

High Efficiency Residential Gas Heating



Overview: CEE's High efficiency Residential Gas Heating Initiative was launched in January 1998 to encourage the purchase and proper installation of high efficiency gas furnaces and boilers. Initiative participants promote common performance levels for efficient equipment and work with manufacturers and contractors to encourage proper installation practices.

When the Initiative began, just 12 percent of furnaces available in the market met CEE's high efficiency specifications. By 2009, nearly 30 percent of available models qualified for CEE's Initiative. Mirroring this increase in availability, high efficiency furnaces now represent more than one-third of national furnace shipments, a 60 percent increase since 1998. There have been similar trends in the residential boiler market. By 2009, nearly 24 percent of available models qualified for the CEE's Initiative, an 80 percent increase since 2005. Due to this steady and marked advance in the availability and popularity of energy efficient equipment, CEE revised the fuel performance levels for gas furnaces in 2002, added an electricity component to address air-handling efficiency in furnaces in 2003, and revised the fuel performance levels for gas boilers in 2010.

About This Market: There are approximately 35 million gas furnaces currently operating in U.S. homes. Two million gas furnaces are replaced each year. Since 1990, gas furnaces have experienced an increase in popularity and now represent about 73 percent of all central heating equipment sold. The equipment life of a gas furnace is 15-18 years.

Although boilers are used to heat only 7 percent of the homes in the United States and 11 percent of the homes in Canada, they represent nearly a quarter of the heating systems in the Northeast and are very durable, usually lasting 30-40 years.

How CEE's Gas Heating Initiative Works: Energy efficiency programs are the driving force behind this Initiative. Participating utilities and other energy efficiency program administrators promote high efficiency heating equipment that meets the CEE specifications (see next page). Market acceptance is fostered through financial incentives, educational activities, and industry stakeholder training. CEE assists Initiative participants by monitoring program activities and market changes, and facilitating communication between efficiency programs and industry stakeholders. In addition, CEE maintains a list of CEE-qualified furnaces and boilers on its Web site (www.cee1.org) to help identify efficient equipment. To obtain a copy of the qualifying products list, download a copy from the Residential Gas Heating page on the CEE Web site.

Furnaces and boilers are rated by an Annual Fuel Utilization Efficiency (AFUE). The minimum efficiency standards, as established by the U.S. Department of Energy, are 78 percent AFUE for furnaces and 80 percent AFUE for hot-water boilers.

In recognizing that different areas of the country have varying heating requirements, both specifications consist of multiple tiers for fuel efficiency, as shown on the next page. The Tier 1 for both products is set at the current ENERGY STAR® level.

In November 2003, CEE added an optional specification for electricity use by gas furnaces. Power use for air handling (moving the heated air through the ducts into the house) represents 70-80

FACT SHEET

percent of the electricity drawn by furnaces. Efficient air-handling systems can include motors with greater efficiency and fans that are aerodynamically more efficient. The optional air-handling performance level specifies that the annual energy use must be less than or equal to 2 percent of the total energy use by the furnace. This specification applies only to furnaces that meet at least the Tier 1 fuel efficiency specification (90 percent AFUE).

CEE’s High Efficiency Residential Gas Heating Initiative Specifications
(See CEE Web site for Terms of Usage)

Annual Fuel Utilization Efficiency (AFUE) Performance Levels

Technology	CEE Specifications (%)	Federal Minimum (%)
Gas-fired Furnaces	Tier 1: 90 Tier 2: 92 Tier 3: 94	78
Gas-fired Boilers	Tier 1: 85 Tier 2: 90	80

Air Handling (Electricity Use) Performance Level*

Technology	CEE specification
Gas-fired Furnaces, Minimum of 90% AFUE	$\frac{3.412 * E_{AE}}{3.412 * E_{AE} + 1000 * E_F} \leq 2.0\%$

*There is no Federal minimum for furnace electricity use. E_{AE} (Annual Electricity Use) and E_F (Annual Fuel Energy Use) are outputs of the US Department of Energy test procedure for residential gas furnaces. Both E_{AE} and E_F are listed in the Air-Conditioning, Heating, and Refrigeration Institute *Directory of Certified Product Performance* (available at www.ahrirectory.org).

Quality Installation Specification: This Initiative also promotes proper sizing and system installation through utility education programs and installation evaluations. Such measures can reduce system efficiency losses by as much as 35 percent. To address this, in 2007 CEE adopted the Air Conditioning Contractors Association Standard: HVAC Quality Installations Specification, which is available on the CEE Web site (www.cee1.org). This standard is a comprehensive document providing consistent guidelines that can be incorporated into an efficiency program with the goal of encouraging energy efficiency installations.

Expected Energy Savings: Energy savings vary greatly, depending on locale and usage patterns in heating system operations. Investing in high efficiency heating equipment is generally most cost effective in cooler climates where equipment is used more frequently. In general, consumers can expect to save 12 percent of their heating bills with energy efficient furnace equipment (compared to equipment meeting minimum federal standards). Investing in an energy efficient boiler can result in approximately 6 percent energy savings over standard efficiency equipment. A quality installation can save up to 35 percent of energy losses in furnace heating systems.

For further information about CEE’s Residential Gas Heating Initiative, as well as other CEE natural gas programs, contact Jennifer Anziano at janziano@cee1.org or 617-337-9278.