



Michaels Engineering Energy Brief

INFRARED HEATING



SUGGESTIONS...

Do you have certain Energy Efficiency topics you'd like to know more about? Send an email with your suggestion to the author listed below and your topic might become a future Energy Brief!

DID YOU KNOW...

...Infrared heating can heat objects and people directly in its path, without having to heat the air.

...In warehouse and shop settings, it is typically difficult to keep warm air where the people are.

MEET THE AUTHOR



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→ INFRARED HEATING APPLICATIONS

When you are relaxing in front of a campfire on a cold night or soaking in the sun on a cool spring or autumn day, you are enjoying the benefits of infrared heating. In recent years infrared heating has moved indoors with growing popularity in both industrial and space heating applications.

→ HOW DOES INFRARED WORK?

Infrared heat is a form of electromagnetic energy, similar to light. It can heat objects and people directly in its path, without having to heat the air. When radiant energy strikes the floor or another object in its path, the energy is absorbed heating up the surface of the object. Most of the radiant energy absorbed by people, objects and building structure is given up to heat the air in the space.

→ WHAT ARE GOOD USES OF INFRARED HEAT?

Infrared can be used as a primary or supplementary space heating solution. Often people will complain about spaces with outer walls feeling cold. This cold feeling is produced by radiative cooling from poorly insulated walls and/or windows. When used to provide supplementary heating around a perimeter of a building ASHRAE states fuel usage savings of 15% are typical. Infrared heating can also provide an inexpensive solution for spaces where changing an existing HVAC system would be expensive.

When retrofitting older, uninsulated buildings with ground source heat pump systems, it may be cost effective to use electric radiant panels even though "electric heat" is expensive – in this case it is effective. The radiant panels are only needed in the coldest weather and they will also reduce the load on the heat pump, so heat pumps, and a bigger expense, the well field, may be downsized. Thus, adding panels can actually reduce the cost of the system design. Controls should be used to limit electric panel heating to only when it is necessary.

Infrared heating can also provide significant savings in a warehouse setting, where traffic patterns are well defined. The air temperature of the space can be reduced, with infrared heating used only for aisle areas. Air temperatures can be decreased by 5-15F with no loss in occupant comfort. Infrared heating also has quick warm-up times; therefore heaters can be coupled with occupancy sensors. Savings can be realized not only by doing less space (air) heating, but also by not heating any area where there are no people.

In warehouse and shop settings, it is typically difficult to keep warm air where the people are. The air in these spaces with high ceilings stratifies with the warmest air pooling near the ceiling, away from the occupants. Air temperature near the ceiling may climb as much as 30F, or more near the ceiling, compared to the temperatures at the level of the occupants. One hundred degree air at the ceiling wastes energy and doesn't provide any value. Since infrared energy is transported by waves, and not air, it cuts through the space to heat occupants and objects. There can still be some stratification, but it is greatly reduced.

Also, these types of settings often have high infiltration loads due to open doors or types of wall construction. In these situations, with traditional heating and its warmer air requirements, any air lost to the outdoors is money lost as well. With infrared heating, you have paid less to heat the air that you lose.

Infrared heating may not be appropriate for every heating situation. Many infrared heaters, particularly gas-fired units, have high surface temperatures that may pose a burn hazard. Proximity is another issue. The source should be far enough away and/or "cool" enough to provide uniform, comfortable heating.

→ PRIME OPPORTUNITIES

Prime opportunities for infrared heating include: warehouses, manufacturing spaces, auto shops, retrofitting poorly insulated buildings with new HVAC systems, livestock, vestibules, hockey rinks, loading docks.