

Infrared Heaters Offer Green Benefits

Long before the importance of the environment was widely understood, fuel efficient heaters for industrial and commercial use were available in the marketplace. Gas-fired infrared heaters offer a solution to the global effort for businesses to design, build and operate facilities that are ecologically friendly.

Infrared heaters allow for a lower temperature setting, resulting in lower fuel costs. On average, infrared heaters can save the customer 23 to 50%. Two-stage technology can reduce energy costs by another 12% and benefit customers with faster heat loss recovery, improved comfort and a significant reduction in equipment cycles.

Today more than ever, infrared heaters are getting the recognition they deserve for their many green benefits they bring to businesses, including:

- Proven fuel savings.
- Possible rebates from local gas companies.
- Low levels of harmful emissions.
- Improved air quality because airborne particles are not circulated.
- Increased comfort levels.

'Green' Characteristics of Infrared Heaters

Topic	BTU/h Range
Energy Savings	Heating with gas-fired infrared heating appliances have proven fuel savings over traditional forced air systems. Documented cases have confirmed a savings of up to 50%.
Rebates	Numerous gas companies recognize the energy savings associated with infrared heaters and encourage the installations by offering rebates of up to \$500 for each installed unit. Check with your local supplier.
Tax Credits	The Energy Act of 2005 allows commercial buildings a tax credit of up to \$1.80 per sq. ft. for buildings that demonstrate a total energy savings greater than 50% of an established baseline. Infrared heating can help to achieve an overall energy efficient building. LEED® Platinum Certification automatically qualifies.
Emissions	Reducing the energy consumption of your heating appliance will reduce the amount of CO ₂ released into the atmosphere. Furthermore, infrared heaters are low emitters of other noxious gases such as NOx, Carbon Monoxide and VOC's.
Air Quality	Infrared heaters do not use air currents to transfer the heat. This will help minimize the exposure of hazardous particles, chemical pollutants, and cross-contamination of regularly occupied areas.
Thermal Comfort	Individual zone controls increase the thermal comfort for all occupants. Heat energy stored within ambient objects rather than the air improves the heater's energy efficiency.
Advanced Technology	Features such as two-stage technology, black coated emitter tubes, highly polished reflector material, and an advanced burner design all contribute to increasing the heater's energy efficiency.

Proven Infrared Savings

Reduced fuel requirements of radiant heaters allow them to be installed with a rated input of 80 to 85% of the total calculated heat loss. Source: ASHRAE HVAC Systems and Equipment.

"Additional energy savings of 25 to 30% were associated with operation of the two-stage infrared system..."

Source: ASHRAE Technical Paper 4643.

"...for total building heating... complete [radiant heating] systems... produce a most effective and efficient means of utilizing energy for space heating." Source: ASHRAE Systems Handbook.

"...annual fuel savings as high as 50%." Source: ASHRAE Systems Handbook Chapter 15.

Two-stage technology has a proven 35% less cycles and an additional 12% fuel savings over single-stage operation. Source: Braneida Study October 1993.

Did You Know?

USA fossil fuel consumption in BTU's.

- Dec. 2009 - 58.7 Quadrillion
- Dec. 2008 - 62.8 Quadrillion
- Dec. 2007 - 64.6 Quadrillion

Source - US Department of Energy

Definitions and References

LEED®: An acronym that stands for “Leadership in Energy and Environmental Design”. This is a third party certification program for design, construction, and operation of high performance green buildings. Visit www.usgbc.org/LEED.

LEED® AP: An accredited professional who has demonstrated a thorough understanding of green building practices, principles of green, and the LEED® Rating System through a standardized test. Consult with LEED® AP when planning to build an energy efficient, green building. Visit www.gbci.org.

ASHRAE: An acronym that stands for “American Society of Heating, Refrigeration, and Air-Conditioning Engineers”. A technical society to advance the arts and sciences of heating, ventilation, air conditioning, and refrigeration. Visit www.ashrae.org.

USGBC: An acronym that stands for “U.S. Green Building Council”, a non-profit trade organization that oversees the LEED® Certification program. Visit www.usgbc.org.

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The USGBC



Energy efficiency is recognized by LEED® as a significant contributing factor to a green environment. An infrared heating system design with multiple units allows for greater control over comfort. Infrared allows for overall lower temperatures, yet units can be controlled separately for higher or lower temperatures in each area.

The U.S. Green Building Council (USGBC) is a non-profit organization that oversees LEED®, and the Green Building Certification Institute (GBCI) handles the credentialing of professionals who demonstrate a thorough understanding of LEED® principles. Those individuals can earn an “Accredited Professional” certification – LEED® AP – title.

Customers should consult a LEED® AP when beginning a new building project or making enhancements to an existing facility.

Taking the "LEED®"

Businesses worldwide are taking the steps to build office buildings, manufacturing plants and commercial shops with efforts toward higher efficiencies and lower operating costs by going “green.”



Leadership in Energy and Environmental Design (LEED®) is a third-party certification program and an internationally

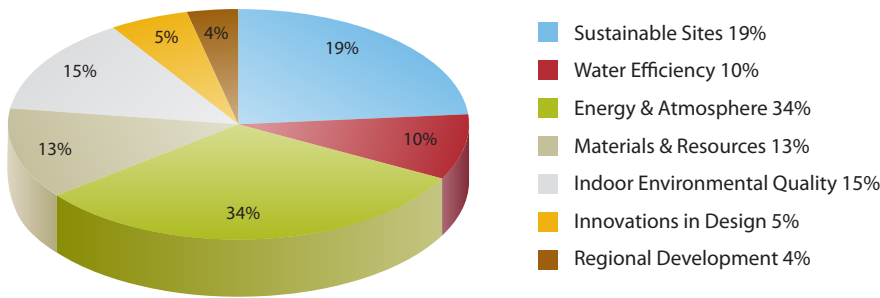
accepted benchmark for the design, construction and operation of high-performance, environmentally friendly buildings. LEED® provides the tools to create and sustain a building's LEED® rating, and recognizes performance in seven key credit categories:

- Sustainable Site
- Water Efficiency
- Energy and Atmosphere
- Materials and Resources
- Environmental Quality
- Innovation and Design
- Regional Priority

Energy Savings Recognition & Reward

The continued emphasis on the use of energy saving appliances has resulted in numerous programs designed to encourage the use of infrared heaters. Federal tax credits (see page 8-1) and/or generous utility rebate programs (see page 10-1), designed to promote the use of ‘green’ technologies, are presently available in many parts of the United States.

LEED® Points Breakdown



When implementing the LEED® NC (v.3.0) process, there are seven credit categories in which up to 110 total points are earned. The application of infrared heaters can contribute up to 22 points in three of the qualifying categories.

Category Code	Category Point Total		Description
	Code	Total	
SS	21	Sustainable Sites	
WE	11	Water Efficiency	
EA	37	Energy & Atmosphere (up to 19 points)	
MR	14	Materials and Resources	
EQ	17	Indoor Environmental Quality (up to 2 points)	
ID	6	Innovation and Design (up to 1 point)	
RP	4	Regional Priority	

Qualifying Credit Categories when Using Infrared Heaters: EA, EQ, ID

Energy & Atmosphere (EA): Category point total = 37 points. Establishes energy efficiency and system performance, optimizes energy efficiency, supports ozone protection protocols and encourages renewable/alternate energy sources.

Indoor Environmental Quality (EQ): Category point total = 17 points. Establishes minimum indoor environmental quality performance to prevent the development of indoor environmental quality problems in buildings.

Innovation & Design (ID): Category point total = 6 points. Project teams are encouraged to apply for innovation credits if the energy consumption of non-regulated systems are also reduced. One point can be credited if at least one project team participant is a LEED® Accredited Professional (AP).

Areas Where Infrared Can Contribute

LEED® Credits

Based on LEED® for new construction.

Contributes up to **22*** pts.

- Reduced fuel consumption rates up to 50%. (**EA Credit 1**)
- Reduced electrical energy consumption. (**EA Credit 1**)
- Increased thermal comfort levels by design in the space. (**EQ Credit 7.1**)
- Improved individualized comfort zones through modular design. (**EQ Credit 6.2**)
- Exemplary performance in energy conservation. (**ID Credit 1**)
- Consulting a LEED® AP can potentially earn an additional credit. (**ID Credit 2**)

* Out of 110 total points. See adjacent chart for point breakdown and infrared contribution.

Four Levels of Certification

Certified:	40-49 pts.
Silver:	50-59 pts.
Gold:	60-79 pts.
Platinum:	80+ pts.

Did You Know?

There are several LEED approved energy modeling software programs from which to choose. Below is a list of some of the more popular programs:

- US DOE®
- Trane TRACE®
- Carrier HAP®
- eQUEST®
- Energy 10®
- TRNSYS®
- EnergyPlus®
- EnergyPro®
- VisualDOE®
- BLAST®
- Energy Pro®

Consider This...

The information that is provided from the energy modeling does not represent the actual energy costs after construction. Many extraneous factors such as variable occupancy, building operation and maintenance, weather, and changes in energy rates can all play a factor in the actual outcome.



As with any calculation, the results are only as good as the information provided. The old antic dote 'garbage in, garbage out' even applies when utilizing energy modeling tools.

Energy Modeling and Infrared Heaters

What is Energy Modeling?

Energy modeling is the process in which a building is evaluated through a software program for total building efficiency. This is accomplished by utilizing specialized software with complex algorithms, specific design variables, and weather data. The benefit of performing an energy modeling simulation is that a building can be compared to several different design alternatives prior to the start of construction. This allows the owner and the design team to select the optimal design.

Energy Modeling and LEED®

The LEED® rating system typically utilizes energy modeling to award points based on a percentage of improvement over a theoretical baseline building. The amount of points awarded is dependent on the percentage of improvement. The energy modeling must be in conformance with ASHRAE 90.1-2004, and the calculation for improvement is taken from appendix G; seen below.

$$100 \times \frac{(\text{Baseline Building Performance} - \text{Proposed Building Performance})}{\text{Baseline Building Performance}} = \text{Percentage Improvements}$$

How to Utilize Infrared in an Energy Model

In order to represent the maximum efficiency of infrared, a few key items must be considered prior to entering data into the calculation. These following tips are provided to help maximize the points scheme for a project utilizing infrared.



TIP #1: According to the ASHRAE Handbook HVAC SYSTEMS AND EQUIPMENT, when utilizing infrared heating, it is recommended to reduce the required heat energy 80 to 85% of the total heat needed according to the calculated heat loss. This reduction in fuel consumption will increase the overall efficiency of the baseline building model.

This allowable reduction in required heat is unique to infrared because of its overall high system efficiency.



TIP #2: ASHRAE 90.1-2004 Section 6.5.8 states that radiant heating SHALL be used when heating unenclosed spaces. (Examples: loading docks, patios, valet areas, etc.)

Infrared heats objects directly without heating the air first – which makes it ideal for areas with high air infiltration.



TIP #3: Because infrared is a very unique method of heating, it is addressed separately in ASHRAE 90.1-2004 under Section 6.5.8. Therefore, do not look for infrared in Tables 6.8.1 Minimum Efficiency Requirement, as there is no clause for infrared heaters.

Because of the fundamental method in which infrared heats objects, a thermal efficiency rating does not fully depict the effectiveness of the unit (see Chapter 5).