -11.29 | 0.22 | 0.04 | 0.23 | -0.03 | 0.08 | 0.08 | 0.21 | -0.24 | 0.60 |
| Multi-Family 2-4 | 2 | 5 | 1950-1979 | 97.1 | -2.45 | -1.94 | 0.39 | -1.37 | -3.11 | 0.29 | 1.10 | -1.69 | -8.78 | 0.00 | 0.17 | 0.03 | 0.18 | -0.02 | 0.07 | 0.06 | 0.17 | 0.66 |
| Multi-Family 2-4 | 2 | 5 | 1980-1989 | 4.0 | -0.02 | -0.05 | 0.01 | -0.07 | -0.10 | 0.01 | 0.05 | -0.06 | -0.23 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.01 | -0.01 | 0.02 |
| Multi-Family 2-4 | 2 | 6 | Before 1950 | 84.1 | -2.04 | -1.56 | 0.54 | -1.21 | -2.22 | 0.31 | 1.21 | -1.16 | -6.13 | 0.61 | 0.30 | 0.59 | -0.03 | 0.36 | 0.23 | 0.66 | -0.31 | 2.39 |
| Multi-Family 2-4 | 2 | 6 | 1950-1979 | 45.6 | -0.53 | -0.40 | 0.14 | -0.31 | -0.57 | 0.08 | 0.31 | -0.30 | -1.59 | 0.00 | 0.20 | 0.10 | 0.19 | -0.01 | 0.12 | 0.07 | 0.22 | 0.88 |
| Multi-Family 2-4 | 2 | 6 | 1980-1989 | 35.6 | -0.07 | -0.17 | 0.07 | -0.23 | -0.27 | 0.04 | 0.20 | -0.18 | -0.60 | 0.02 | 0.04 | 0.11 | 0.00 | 0.05 | 0.04 | 0.13 | -0.09 | 0.30 |
| Multi-Family 2-4 | 3 | 7 | Before 1950 | 172.4 | -2.19 | -3.12 | 0.60 | -1.51 | -1.71 | 0.22 | 1.27 | -0.97 | -7.42 | 0.24 | 0.19 | 0.23 | -0.02 | 0.12 | 0.06 | 0.27 | -0.09 | 1.00 |
| Multi-Family 2-4 | 3 | 7 | 1950-1979 | 236.4 | -2.32 | -1.40 | 0.43 | -1.27 | -2.13 | 0.25 | 1.39 | -1.07 | -6.11 | 0.59 | 0.20 | 0.47 | -0.04 | 0.34 | 0.18 | 0.73 | -0.27 | 2.20 |
| Multi-Family 2-4 | 3 | 7 | 1980-1989 | 164.9 | -0.48 | -0.47 | 0.18 | -0.67 | -1.39 | 0.20 | 1.07 | -0.74 | -2.29 | 0.06 | 0.05 | 0.21 | -0.05 | 0.09 | 0.14 | 0.50 | -0.36 | 0.63 |
| Multi-Family 2-4 | 3 | 7 | After 1989 | 27.9 | -0.11 | -0.11 | 0.04 | -0.15 | -0.31 | 0.04 | 0.24 | -0.17 | -0.52 | 0.00 | 0.02 | 0.01 | 0.07 | -0.02 | 0.03 | 0.04 | 0.31 | 0.47 |
| Multi-Family 2-4 | 3 | 8 | 1950-1979 | 12.6 | -0.06 | -0.03 | 0.01 | -0.03 | -0.05 | 0.01 | 0.04 | -0.01 | -0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Multi-Family 2-4 | 3 | 8 | 1980-1989 | 107.3 | -0.27 | -0.24 | 0.09 | -0.37 | -0.69 | 0.10 | 0.61 | -0.04 | -0.81 | 0.08 | 0.08 | 0.32 | -0.12 | 0.10 | 0.24 | 0.79 | -0.36 | 1.14 |
| Multi-Family 2-4 | 3 | 8 | After 1989 | 7.0 | -0.03 | -0.02 | 0.01 | -0.04 | -0.07 | 0.01 | 0.06 | 0.00 | -0.08 | 0.00 | 0.01 | 0.01 | 0.03 | -0.01 | 0.01 | 0.03 | 0.16 | 0.23 |
| Multi-Family 2-4 | 3 | 9 | Before 1950 | 38.8 | -0.01 | -0.01 | 0.00 | -0.01 | -0.01 | 0.00 | 0.01 | 0.00 | -0.02 | 0.08 | 0.08 | 0.10 | -0.01 | 0.10 | 0.04 | 0.15 | 0.00 | 0.53 |
| Multi-Family 2-4 | 3 | 9 | 1950-1979 | 173.1 | -0.07 | -0.01 | 0.01 | -0.03 | -0.04 | 0.01 | 0.06 | 0.00 | -0.06 | 0.74 | 0.36 | 0.74 | -0.05 | 1.00 | 0.37 | 1.45 | -0.02 | 4.59 |
| Multi-Family 2-4 | 3 | 9 | 1980-1989 | 72.5 | -0.01 | 0.00 | 0.00 | -0.01 | -0.01 | 0.00 | 0.01 | 0.00 | -0.01 | 0.07 | 0.06 | 0.26 | -0.04 | 0.28 | 0.20 | 0.78 | -0.03 | 1.58 |
| Multi-Family 2-4 | 3 | 10 | Before 1950 | 67.6 | -0.35 | -0.49 | 0.11 | -0.25 | -0.23 | 0.04 | 0.25 | -0.13 | -1.05 | 0.16 | 0.11 | 0.12 | -0.02 | 0.05 | 0.04 | 0.15 | -0.04 | 0.58 |
| Multi-Family 2-4 | 3 | 10 | 1950-1979 | 121.2 | -0.76 | -0.41 | 0.18 | -0.42 | -0.62 | 0.09 | 0.54 | -0.14 | -1.55 | 0.25 | 0.09 | 0.22 | -0.04 | 0.12 | 0.09 | 0.34 | -0.14 | 0.94 |
| Multi-Family 2-4 | 3 | 10 | 1980-1989 | 15.8 | -0.03 | -0.02 | 0.01 | -0.04 | -0.07 | 0.01 | 0.06 | 0.00 | -0.08 | 0.01 | 0.01 | 0.03 | -0.01 | 0.01 | 0.02 | 0.07 | -0.03 | 0.09 |
| Multi-Family 2-4 | 3 | 11 | 1980-1989 | 8.0 | -0.01 | 0.00 | 0.00 | -0.01 | -0.01 | 0.00 | 0.02 | 0.00 | -0.01 | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 | 0.01 | 0.04 | -0.01 | 0.07 |
| Multi-Family 2-4 | 3 | 12 | Before 1950 | 69.4 | -0.39 | -0.54 | 0.14 | -0.28 | -0.27 | 0.05 | 0.29 | -0.08 | -1.08 | 0.26 | 0.23 | 0.21 | 0.01 | 0.18 | 0.07 | 0.26 | -0.05 | 1.17 |
| Multi-Family 2-4 | 3 | 12 | 1950-1979 | 218.9 | -1.12 | -0.60 | 0.31 | -0.63 | -0.96 | 0.15 | 0.85 | -0.23 | -2.23 | 0.91 | 0.41 | 0.62 | 0.05 | 0.86 | 0.26 | 1.02 | -0.22 | 3.92 |
| Multi-Family 2-4 | 3 | 12 | 1980-1989 | 60.2 | -0.07 | -0.06 | 0.03 | -0.10 | -0.16 | 0.03 | 0.16 | 0.00 | -0.17 | 0.04 | 0.03 | 0.09 | 0.00 | 0.11 | 0.07 | 0.25 | -0.07 | 0.52 |
| Multi-Family 2-4 | 3 | 13 | Before 1950 | 12.0 | -0.04 | -0.05 | 0.01 | -0.02 | -0.02 | 0.00 | 0.03 | 0.00 | -0.08 | 0.04 | 0.03 | 0.03 | 0.00 | 0.03 | 0.01 | 0.05 | -0.01 | 0.18 |
| Multi-Family 2-4 | 3 | 13 | 1950-1979 | 36.5 | -0.15 | -0.07 | 0.04 | -0.08 | -0.12 | 0.02 | 0.13 | -0.02 | -0.25 | 0.17 | 0.08 | 0.14 | 0.00 | 0.18 | 0.07 | 0.26 | -0.05 | 0.85 |
| Multi-Family 2-4 | 3 | 13 | 1980-1989 | 36.5 | -0.04 | -0.03 | 0.01 | -0.05 | -0.09 | 0.01 | 0.10 | 0.00 | -0.08 | 0.04 | 0.03 | 0.12 | -0.01 | 0.12 | 0.09 | 0.33 | -0.08 | 0.64 |

| | | | | | Aggregated Heating Component Loads (Trillion Btus) | | | | | | | | | Aggregated Cooling Component Loads (Trillion Btus) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Reg | Loc | YearMade | Number of Bldgs (thous.) | roof | wall | wndw solar | wndw cond. | infilt | peop | equip. | ground | total | roof | wall | wndw solar | wndw cond. | infilt | peop | equip. | ground | total |
| Multi-Family 2-4 | 4 | 14 | Before 1950 | 88.2 | -1.16 | -1.71 | 0.72 | -1.40 | -0.89 | 0.09 | 0.72 | -0.59 | -4.22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Multi-Family 2-4 | 4 | 14 | 1950-1979 | 76.0 | -0.56 | -0.72 | 0.32 | -0.67 | -0.63 | 0.10 | 0.55 | -0.69 | -2.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Multi-Family 2-4 | 4 | 15 | Before 1950 | 27.5 | -0.37 | -0.49 | 0.16 | -0.30 | -0.19 | 0.02 | 0.15 | -0.25 | -1.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Multi-Family 2-4 | 4 | 15 | 1950-1979 | 12.2 | -0.09 | -0.12 | 0.05 | -0.11 | -0.10 | 0.02 | 0.09 | -0.11 | -0.37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Multi-Family 2-4 | 4 | 15 | After 1989 | 3.6 | -0.03 | -0.08 | 0.02 | -0.05 | -0.08 | 0.01 | 0.08 | -0.07 | -0.18 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.02 | 0.04 |
| Multi-Family 2-4 | 4 | 16 | After 1989 | 31.6 | -0.05 | -0.10 | 0.04 | -0.07 | -0.10 | 0.02 | 0.13 | -0.07 | -0.19 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.03 |
| Multi-Family 2-4 | 4 | 17 | 1950-1979 | 39.2 | -0.06 | -0.07 | 0.03 | -0.04 | -0.04 | 0.01 | 0.07 | -0.01 | -0.11 | 0.13 | 0.15 | 0.13 | 0.03 | 0.08 | 0.05 | 0.18 | -0.02 | 0.74 |
| Multi-Family 2-4 | 4 | 17 | 1980-1989 | 5.9 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 | 0.01 | 0.02 | 0.00 | 0.05 |
| Multi-Family 2-4 | 4 | 18 | Before 1950 | 25.3 | -0.50 | -0.78 | 0.23 | -0.61 | -0.47 | 0.05 | 0.42 | -0.27 | -1.92 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Multi-Family 2-4 | 4 | 18 | 1950-1979 | 338.7 | -2.05 | -2.73 | 0.79 | -2.42 | -2.80 | 0.50 | 2.70 | -2.54 | -8.56 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| Multi-Family 2-4 | 4 | 18 | 1980-1989 | 97.0 | -0.23 | -0.53 | 0.09 | -0.37 | -0.72 | 0.14 | 0.79 | -0.48 | -1.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| Multi-Family 2-4 | 4 | 19 | Before 1950 | 136.2 | -1.18 | -2.32 | 1.12 | -1.28 | -0.91 | 0.15 | 1.26 | -0.44 | -3.61 | 0.02 | 0.02 | 0.02 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.05 |
| Multi-Family 2-4 | 4 | 19 | 1950-1979 | 135.8 | -0.68 | -1.06 | 0.56 | -0.76 | -0.79 | 0.19 | 1.12 | -0.27 | -1.69 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.02 |
| Multi-Family 2-4 | 4 | 19 | 1980-1989 | 48.8 | -0.08 | -0.16 | 0.07 | -0.12 | -0.18 | 0.05 | 0.32 | -0.10 | -0.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| Multi-Family 2-4 | 4 | 19 | After 1989 | 12.4 | -0.03 | -0.06 | 0.03 | -0.05 | -0.07 | 0.02 | 0.12 | -0.04 | -0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Multi-Family 2-4 | 4 | 20 | Before 1950 | 188.6 | -0.48 | -0.81 | 0.43 | -0.43 | -0.27 | 0.06 | 0.57 | -0.09 | -1.04 | 0.08 | 0.07 | 0.11 | -0.03 | 0.01 | 0.01 | 0.06 | -0.02 | 0.30 |
| Multi-Family 2-4 | 4 | 20 | 1950-1979 | 237.3 | -0.39 | -0.54 | 0.30 | -0.36 | -0.33 | 0.09 | 0.69 | -0.10 | -0.64 | 0.01 | 0.01 | 0.01 | -0.01 | 0.00 | 0.00 | 0.01 | -0.01 | 0.04 |
| Multi-Family 2-4 | 4 | 20 | 1980-1989 | 35.2 | -0.02 | -0.04 | 0.01 | -0.03 | -0.04 | 0.01 | 0.09 | -0.02 | -0.04 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.01 | -0.01 | 0.02 |
| Multi-Family 2-4 | 4 | 20 | After 1989 | 24.3 | -0.01 | -0.03 | 0.01 | -0.02 | -0.03 | 0.00 | 0.06 | -0.01 | -0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Multi-Family >=5 | 1 | 1 | Before 1950 | 207.0 | -1.85 | -1.13 | 0.43 | -1.35 | -1.80 | 0.15 | 1.08 | -0.90 | -5.37 | 0.05 | 0.00 | 0.07 | -0.01 | 0.02 | 0.02 | 0.08 | -0.06 | 0.17 |
| Multi-Family >=5 | 1 | 1 | 1950-1979 | 548.3 | -1.21 | -2.28 | 1.11 | -4.80 | -6.97 | 0.75 | 2.58 | -0.97 | -11.77 | 0.09 | 0.03 | 0.55 | -0.03 | 0.16 | 0.11 | 0.32 | -0.08 | 1.15 |
| Multi-Family >=5 | 1 | 1 | 1980-1989 | 91.0 | -0.14 | -0.15 | 0.16 | -0.83 | -0.83 | 0.09 | 0.48 | -0.29 | -1.53 | 0.01 | 0.00 | 0.10 | -0.03 | 0.01 | 0.02 | 0.08 | -0.04 | 0.15 |
| Multi-Family >=5 | 1 | 2 | Before 1950 | 1532.7 | -8.34 | -5.64 | 2.19 | -8.26 | -10.04 | 0.93 | 6.59 | -3.16 | -25.73 | 0.52 | 0.14 | 0.72 | -0.16 | 0.25 | 0.23 | 1.06 | -0.43 | 2.32 |
| Multi-Family >=5 | 1 | 2 | 1950-1979 | 1186.8 | -2.41 | -4.54 | 1.98 | -9.63 | -13.56 | 1.52 | 5.26 | -1.79 | -23.17 | 0.26 | 0.18 | 1.53 | -0.18 | 0.51 | 0.42 | 1.09 | -0.24 | 3.57 |
| Multi-Family >=5 | 1 | 2 | 1980-1989 | 319.6 | -0.32 | -0.35 | 0.42 | -2.39 | -2.31 | 0.26 | 1.41 | -0.48 | -3.76 | 0.03 | 0.01 | 0.41 | -0.13 | 0.08 | 0.11 | 0.41 | -0.11 | 0.79 |
| Multi-Family >=5 | 1 | 2 | After 1989 | 217.9 | -0.40 | -0.40 | 0.39 | -2.27 | -2.19 | 0.25 | 1.34 | -0.72 | -3.99 | 0.04 | 0.02 | 0.52 | -0.17 | 0.10 | 0.13 | 0.52 | -0.23 | 0.94 |
| Multi-Family >=5 | 2 | 3 | Before 1950 | 15.1 | -0.13 | -0.12 | 0.03 | -0.08 | -0.17 | 0.02 | 0.07 | -0.04 | -0.42 | 0.02 | 0.00 | 0.02 | 0.00 | 0.01 | 0.01 | 0.02 | -0.01 | 0.06 |
| Multi-Family >=5 | 2 | 3 | 1950-1979 | 223.0 | -0.32 | -0.39 | 0.15 | -1.36 | -1.86 | 0.21 | 1.09 | -0.20 | -2.68 | 0.02 | 0.01 | 0.19 | -0.03 | 0.04 | 0.07 | 0.25 | -0.06 | 0.50 |
| Multi-Family >=5 | 2 | 3 | 1980-1989 | 118.5 | -0.17 | -0.49 | 0.22 | -0.83 | -1.17 | 0.14 | 0.67 | -0.49 | -2.12 | 0.01 | 0.02 | 0.10 | -0.01 | 0.03 | 0.03 | 0.10 | -0.07 | 0.22 |
| Multi-Family >=5 | 2 | 4 | Before 1950 | 364.7 | -2.88 | -2.65 | 0.72 | -1.75 | -3.68 | 0.42 | 1.47 | -0.88 | -9.23 | 0.17 | 0.04 | 0.20 | -0.02 | 0.07 | 0.07 | 0.19 | -0.09 | 0.62 |
| Multi-Family >=5 | 2 | 4 | 1950-1979 | 1384.7 | -2.80 | -3.47 | 1.36 | -11.99 | -16.41 | 1.82 | 9.57 | -1.73 | -23.64 | 0.21 | 0.11 | 1.84 | -0.29 | 0.43 | 0.69 | 2.39 | -0.60 | 4.79 |
| Multi-Family >=5 | 2 | 4 | 1980-1989 | 368.9 | -0.52 | -1.70 | 0.91 | -3.39 | -4.80 | 0.59 | 2.74 | -1.26 | -7.43 | 0.07 | 0.14 | 0.69 | -0.08 | 0.19 | 0.23 | 0.74 | -0.32 | 1.67 |
| Multi-Family >=5 | 2 | 4 | After 1989 | 42.1 | -0.05 | -0.16 | 0.08 | -0.32 | -0.45 | 0.06 | 0.26 | -0.12 | -0.69 | 0.01 | 0.01 | 0.06 | -0.01 | 0.02 | 0.02 | 0.07 | -0.03 | 0.16 |
| Multi-Family >=5 | 2 | 5 | Before 1950 | 119.9 | -1.21 | -1.11 | 0.24 | -0.71 | -1.51 | 0.15 | 0.53 | -0.48 | -4.09 | 0.05 | 0.01 | 0.05 | -0.01 | 0.02 | 0.02 | 0.04 | -0.03 | 0.15 |
| Multi-Family >=5 | 2 | 5 | 1950-1979 | 104.7 | -0.26 | -0.32 | 0.07 | -1.07 | -1.41 | 0.15 | 0.76 | -0.23 | -2.33 | 0.02 | 0.01 | 0.13 | -0.02 | 0.03 | 0.04 | 0.15 | -0.05 | 0.30 |
| Multi-Family >=5 | 2 | 5 | 1980-1989 | 17.3 | -0.05 | -0.13 | 0.04 | -0.21 | -0.29 | 0.03 | 0.15 | -0.09 | -0.55 | 0.00 | 0.01 | 0.03 | 0.00 | 0.01 | 0.01 | 0.03 | -0.02 | 0.06 |
| Multi-Family >=5 | 2 | 6 | Before 1950 | 100.2 | -0.37 | -0.37 | 0.15 | -0.31 | -0.53 | 0.08 | 0.29 | -0.10 | -1.16 | 0.08 | 0.05 | 0.11 | -0.01 | 0.06 | 0.04 | 0.12 | -0.02 | 0.44 |
| Multi-Family >=5 | 2 | 6 | 1950-1979 | 252.4 | -0.50 | -0.52 | 0.26 | -1.52 | -1.73 | 0.25 | 1.35 | -0.34 | -2.77 | 0.12 | 0.11 | 0.68 | -0.02 | 0.29 | 0.25 | 0.94 | -0.25 | 2.13 |
| Multi-Family >=5 | 2 | 6 | 1980-1989 | 148.3 | -0.19 | -0.54 | 0.28 | -0.89 | -1.03 | 0.16 | 0.78 | -0.39 | -1.81 | 0.06 | 0.12 | 0.45 | -0.02 | 0.19 | 0.15 | 0.52 | -0.19 | 1.29 |
| Multi-Family >=5 | 2 | 6 | After 1989 | 206.8 | -0.30 | -0.85 | 0.45 | -1.40 | -1.62 | 0.26 | 1.23 | -0.61 | -2.85 | 0.09 | 0.18 | 0.71 | -0.03 | 0.30 | 0.24 | 0.81 | -0.30 | 2.01 |
| Multi-Family >=5 | 3 | 7 | Before 1950 | 244.8 | -1.46 | -2.60 | 0.60 | -1.51 | -1.71 | 0.22 | 1.27 | -0.54 | -5.74 | 0.15 | 0.14 | 0.21 | -0.02 | 0.11 | 0.06 | 0.25 | -0.05 | 0.85 |

| | | | | | Aggregated Heating Component Loads (Trillion Btus) | | | | | | | | | Aggregated Cooling Component Loads (Trillion Btus) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Reg | Loc | YearMade | Number of Bldgs (thous.) | roof | wall | wndw solar | wndw cond. | infilt | peop | equip. | ground | total | roof | wall | wndw solar | wndw cond. | infilt | peop | equip. | ground | total |
| Multi-Family >=5 | 3 | 7 | 1950-1979 | 777.6 | -3.30 | -2.86 | 0.74 | -2.54 | -6.09 | 0.85 | 4.20 | -1.25 | -10.23 | 0.66 | 0.36 | 0.86 | -0.11 | 0.69 | 0.63 | 2.24 | -0.41 | 4.92 |
| Multi-Family >=5 | 3 | 7 | 1980-1989 | 465.5 | -0.61 | -0.83 | 0.46 | -1.68 | -3.52 | 0.50 | 2.72 | -0.66 | -3.61 | 0.09 | 0.11 | 0.70 | -0.16 | 0.31 | 0.45 | 1.66 | -0.42 | 2.75 |
| Multi-Family >=5 | 3 | 7 | After 1989 | 9.9 | -0.02 | -0.02 | 0.01 | -0.03 | -0.07 | 0.01 | 0.05 | -0.02 | -0.08 | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 | 0.01 | 0.03 | -0.01 | 0.05 |
| Multi-Family >=5 | 3 | 8 | 1950-1979 | 128.3 | -0.30 | -0.24 | 0.08 | -0.23 | -0.48 | 0.08 | 0.43 | -0.02 | -0.69 | 0.09 | 0.06 | 0.13 | -0.03 | 0.08 | 0.11 | 0.37 | -0.06 | 0.75 |
| Multi-Family >=5 | 3 | 8 | 1980-1989 | 260.4 | -0.20 | -0.25 | 0.14 | -0.56 | -1.02 | 0.14 | 0.91 | -0.02 | -0.86 | 0.05 | 0.07 | 0.39 | -0.15 | 0.12 | 0.30 | 0.97 | -0.15 | 1.60 |
| Multi-Family >=5 | 3 | 9 | 1950-1979 | 513.0 | -0.17 | -0.03 | 0.03 | -0.09 | -0.15 | 0.03 | 0.25 | 0.00 | -0.12 | 1.29 | 0.90 | 1.95 | -0.14 | 3.22 | 1.71 | 6.30 | -0.12 | 15.12 |
| Multi-Family >=5 | 3 | 9 | 1980-1989 | 288.9 | -0.02 | -0.01 | 0.00 | -0.03 | -0.04 | 0.01 | 0.07 | 0.00 | -0.02 | 0.18 | 0.18 | 0.98 | -0.17 | 1.05 | 0.74 | 2.88 | -0.07 | 5.78 |
| Multi-Family >=5 | 3 | 9 | After 1989 | 32.4 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.03 | 0.03 | 0.15 | -0.03 | 0.17 | 0.12 | 0.45 | -0.01 | 0.91 |
| Multi-Family >=5 | 3 | 10 | Before 1950 | 12.9 | -0.06 | -0.10 | 0.03 | -0.06 | -0.06 | 0.01 | 0.06 | -0.02 | -0.20 | 0.01 | 0.01 | 0.02 | 0.00 | 0.01 | 0.01 | 0.02 | 0.00 | 0.07 |
| Multi-Family >=5 | 3 | 10 | 1950-1979 | 152.9 | -0.56 | -0.40 | 0.11 | -0.33 | -0.67 | 0.11 | 0.60 | -0.05 | -1.19 | 0.16 | 0.09 | 0.17 | -0.04 | 0.10 | 0.14 | 0.47 | -0.11 | 0.98 |
| Multi-Family >=5 | 3 | 10 | 1980-1989 | 192.3 | -0.23 | -0.25 | 0.12 | -0.47 | -0.86 | 0.12 | 0.77 | -0.03 | -0.83 | 0.05 | 0.06 | 0.29 | -0.11 | 0.09 | 0.22 | 0.72 | -0.18 | 1.14 |
| Multi-Family >=5 | 3 | 10 | After 1989 | 11.9 | -0.01 | -0.01 | 0.01 | -0.03 | -0.05 | 0.01 | 0.04 | 0.00 | -0.04 | 0.00 | 0.00 | 0.02 | -0.01 | 0.01 | 0.01 | 0.04 | -0.01 | 0.07 |
| Multi-Family >=5 | 3 | 11 | 1950-1979 | 36.5 | -0.09 | -0.06 | 0.02 | -0.05 | -0.10 | 0.02 | 0.11 | 0.00 | -0.14 | 0.08 | 0.05 | 0.07 | 0.00 | 0.11 | 0.06 | 0.22 | -0.03 | 0.56 |
| Multi-Family >=5 | 3 | 11 | After 1989 | 20.7 | -0.01 | -0.01 | 0.01 | -0.02 | -0.03 | 0.01 | 0.04 | 0.00 | -0.02 | 0.01 | 0.01 | 0.03 | 0.00 | 0.04 | 0.03 | 0.10 | -0.01 | 0.19 |
| Multi-Family >=5 | 3 | 12 | Before 1950 | 65.6 | -0.19 | -0.33 | 0.10 | -0.21 | -0.20 | 0.04 | 0.21 | -0.03 | -0.61 | 0.12 | 0.13 | 0.14 | 0.01 | 0.13 | 0.05 | 0.18 | -0.02 | 0.73 |
| Multi-Family >=5 | 3 | 12 | 1950-1979 | 638.8 | -1.38 | -1.08 | 0.42 | -1.10 | -2.28 | 0.38 | 2.10 | -0.09 | -3.02 | 0.98 | 0.66 | 0.95 | 0.10 | 1.78 | 0.76 | 2.72 | -0.23 | 7.72 |
| Multi-Family >=5 | 3 | 12 | 1980-1989 | 219.6 | -0.18 | -0.20 | 0.12 | -0.38 | -0.63 | 0.10 | 0.63 | -0.01 | -0.56 | 0.11 | 0.10 | 0.37 | 0.00 | 0.45 | 0.26 | 0.99 | -0.16 | 2.12 |
| Multi-Family >=5 | 3 | 12 | After 1989 | 24.4 | -0.01 | -0.02 | 0.01 | -0.03 | -0.05 | 0.01 | 0.05 | 0.00 | -0.04 | 0.01 | 0.01 | 0.03 | 0.00 | 0.04 | 0.02 | 0.08 | -0.01 | 0.17 |
| Multi-Family >=5 | 3 | 13 | 1950-1979 | 194.3 | -0.40 | -0.25 | 0.09 | -0.22 | -0.44 | 0.09 | 0.50 | -0.02 | -0.64 | 0.34 | 0.22 | 0.31 | -0.01 | 0.52 | 0.27 | 0.98 | -0.12 | 2.52 |
| Multi-Family >=5 | 3 | 13 | 1980-1989 | 87.1 | -0.05 | -0.05 | 0.03 | -0.10 | -0.16 | 0.03 | 0.19 | 0.00 | -0.11 | 0.04 | 0.04 | 0.16 | -0.02 | 0.17 | 0.12 | 0.46 | -0.06 | 0.91 |
| Multi-Family >=5 | 3 | 13 | After 1989 | 23.5 | -0.01 | -0.01 | 0.01 | -0.02 | -0.03 | 0.01 | 0.04 | 0.00 | -0.02 | 0.01 | 0.01 | 0.03 | 0.00 | 0.04 | 0.03 | 0.10 | -0.01 | 0.19 |
| Multi-Family >=5 | 4 | 14 | Before 1950 | 33.5 | -0.24 | -0.43 | 0.22 | -0.42 | -0.27 | 0.03 | 0.22 | -0.10 | -1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Multi-Family >=5 | 4 | 14 | 1950-1979 | 111.6 | -0.42 | -0.67 | 0.35 | -0.75 | -0.71 | 0.12 | 0.61 | -0.43 | -1.90 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Multi-Family >=5 | 4 | 14 | 1980-1989 | 11.8 | -0.01 | -0.03 | 0.01 | -0.02 | -0.04 | 0.01 | 0.04 | -0.02 | -0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Multi-Family >=5 | 4 | 15 | 1950-1979 | 171.5 | -0.51 | -0.90 | 0.57 | -1.20 | -1.14 | 0.18 | 0.98 | -0.43 | -2.44 | 0.07 | 0.06 | 0.15 | 0.00 | 0.01 | 0.03 | 0.14 | -0.04 | 0.43 |
| Multi-Family >=5 | 4 | 16 | 1950-1979 | 11.9 | -0.03 | -0.05 | 0.03 | -0.05 | -0.04 | 0.01 | 0.05 | -0.02 | -0.11 | 0.01 | 0.01 | 0.02 | 0.00 | 0.00 | 0.01 | 0.02 | 0.00 | 0.06 |
| Multi-Family >=5 | 4 | 16 | 1980-1989 | 6.7 | -0.01 | -0.02 | 0.01 | -0.02 | -0.03 | 0.01 | 0.04 | -0.01 | -0.03 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.04 |
| Multi-Family >=5 | 4 | 16 | After 1989 | 3.4 | 0.00 | -0.01 | 0.00 | -0.01 | -0.01 | 0.00 | 0.02 | 0.00 | -0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.02 |
| Multi-Family >=5 | 4 | 17 | 1950-1979 | 210.7 | -0.16 | -0.29 | 0.16 | -0.26 | -0.22 | 0.06 | 0.39 | -0.01 | -0.33 | 0.34 | 0.53 | 0.68 | 0.16 | 0.40 | 0.27 | 0.94 | -0.03 | 3.29 |
| Multi-Family >=5 | 4 | 17 | 1980-1989 | 181.9 | -0.06 | -0.13 | 0.03 | -0.10 | -0.13 | 0.03 | 0.26 | -0.01 | -0.10 | 0.18 | 0.36 | 0.48 | 0.09 | 0.37 | 0.26 | 0.92 | -0.05 | 2.61 |
| Multi-Family >=5 | 4 | 17 | After 1989 | 33.6 | -0.01 | -0.02 | 0.01 | -0.02 | -0.03 | 0.01 | 0.05 | 0.00 | -0.01 | 0.03 | 0.06 | 0.10 | 0.02 | 0.08 | 0.05 | 0.19 | -0.01 | 0.51 |
| Multi-Family >=5 | 4 | 18 | Before 1950 | 66.5 | -0.30 | -0.65 | 0.27 | -0.72 | -0.55 | 0.06 | 0.50 | -0.11 | -1.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Multi-Family >=5 | 4 | 18 | 1950-1979 | 460.8 | -1.21 | -2.25 | 0.93 | -2.86 | -3.30 | 0.59 | 3.19 | -1.05 | -5.97 | 0.01 | 0.01 | 0.02 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.04 |
| Multi-Family >=5 | 4 | 18 | 1980-1989 | 128.4 | -0.22 | -0.62 | 0.12 | -0.52 | -1.01 | 0.20 | 1.11 | -0.37 | -1.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| Multi-Family >=5 | 4 | 18 | After 1989 | 19.2 | -0.02 | -0.06 | 0.02 | -0.06 | -0.12 | 0.02 | 0.14 | -0.03 | -0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| Multi-Family >=5 | 4 | 19 | Before 1950 | 75.1 | -0.14 | -0.39 | 0.27 | -0.31 | -0.22 | 0.04 | 0.30 | -0.04 | -0.49 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Multi-Family >=5 | 4 | 19 | 1950-1979 | 504.4 | -1.16 | -2.24 | 1.44 | -1.95 | -2.01 | 0.48 | 2.85 | -0.38 | -2.98 | 0.01 | 0.01 | 0.02 | 0.00 | 0.00 | 0.01 | 0.02 | -0.01 | 0.07 |
| Multi-Family >=5 | 4 | 19 | 1980-1989 | 274.9 | -0.28 | -0.74 | 0.40 | -0.68 | -1.03 | 0.26 | 1.79 | -0.33 | -0.61 | 0.00 | 0.01 | 0.02 | 0.00 | 0.00 | 0.01 | 0.02 | -0.01 | 0.05 |
| Multi-Family >=5 | 4 | 19 | After 1989 | 42.8 | -0.04 | -0.10 | 0.05 | -0.09 | -0.13 | 0.03 | 0.23 | -0.04 | -0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| Multi-Family >=5 | 4 | 20 | Before 1950 | 246.5 | -0.59 | -1.24 | 0.78 | -0.79 | -0.50 | 0.11 | 1.04 | -0.10 | -1.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Multi-Family >=5 | 4 | 20 | 1950-1979 | 1112.9 | -1.27 | -2.45 | 1.92 | -2.29 | -2.09 | 0.56 | 4.42 | -0.21 | -1.41 | 0.10 | 0.10 | 0.25 | -0.09 | 0.01 | 0.08 | 0.25 | -0.04 | 0.66 |

| | | | | | Aggregated Heating Component Loads (Trillion Btus) | | | | | | | | | Aggregated Cooling Component Loads (Trillion Btus) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Reg | Loc | YearMade | Number of Bldgs (thous.) | roof | wall | wndw solar | wndw cond. | infilt | peop | equip. | ground | total | roof | wall | wndw solar | wndw cond. | infilt | peop | equip. | ground | total |
| Multi-Family >=5 | 4 | 20 | 1980-1989 | 201.3 | -0.08 | -0.20 | 0.06 | -0.17 | -0.22 | 0.04 | 0.53 | -0.05 | -0.08 | 0.01 | 0.01 | 0.05 | -0.02 | -0.01 | 0.02 | 0.06 | -0.02 | 0.11 |
| Multi-Family >=5 | 4 | 20 | After 1989 | 191.5 | -0.04 | -0.11 | 0.04 | -0.11 | -0.14 | 0.03 | 0.35 | -0.02 | -0.01 | 0.01 | 0.01 | 0.03 | -0.01 | -0.01 | 0.02 | 0.04 | -0.01 | 0.08 |
| | | | | (millions) | | | | | | | | | | | | | | | | | | |
| **Summary for Mobile Home houses** | | | | 5.56 | -19.64 | -38.03 | 18.11 | -64.42 | -60.03 | 4.66 | 29.32 | -36.41 | -166.43 | 5.73 | 4.42 | 16.67 | 0.78 | 7.44 | 2.07 | 10.17 | -3.24 | 44.04 |
| **Summary for Single-Family Detached** | | | | 59.23 | -445.6 | -726.6 | 328.4 | -1015.2 | -1053.4 | 75.6 | 456.2 | -577.2 | -2957.7 | 128.4 | 86.3 | 292.9 | 9.0 | 145.5 | 35.5 | 171.4 | -54.7 | 814.2 |
| **Summary for Single-Family Attached** | | | | 7.25 | -42.0 | -81.9 | 36.7 | -112.7 | -124.7 | 8.6 | 54.2 | -64.4 | -326.2 | 11.7 | 9.5 | 32.5 | 1.0 | 15.0 | 3.9 | 19.4 | -6.0 | 86.9 |
| **Summary for Multi-Family 2-4 units** | | | | 7.99 | -98.8 | -103.6 | 25.1 | -70.1 | -120.8 | 14.5 | 60.7 | -58.3 | -351.3 | 9.6 | 6.1 | 11.5 | 0.3 | 6.3 | 4.9 | 14.6 | -4.7 | 48.4 |
| **Summary for Multi-Family >= 5 units** | | | | 16.07 | -40.5 | -50.5 | 22.5 | -78.5 | -107.0 | 13.9 | 74.0 | -21.8 | -187.7 | 7.2 | 5.6 | 19.0 | -2.0 | 12.9 | 9.8 | 34.8 | -5.7 | 81.6 |
| **Summary for All Single-Family** | | | | 66.49 | -487.6 | -808.5 | 365.1 | -1127.9 | -1178.1 | 84.2 | 510.4 | -641.6 | -3283.9 | 140.1 | 95.8 | 325.4 | 10.0 | 160.4 | 39.4 | 190.7 | -60.7 | 901.1 |
| **Summary for All Multi-Family** | | | | 24.07 | -139.3 | -154.0 | 47.6 | -148.6 | -227.8 | 28.4 | 134.7 | -80.1 | -539.1 | 16.7 | 11.7 | 30.5 | -1.7 | 19.2 | 14.7 | 49.4 | -10.4 | 130.0 |
| **Summary for All Houses** | | | | 96.11 | -646.6 | -1000.6 | 430.8 | -1340.8 | -1465.9 | 117.3 | 674.5 | -758.1 | -3989.4 | 162.5 | 111.9 | 372.6 | 9.0 | 187.0 | 56.2 | 250.3 | -74.4 | 1075.2 |