

Radiant heat is the heat generated when electromagnetic waves discharged from a hot object are received.

The Sun's gift, delivered from 150,000,000 km away

The Earth receives a huge amount of energy from the Sun. This energy constantly warms our planet and can be utilized by us. However, the distance from the Sun to the Earth is approximately 150 million kilometers. By what mechanism does the energy reach us?

When the temperature of an object rises, it emits electromagnetic waves and transmits heat to the surrounding area. This phenomenon is called *radiation*, and the heat transferred at this time is called *radiant heat*.

The surface temperature of the Sun is around 6,000 K. The surface emits sunlight, which includes electromagnetic waves such as visible light, infrared light, and ultraviolet light. Electromagnetic waves can pass through space and gas. When these electromagnetic waves collide with another object, the object absorbs heat.

The electromagnetic waves emitted from hot objects penetrate the air and other objects and transfer their heat to the other objects.

In other words, when sunlight reaches Earth and hits other objects such as the ground, people, or buildings, it is converted into heat that warms the objects.

Making homes more comfortable by reducing radiant heat generation

The position of the Sun in the sky varies according to the season and time of day, causing changes in temperature that make us feel hot or cold. At midday, sunlight shines from a high overhead position. Light that arrives from above has greater energy than light that arrives from the side. A correspondingly larger amount of sunlight is received, generating more radiant heat.

Also, the temperature in a room often does not decrease even when nighttime arrives, and instead the heat of the day remains. This is also related to radiant heat. When buildings receive light from the Sun during the day, the heat generated is stored in the structural components of buildings, causing the temperature of the building itself to increase. The building then starts to emit electromagnetic waves. As a result, people in the rooms inside feel hotter because they directly receive the electromagnetic waves emitted from the walls, furniture, and floor.

Furthermore, because electromagnetic waves can be transmitted through air and glass, sunlight directly warms the floor and other objects in the room. This also causes the room to become hot.

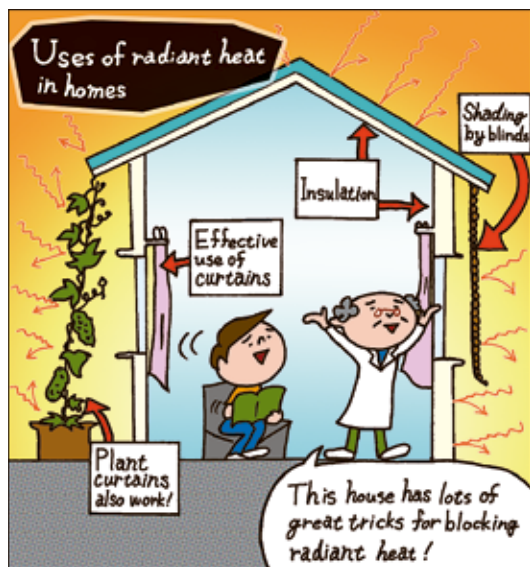
To make the room temperature more comfortable, it is important to effectively shield the sunlight to reduce the generation of radiant heat. Examples of effective methods include installing a shade or positioning plants with many leaves outside the window.

Low-energy air conditioning using radiant heat

The electromagnetic waves that penetrate the air warm objects such as walls, floors, and people by being absorbed by them. Therefore, the effects of radiant heat cannot be sufficiently eliminated only with an air conditioner that warms or cools the air. One available mechanism is to reduce the radiant heat by absorbing the electromagnetic waves from warmed objects or space. This can be done with a radiant ceiling panel.

When cooling the room, the radiant panel is cooled to make the entire ceiling cold by absorbing radiant heat from the walls, floor, and people. Conversely, when heating the room, the radiant panel is heated to emit electromagnetic waves from the panel and warm objects in the room through radiant heat.

Using radiant ceiling panels greatly improves the effectiveness of indoor cooling and heating. In office buildings, the installation of radiant ceiling panels that use waste heat from the air-conditioning heat source or from renewable energy (such as rainwater, geothermal heat, or rivers) is one method with potential use in systems that consume close to zero energy when building facilities are running.



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Azbil's radiant temperature sensor measures the thermal radiation on the ceiling at locations such as the space close to a window. Thermal radiation is one element that affects how people feel heat. People indoors can be made more comfortable if the temperature of thermal radiation is reflected in the settings of air conditioners.



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 Issued by Mikako Takahashi, Public Relations Section, Corporate Planning Department, Azbil Corporation
 19F Tokyo Building, 2-7-3 Marunouchi, Chiyoda-ku, Tokyo 100-6419 Japan TEL: 81-3-6810-1006 FAX: 81-3-5220-7274
 URL: <http://www.azbil.com/>



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