

# Commercial Kitchens Initiative



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## Revisions

January 2021	<i>CEE<sup>SM</sup> High Efficiency Specifications for Commercial Pre-Rinse Spray Valves</i> retired and initiative strategy for PRSV revised.
October 2017	<i>CEE<sup>SM</sup> High Efficiency Specifications for Commercial Fryers</i> , <i>CEE<sup>SM</sup> High Efficiency Specifications for Commercial Rack Ovens</i> , and <i>CEE<sup>SM</sup> High Efficiency Specifications for Commercial Dishwashers</i> suspended.
March 2017	<i>CEE High Efficiency Specifications for Commercial Refrigerators and Freezers</i> suspended.
January 2015	<i>CEE<sup>SM</sup> High Efficiency Specification for Convection Ovens</i> revised increasing stringency of criteria for Tier 1 and adopting a Tier 2; <i>CEE<sup>SM</sup> High Efficiency Specifications for Commercial Rack Ovens</i> adopted.
June 2014	<i>CEE<sup>SM</sup> High Efficiency Specifications for Commercial Pre-Rinse Spray Valves</i> adopted, <i>CEE Commercial Kitchens Ventilation: Energy Efficiency Program Administrator's Guide to Demand Control Ventilation</i> updated.
January 2012	<i>CEE<sup>SM</sup> Commercial Kitchen Demand Control Ventilation (DCV) Field Test Protocol Version 1.0</i> approved.
October 2011	<i>CEE<sup>SM</sup> Commercial Convection Oven Specification</i> adopted, notice of availability of <i>CEE<sup>SM</sup> Commercial Ice Machines Program Guide</i> .
October 2010	<i>CEE Commercial Kitchens Ventilation: Energy Efficiency Program Administrator's Guide to Demand Control Ventilation</i> published.
July 2008	Initiative description updated.
June 2008	<i>CEE<sup>SM</sup> High Efficiency Specifications for Commercial Dishwashers</i> adopted.
January 2007	<i>CEE<sup>SM</sup> High Efficiency Specifications for Steamers</i> and <i>CEE<sup>SM</sup> High Efficiency Specifications for Hot Food Holding Cabinets</i> adopted.
January 2006	<i>CEE<sup>SM</sup> Commercial Kitchens Initiative</i> instituted, incorporating the specifications of the <i>CEE<sup>SM</sup> Commercial Refrigeration Initiative</i> including the <i>CEE<sup>SM</sup> High Efficiency Specifications for Solid Door Refrigerators and Freezers and Glass Door Refrigerators</i> , a revised version of the <i>CEE<sup>SM</sup> Commercial Ice Machines Specification</i> , and establishing new <i>CEE<sup>SM</sup> High Efficiency Specifications for Commercial Fryers</i> , and <i>CEE<sup>SM</sup> Application Guidelines for Pre-Rinse Spray Valves</i> .
December 2005	<i>CEE<sup>SM</sup> Commercial Kitchens Initiative</i> adopted.

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# 1 Initiative Overview

The foodservice market consists of some of the most energy-intensive commercial spaces, consuming roughly 2.5 times more energy per square foot than commercial office buildings. In addition, this market is also a large consumer of water and generator of wastewater and solid waste. To address some of the energy efficiency opportunities in this market, the Commercial Refrigeration Initiative was approved by the CEE Board of Directors in December 2002 and included voluntary energy performance specifications for refrigerators, freezers and ice makers. Based upon program experience, Initiative participants agreed that program participation could be increased by expanding the Initiative to include a suite of offerings relevant to the foodservice sector, thereby expanding to a more comprehensive commercial kitchens focus. As a result, CEE developed the Commercial Kitchens Initiative (the Initiative) in 2005. The purpose of this Initiative is to provide clear and credible definitions in the marketplace as to what constitutes highly efficient energy and water performance in cooking, refrigeration and sanitation equipment and then to help streamline the selection of products through targeted market strategies based upon the unique features of particular foodservice markets. Since 2005, the CEE Board of Directors has approved new and revised specifications and program guidance for the existing refrigeration products and other new product categories, as described in this document. The Initiative focus has also been broadened from an initial focus on the restaurant segment to include energy and water efficiency opportunities across all foodservice market segments.

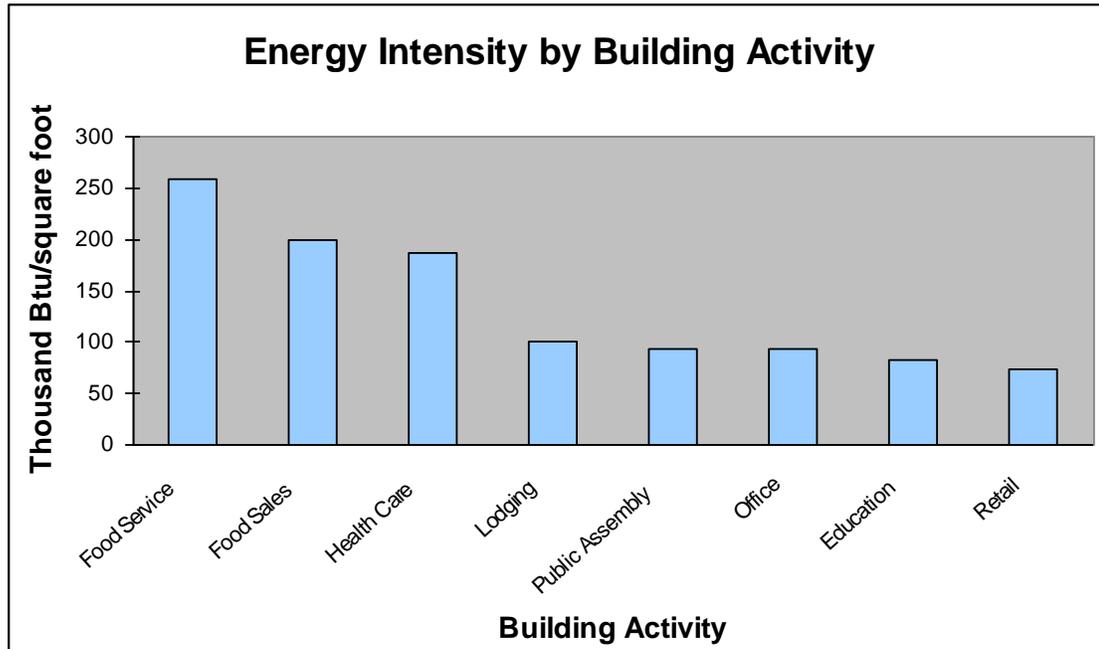
The remainder of this document is organized as follows: Section 2 provides an overview of the energy consumption in the foodservice industry and the foodservice market; Section 3 outlines the major goals, strategies, and activities of the Initiative; Section 4 provides information on how to participate in this Initiative; and Section 5 contains the specifications and supporting information for foodservice equipment covered by this Initiative.

## 2 Background

### 2.1 Foodservice Energy Consumption

Buildings with foodservice operations are the most energy intensive of all commercial building types tracked by the U.S. Department of Energy (DOE) Commercial Building Energy Survey (CBECS). According to the DOE 2003 CBECS data, commercial buildings dedicated to foodservice operations consume an average of 258,000 Btu/sq. ft., and market segments including foodservice operations, such as food sales, health care, and lodging, were the next most energy intensive market segments. By comparison, office buildings consume an average of 93,000 Btu/sq. ft (see **Error! Reference source not found.**).

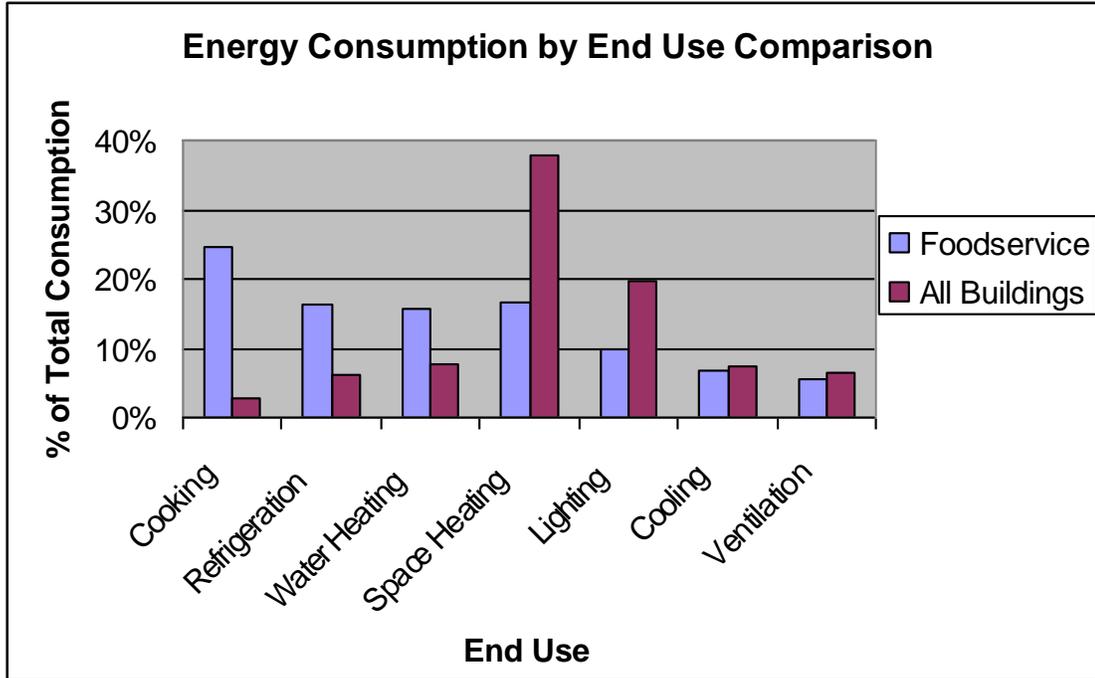
Figure 1. Energy Intensity by Building Activity



The dominant energy consuming end uses in foodservice establishments are unique relative to the end uses that tend to dominate other types of commercial buildings (see **Error! Reference source not found.**). While space heating and lighting are the dominant energy consuming end uses in other commercial buildings, the energy use in foodservice establishment is generally dominated by cooking, refrigeration, and sanitation end uses.<sup>1</sup>

<sup>1</sup> Energy Information Administration, Commercial Building Energy Consumption Survey, 2003.

Figure 2. Energy Consumption by End Use Comparison



In absolute terms, the annual energy consumption for water heating, cooking, and refrigeration for foodservice establishments in the U.S. is 242 trillion Btu.<sup>2</sup>

## 2.2 Foodservice Industry

The foodservice industry includes a wide range of market segments, including independent restaurants, chain restaurants, elementary and secondary schools, colleges and universities, corporate foodservice operations, healthcare, hospitality, and supermarkets. These market segments differ in many ways including their decision-making channels as well as equipment considerations. This Initiative does not include a preferred market segmentation approach at this time. Additional guidance and information characterizing each market segment can be found in the CEE [Program Guide for Commercial Kitchens Market Segments](#), developed by the CEE Kitchens Committee and [Cooking Up a New Approach for Commercial Program Design](#), a research paper authored by CEE staff, a group of CEE members, an industry representative, and ENERGY STAR staff.

<sup>2</sup> Energy Information Administration, Commercial Building Energy Consumption Survey, 2003.

### 3 Initiative Goals, Strategies & Major Activities

The goal of this Initiative is to provide clear and credible definitions in the marketplace as to what constitutes highly efficient energy and water performance in cooking, refrigeration and sanitation equipment and to help streamline the selection of products through targeted market strategies based upon the unique features of particular foodservice markets.

To support the goal of this Initiative, CEE applies the following strategies:

1. Research binational opportunities for significant energy and water savings opportunities in commercial kitchens, develop voluntary energy and water equipment performance specifications that represent efficiency products and maintain the relevance of these specifications over time.
2. Initiate and strengthen relationships with key stakeholders, including manufacturers, trade associations, and key end-user associations.
3. Increase the use of CEE specifications in efficiency programs through promotion and exploration of various program approaches and document how they can meet various program objectives.
4. Inform and strengthen the relevance of the ENERGY STAR® and WaterSense® programs for energy and water efficiency program administrators.

The major Initiative activities that support the overall Initiative goal and strategies include:

1. Research opportunities for additional energy and water savings opportunities in commercial kitchens, develop and maintain energy and water equipment specifications.
  - Support a working committee of efficiency program administrators to assess the technical energy savings potential foodservice equipment
  - Invite water agencies to participate in the Initiative to ensure adequate understanding and consideration of water efficiency opportunities
  - Analyze specification development and revision opportunities according to:
    - Market relevance to the foodservice industry
    - Electric, natural gas and water consumption savings potential
    - Level of effort required to develop a significant performance specification
    - Existence of national, state, and local codes and standards
    - Other criteria and factors as appropriate.
2. Initiate and strengthen relationships with key stakeholders, including manufacturers, trade associations, and key end-user associations.
  - Attend trade shows as relevant, timely and resources allow
  - Issue periodic updates on the Initiative, member programs, and [qualifying products lists](#)
  - Vet Initiative outputs with stakeholders.
3. Increase specification use in programs through promotion and exploration of various program approaches and document how they can meet various program objectives.

- Support a working committee of energy efficiency program administrators to share and analyze market dynamics, program approaches, and implications for efficiency program design
  - Conduct market research to develop program guidance supporting easy adoption of specifications
  - Capture program experiences to facilitate learning by new program administrators and across existing programs
  - Maintain a [summary of CEE member programs](#).
4. Inform and strengthen the relevance of the ENERGY STAR® and WaterSense® programs for energy and water efficiency program administrators.
- Monitor, analyze and provide consensus-based committee comments to the U.S. EPA during the development and revision of related ENERGY STAR and WaterSense specifications
  - Facilitate collaboration in areas of mutual interest and scope between efficiency programs and the ENERGY STAR and WaterSense program.

## 4 Initiative Participation

As with all Initiatives of CEE, participation in the Commercial Kitchens Initiative is voluntary. To be considered an Initiative participant, one must support the CEE Commercial Kitchens Initiative through the following activities:

1. Incorporate at least one of the Initiative specifications or guidelines in an educational or incentive based regional or local program.
2. Communicate the scope, duration, and key aspects of their respective regional or local programs to CEE staff when requested.
3. Allow the use of their organization's name and program information for the purpose of achieving the Initiative's goals.

## 5 Equipment Specifications

### 5.1 Overview

As discussed above, the dominant energy consumption end uses in the foodservice industry are cooking (25%), refrigeration (16%), and sanitation (16%). Typical cooking equipment includes fryers, convection ovens, rack ovens, ranges, steamers, hot food holding cabinets, conveyor ovens, griddles, broilers, and combination ovens. Most cooking equipment is available powered by either natural gas or electricity, and some cooking equipment also consumes water (e.g., steamers, combination ovens, wok ranges). While not included in cooking energy consumption, kitchen ventilation systems, which support cooking activities, also represent significant energy

consumption in the foodservice industry. Typical refrigeration equipment includes self-contained refrigerators and freezers, ice machines, walk-in refrigerators and freezers, and ice cream cabinets. Refrigeration equipment is generally available using either air-cooled or water-cooled technology, whose choice impacts energy and water consumption. Typical sanitation equipment includes dishwashers, pre-rinse spray valves, and hot water heaters. Efficiency advances in sanitation equipment typically impact both energy and water efficiency as reductions in hot water consumption result in energy savings from heating less water.

This Initiative includes voluntary energy performance specifications for fryers, steamers, hot food holding cabinets, convection ovens, rack ovens, self-contained refrigerators and freezers, ice machines, dishwashers, and pre-rinse spray valves. Additional equipment categories are periodically evaluated for specification development potential. As new product specifications are developed and approved by CEE this section will be updated with that information.

## 5.2 Safety, Sanitation, and Persistence of Energy Savings

As with many types of equipment, proper installation, maintenance, and operation of commercial kitchen equipment are critical to ensuring safety, sanitation, and persistence of energy savings. All equipment should be installed, maintained, and operated according to manufacturer instructions and in compliance with all applicable Federal and local codes and standards.

In the case of commercial cooking equipment, unwanted vapors, heat and products of combustion that are not properly vented may result in poor or even hazardous indoor air quality or fire hazard; improper electric and gas utility installations may result in fire or electrocution hazard. These concerns are addressed by the following US national codes and standards:

4. Indoor air quality and fire hazard of cooking operations: NFPA 96-Latest Edition, *Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations*. **This standard does not typically apply to single dwelling units, so energy efficiency programs that do not otherwise limit support for commercial equipment installed in residential locations may wish to require this compliance with this code for residential installations as well in program requirements.**
5. Proper installation: NFPA 54-Latest Edition, *National Fuel Gas Code*; and ANSI Z223.1/NFPA 70-Latest Edition, *National Electrical Code*. These covers both commercial and residential applications, and include specific requirements related to foodservice equipment, regardless of installation location.

In addition to required local, State, and Federal standards, user and installation manuals often stipulate additional installation, maintenance, and operation instructions to ensure safe and sanitary use of equipment, so efficiency programs may wish to require that all equipment is

installed, maintained, and operated as directed by the manufacturer as well as in accordance with all applicable local, State, and Federal codes and standards.

Finally, while Federal, State, and Local jurisdictions in both the US and Canada may choose to adopt any of the codes and standards listed above actual adoption in any given location may vary, and program administrators should investigate the requirements in their jurisdiction prior to including references to any of the codes or standards identified here.

### 5.3 Test Result Variability from Use of Food Products in Product Testing

Several of the equipment categories covered by this Initiative require the use of food products (potatoes) in product testing. These equipment categories currently include fryers, steamers, and convection ovens. The use of real food products in product testing may result in some amount of variability in test results due to the variability in food products. The American Society for Testing and Materials (ASTM) has periodically reconsidered the use of food products as opposed to a more consistent, non-food product in test methods. ASTM has consistently found that the use of food products instead of non-food products in product testing is more indicative of real-world operating conditions, and therefore continues to instruct use of food products in product testing. In addition, among food products, potatoes, while not perfectly uniform, have been found to be highly consistent. CA test laboratories are currently conducting additional research on this issue, to better understand the potential magnitude of the variability. Preliminary results from this testing indicate that the level of variability is not significant. This section will be updated when additional information based on the testing in CA becomes available.

### 5.4 Fryers

Detailed [program guidance](#) related to fryers is available on the CEE web site. This guidance includes the following information: equipment description, product use and lifetimes, specifications and test methods, product availability, incremental cost, energy savings, program design tips, and additional resources. The full [specification](#), including how to qualify products, and [qualified products list](#) are available on the CEE web site.

### 5.5 Steamers

Detailed [program guidance](#) related to steamers is available on the CEE web site. This guidance includes the following information: equipment description, product use and lifetimes, specifications and test methods, product availability, incremental cost, energy savings, program design tips, and additional resources. The full [specification](#), including how to qualify products,

[qualified products list](#), and [note on interpretation of test data](#) are also available on the CEE web site.

## 5.6 Hot Food Holding Cabinets

Detailed [program guidance](#) related to hot food holding cabinets is available on the CEE web site. This guidance includes the following information: equipment description, product use and lifetimes, specifications and test methods, product availability, incremental cost, energy savings, program design tips, and additional resources. The full [specification](#), including how to qualify products, and [qualified products list](#) are also available on the CEE web site.

## 5.7 Convection Ovens

Detailed [program guidance](#) related to commercial convection ovens is available on the CEE web site. This guidance includes the following information: equipment description, product use and lifetimes, specifications and test methods, product availability, price differential, energy savings, program design tips, and additional resources. The [full specification](#), including how to qualify products, and [qualified products list](#) are also available on the CEE web site.

## 5.8 Self-Contained Refrigerators and Freezers

Detailed [program guidance](#) related to self-contained refrigerators and freezers is available on the CEE web site. This guidance includes the following information: equipment description, product use and lifetimes, specifications and test methods, product availability, price differential, energy savings, program design tips, and additional resources. The full [specification](#), including how to qualify products, and [qualified products list](#) is also available on the CEE web site.

## 5.9 Ice Machines

Detailed [program guidance](#) related to commercial ice machines is available on the CEE web site. This guidance includes the following information: equipment description, product use and lifetimes, specifications and test methods, product availability, price differential, energy savings, program design tips, and additional resources. The full [specification](#), including how to qualify products, and [qualified products list](#) are also available on the CEE web site.

## 5.10 Dishwashers

Detailed [program guidance](#) related to dishwashers is available on the CEE web site. This guidance includes the following information: equipment description, product use and lifetimes, specifications and test methods, product availability, incremental cost, and energy savings. The

full [specification](#), including instructions on how to qualify products, is also available on the CEE web site. A [qualified products list](#) is maintained by ENERGY STAR. (Note that flight type machines are not eligible for qualification under the CEE specification.)

## 5.11 Pre-Rinse Spray Valves

Detailed [program guidance](#) related to pre-rinse spray valves is available on the CEE website. The CEE PRSV [specification](#) was retired on January 15, 2021, thereby discontinuing maintenance of the specification and qualified products list. CEE determined that the market has reached maximum technological potential and no longer presents an opportunity for a voluntary CEE performance specification to differentiate product energy and water performance that would provide meaningful, cost-effective energy savings beyond the new federal minimum standards. Given the success of market transformation—the wide availability of highly efficient products that meet or exceed the CEE specification tiers, achieved through years-long collaboration between CEE member program administrators, water utilities, federal partners, and other experts—there is an opportunity to use PRSV in program designs aimed at building a relationship with the customer, with CEE members reporting success with using PRSV in direct install. There may also be an early retirement opportunity given the installed base of 1.5 million PRSVs and average product life of five years. Detailed program guidance that reflects the changes in strategy to support such programs will be available on the CEE website.

## 5.12 Rack Ovens

Detailed [program guidance](#) related to rack ovens is available on the CEE Forum. This guidance includes the following information: equipment description, product use and lifetimes, specifications and test methods, product availability, price differential, energy savings, program design tips, and additional resources. The [full specification](#), including how to qualify products, and [qualified products list](#) are also available on the CEE web site.