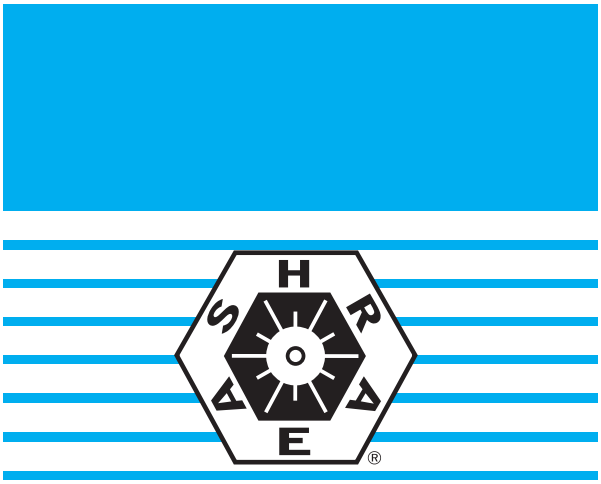

ASHRAE® GUIDELINE

Energy Cost Allocation for Multiple-Occupancy Residential Buildings

Approved by the ASHRAE Standards Committee June 29, 1994, and by the ASHRAE Board of Directors June 30, 1994.

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SPECIAL NOTE

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The Manager of Standards of ASHRAE should be contacted for

a. interpretation of the contents of this Guideline,
b. participation in the next review of this Guideline,
c. offering constructive criticism for improving this Guideline, and
d. permission to reprint portions of this Guideline.

CONTENTS

(This foreword is not part of this guideline but is included for information purposes only.)

FOREWORD

This guideline has been written following the principles of the guideline "Principles of Equitable Allocation of Energy Costs" in Appendix A.

Energy cost allocation (ECA) systems are combinations of monitoring devices and accounting procedures designed to allow the energy costs in master-metered multiple-occupancy residential buildings to be apportioned among the individual units on the basis of use. ECA systems have been used in Europe since the 1920s and in North America since the 1970s. They provide a means of encouraging energy conservation on the part of residents and provide the building owner with an equitable billing method without requiring the use of exact measurement equipment on each space-conditioning terminal element. Resident education and formula-based billing (resident utility billing systems, or RUBS) have been found to be relatively ineffective in motivating residents to reduce energy use in many cases, and many cost-allocation approaches have evolved employing electronic sensing and data acquisition and direct billing of residents. Research has shown that energy costs in multiple-occupancy residential buildings can be reduced 10% to 25% when residents are billed on the basis of an energy cost allocation system. In addition, there is now a strong preference for resident-paid utilities among developers and owners of multiple-occupancy residential buildings. Cost allocation is mandatory in some European countries and widely practiced in others. Cost allocation has been practiced on a limited scale in the U.S. since the first energy crisis, but no national standards or guidelines and very few state or local regulations have been developed to guide this activity.

The origin of Guideline 8 began with a report submitted to the National Bureau of Standards (NBS, now the National Institute for Standards and Technology, or NIST) by the Minneapolis Energy Office in 1986, citing the need for national standards to provide guidance to state and local jurisdictions in ensuring equitable allocation systems and protecting residents from owners' reduced financial incentive to upgrade building efficiencies once allocation is in place. This report was forwarded by NBS to the American National Standards Institute (ANSI). ANSI forwarded the information to the ASHRAE Manager of Standards, suggesting that there was a need for a standard covering heating cost allocation in multi-family rental housing and that ASHRAE was the proper group to write a standard. Input was requested from ASHRAE Technical Committee 6.1, Hydronic and Steam Heating Equipment and Systems. To gather further information on the issue and the need for a standard, TC 6.1 sponsored several sessions in conjunction with ASHRAE annual and winter meetings: a forum (June 1988, Ottawa) and two symposia (January 1989, Chicago, and January 1991, New York). TC 6.1 unanimously approved a proposed title, purpose, and scope in June 1989 and again in January 1990. A request to develop a standard was submitted to the Standards Committee by TC 6.1 in April 1990. The Standards Committee approved development of a guideline, with revisions to the title, purpose, and scope, in January 1991.

The National Conference on Weights and Measures (NCWM) undertook activity relating to energy cost allocation during this same time period. NCWM established a Task Force on Energy Allocation in July 1988 because of questions about the accuracy of allocation programs, as well as the report submitted to NBS in 1986 by the Minneapolis Energy Office. The task force met in October 1988 and in April and June 1989 at the National Institute for Standards and Technology (NIST) in Gaithersburg, MD. Based on extensive study and discussion, the salient task force conclusions were that

"1) energy or utilities allocation is not a weights and measures concern with respect to device regulation;
2) the NCWM Liaison Committee should approach an organization which might more appropriately regulate energy or utilities allocation systems;
3) information collected by the Task Force should be presented to such organization in the form of a recommended regulation as a basis for that organization to begin its work."

Their final report and "Recommended Regulation for Energy or Utilities Allocation Systems, Final Version" are contained in the Report of the 74th National Conference on Weights and Measures 1989 Executive Committee, Appendices F and G (NIST 1989). In 1990, representatives of the Task Force on Energy Allocation and the National Utilities Allocation Association (NUAA) met with the NCWM Liaison Committee to target national governmental, consumer, landlord/tenant, and technical organizations that should receive the "Recommended Regulation for Energy or Utilities Allocation Systems." Due to staff turnover, the Liaison Committee of NCWM had not approached any other organizations at the time ASHRAE began its guideline development, though ASHRAE was one of the intended targets of such a request and NCWM was subsequently made aware of ASHRAE's plans to write a guideline. A number of members of the NCWM Task Force served on the Guideline Project Committee, and the NCWM-recommended regulation was reviewed and drawn on heavily.

The NCWM-recommended regulation, with minor modifications, formed the basis for "Guidelines and Standards for Utilities Allocation Systems," adopted by the National Utilities Allocation Association in October 1989.

Readers are referred to the NCWM recommended regulation (NIST 1989), included for information purposes as Appendix D to this guideline, and the NUAA guidelines and standards for information on assignment of contractual responsibilities relating to ECA systems, which falls outside the purview of ASHRAE guidelines.

Regulations and standards of European countries, draft standards of the European Committee for Standardization (CEN), and related activities of state and local jurisdictions in the U.S. were also reviewed and used in developing the guideline.

1. PURPOSE

1.1 The purpose of this guideline is to establish recommended methods, applications, and terminology for energy cost allocation systems in multiple-occupancy residential buildings.

1.2 The objective of this guideline is equitable and economically justified cost distribution of energy usage among occupancy units.

2. SCOPE

2.1 This guideline covers (a) all types of HVAC system energy use and all types of energy use on the common utility meter with the HVAC system or included in the same fuel delivery and (b) new and existing residential buildings intended for multiple occupancy.

2.2 It is not intended that the means or methods in this guideline be used for the purpose of resale of energy, which practice is prohibited in many areas.

2.3 This guideline does not cover the use of gas or electric meters for submetering, as defined herein.

3. DEFINITIONS

3.1 Applicable definitions contained in the following publications should be utilized in the interpretation of this guideline:

ASHRAE Terminology of Heating, Ventilation, Air Conditioning, & Refrigeration. 1991.

1993 ASHRAE Handbook—Fundamentals

Both are published by the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 1791 Tullie Circle NE, Atlanta, GA 30329.

3.2 Additional terms used in this guideline not found in the publications referenced in 3.1 are defined in this section.

adjusted bill: a bill issued to a resident that is based on usage that has been adjusted from the utility company's reported meter readings.

allocation: the apportionment of energy costs on a monitored or distributed basis, or a combination of the two, to individual units within a multiple-occupancy residential building.

allocation device: a device that monitors parameters used to determine the net HVAC energy consumed in conditioning an individual unit.

base use: primary HVAC system losses incurred and auxiliary system energy consumed in maintaining a central HVAC energy source available for consumption by all residents.

common area: the conditioned areas of a building common to the residents and guests, such as halls, entries, and storage and meeting rooms.

distributed energy costs: those fees, charges, or assessments for energy use that are apportioned to individual units on any pro-rata basis, rather than on the basis of measurements.

energy cost allocation systems (ECA systems): systems providing a means to apportion approximate energy consumption to individual dwelling units in a multiple-occupancy residential building, based on one or more parameters controlled by the resident.

energy cost allocation (ECA): the allotment of energy costs to residents at an aggregate cost sum that does not exceed the actual costs paid to purchase and rebill that energy.

estimated bill: a bill issued to a resident that is based on utility company estimated meter readings for either the starting or the ending date of the utility company's billing period, or both.

flow sensor: a sensor capable of providing a signal (output) that is related to the volumetric flow of liquid through the sensor.

individual unit: a single unit within a multiple-occupancy residential building.

master meter: central utility meter for an aggregation of individual housing units.

measurement unit: the unit of measurement used to measure the parameter(s) recorded by an allocation device.

monitored energy use: the energy delivered directly to individual units for space conditioning, and monitored by the allocation devices. Costs for this energy use are apportioned according to the allocation device measurements.

monitored energy costs: those fees, charges, or assessments that are made for net HVAC energy consumed in conditioning individual units ("monitored energy use") and are apportioned among the units on the basis of regularly recurring measurements of specified measurement parameters by the allocation devices.

non-monitored energy uses: energy uses on the common utility meter with the HVAC system or included in the same fuel delivery, other than monitored energy uses. Costs for these energy uses may be treated as distributed energy costs or owner-paid costs. Non-monitored energy uses include

- on-site plant and distribution losses and auxiliary energy uses of central HVAC systems and district heating and cooling systems ("base use"),
- primary HVAC system energy consumed in condi-