



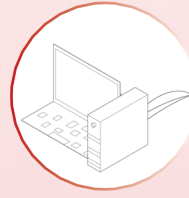
### Infiltration

Air that seeps into indoor spaces through windows, doors, and other openings can add additional heat to indoor spaces, especially in hot and humid climates. To mitigate this heat gain, it is recommended to seal gaps and cracks in doors and windows to reduce infiltration.



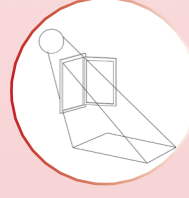
### Lighting

Certain types of light bulbs, such as incandescent bulbs and some halogen ones, can emit significant amounts of heat, adding to indoor temperature. To reduce heat gain from lighting, it is recommended to use LED bulbs or other low-heat-emitting lighting sources.



### Appliances

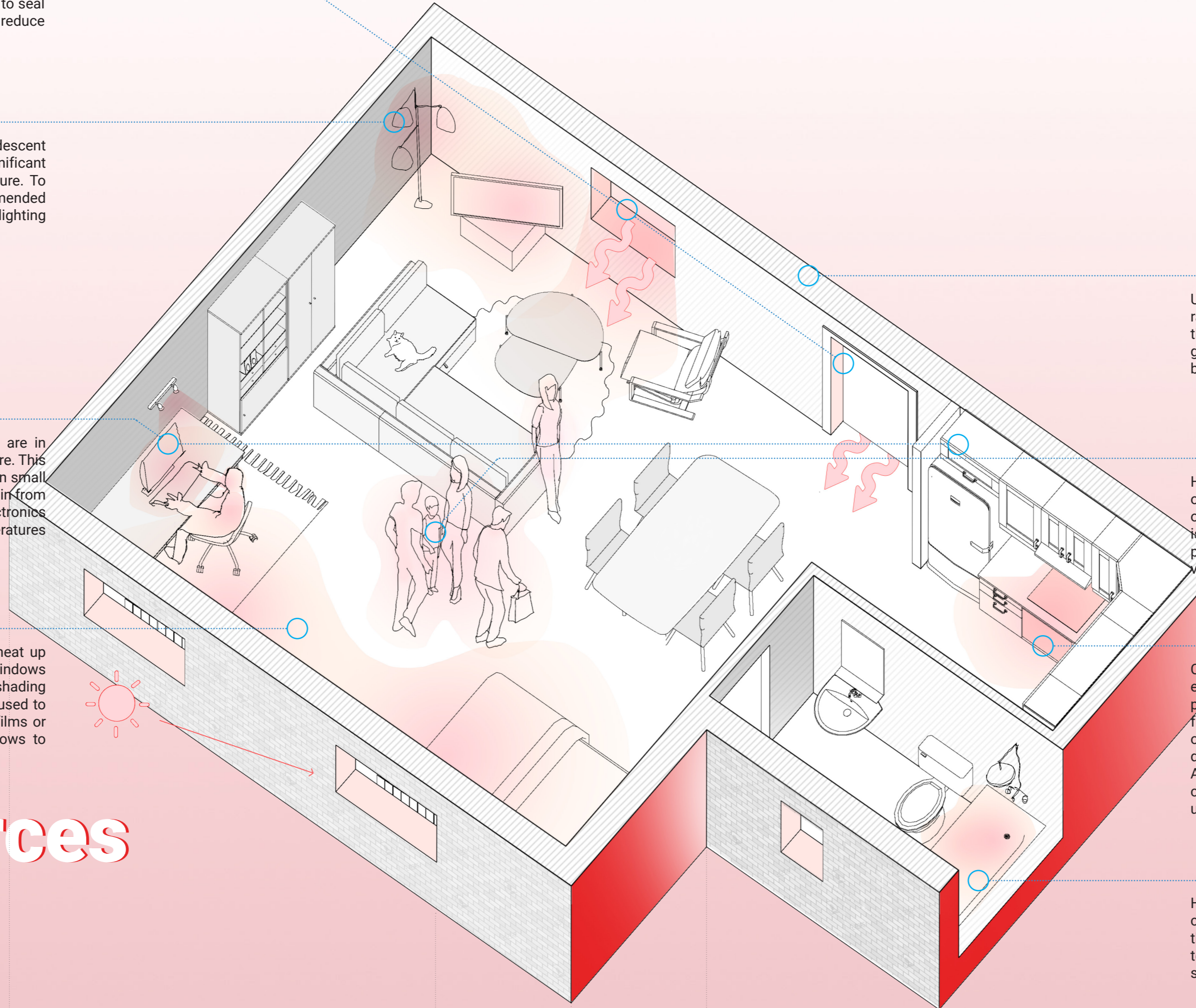
Electronic devices generate heat while they are in use, which can contribute to indoor temperature. This heat generation can be especially significant in small or poorly-ventilated spaces. To reduce heat gain from appliances, it is recommended to turn off electronics when not in use, and to use them when temperatures are lower, in the morning or at night.



### Solar gains

The sun's rays can penetrate windows and heat up indoor spaces, especially in areas with large windows or glass facades. To mitigate this heat gain, shading devices such as awnings or shutters can be used to block direct sunlight. Additionally, reflective films or window treatments can be applied to windows to reduce the amount of solar heat gain.

# Heat sources



### Building envelopes

Uninsulated walls can absorb heat from solar radiation, leading to increased indoor temperature through thermal conduction. To mitigate this heat gain, it is recommended to insulate walls and other building envelope elements, from the exterior faces.

### Occupancy

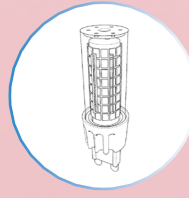
Human bodies generate heat, and as the number of occupants in a room increases, so does the amount of heat generated. In order to mitigate this heat gain, it is recommended to limit occupancy in indoor spaces, particularly if it is not possible to provide an adequate ventilation to allow for heat dissipation.

### Heavy cooking

Cooking can generate significant amounts of heat, especially when using ovens or stovetops for extended periods of time. To reduce heat gain and humidity from cooking, it is recommended to limit the amount of heavy cooking done during the hottest parts of the day or to cook outside of the home when possible. Additionally, using smaller appliances such as slow cookers or microwaves can generate less heat than using larger appliances such as ovens.

### Hot baths

Hot water use in bathrooms generates heat, which can contribute to indoor temperature. To mitigate this heat gain, it is recommended to reduce the temperature and the amount of water used, taking showers instead of baths.



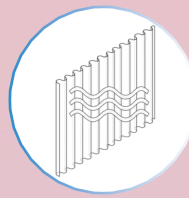
### LED bulbs

LED bulbs use up to 80% less energy than traditional incandescent bulbs. They also last much longer, reducing the need for frequent replacements. By switching to LED bulbs, households can significantly reduce their energy consumption and save money on their electricity bills. They can also reduce their cooling needs by reducing the amount of heat generated by lighting.



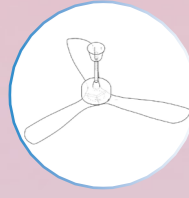
### Interior plants

Indoor plants are a great way to benefit from evaporative cooling. As plants transpire, they release moisture into the air which can help to cool the space. In addition, plants can also help to purify the air and improve indoor air quality. Cooling effect is more efficient in dry climates, where the evaporation rate is higher. Plants with more leaves and larger surface areas, such as ferns or rubber plants, are better at releasing moisture into the air and increasing the effect.



### Wet curtains

Wet curtains are a simple and effective way to cool a space using natural ventilation and evaporative cooling. They consist of wet fabric that is placed in front of an open window or door. As air passes through the wet fabric, it is cooled by the evaporating water, which can lower the temperature of the indoor environment. Wet curtains are particularly effective in dry climates.



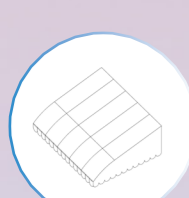
### Fans

Fans help to keep cool by circulating air around the room. They can be used alone or in combination with other passive cooling strategies, such as nebulisers, to create a comfortable indoor environment. For sleeping better, ceiling fans are recommended, paying attention to the noise levels.



### Solar glass film

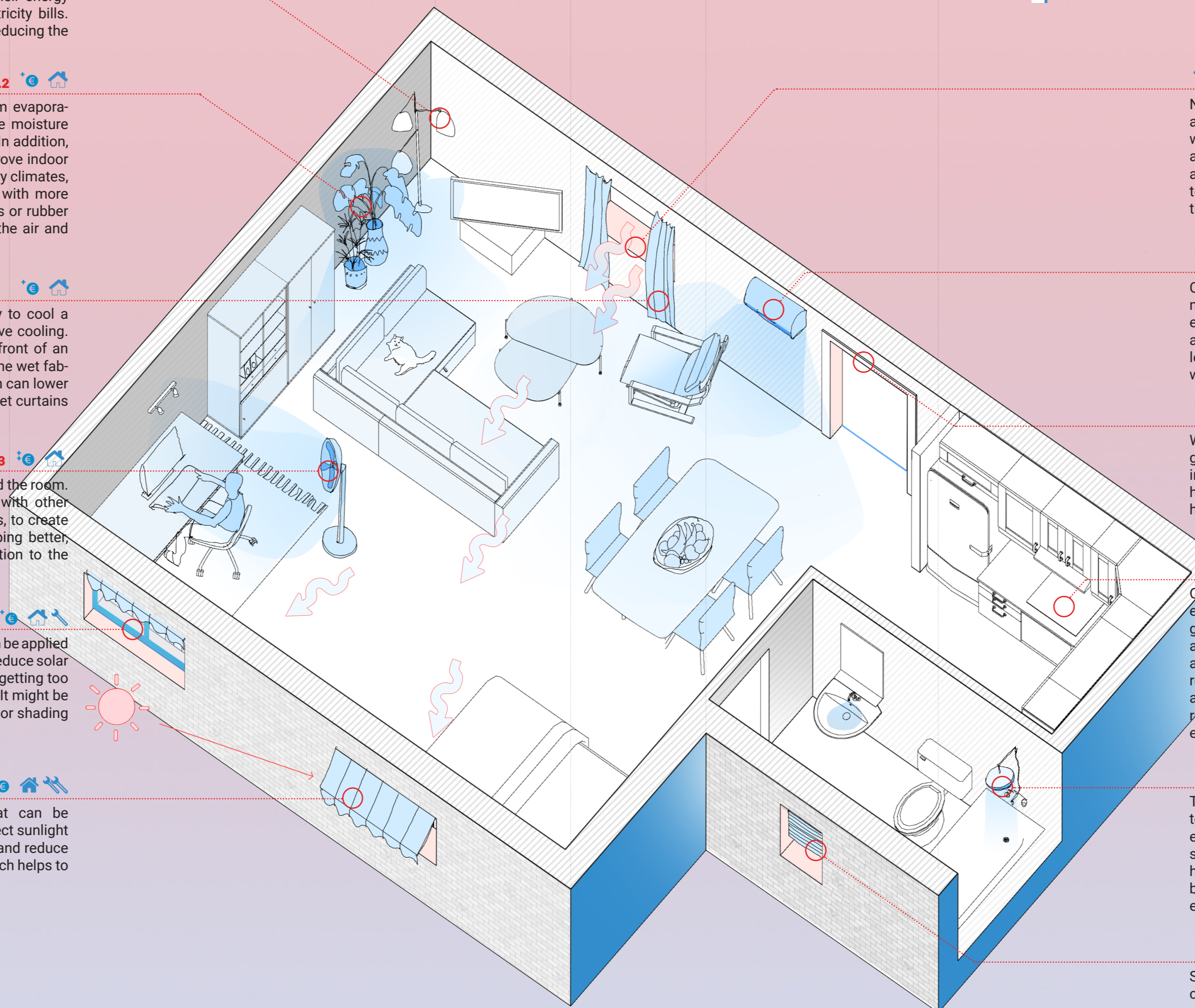
Glass film is a solar protection material that can be applied to windows to block UV and infrared rays and reduce solar heat gain. It helps to prevent the interior from getting too hot and reduces the need for air conditioning. It might be a good alternative to awnings and other exterior shading devices when these cannot be installed.



### Awnings

Awnings are exterior shading devices that can be installed above windows or doors to block direct sunlight from entering the space. They provide shade and reduce the amount of heat that enters the interior, which helps to keep the space cool.

# Adaptive measures



### Natural ventilation

Natural cross ventilation is a cost-effective way to achieve passive cooling in a home. Opening facing windows and doors during cooler times of the day allows fresh air to circulate and remove hot, stale air from the interior. This can help reduce indoor temperatures and improve indoor air quality without the need for energy-intensive air conditioning systems.

### AC filters

Cleaning air conditioner filters is important for maintaining good indoor air quality and improving the efficiency of the unit. Dirty filters can obstruct air flow and cause the air conditioner to work harder, which leads to higher energy consumption and increased wear and tear on the unit.

### Weather strip

Weather stripping is a material that is used to seal gaps around windows and doors to prevent heat infiltration. By sealing these gaps, it helps to keep the hot air from entering the interior, which helps to keep the indoor space cool.

### Appliances

One effective passive cooling strategy for indoor environments is to avoid using appliances that generate waste heat. This includes appliances such as ovens, stoves, dryers, and dishwashers, as well as electronics like computers and televisions. By reducing the amount of heat generated by these appliances, the indoor temperature can be kept lower, reducing the need for air conditioning and saving energy.

### Shower

Taking short, cold showers can be an effective way to cool off during hot weather. When the body is exposed to cold water, the blood vessels near the skin's surface constrict, which helps to reduce body heat. Additionally, cold water can help to lower the body's core temperature, providing relief from heat exhaustion and heat stroke.

### Shutters

Shutters can reduce solar heat gain and maintain a cooler indoor temperature, reducing the need for air conditioning. They also provide privacy and security, while allowing for natural light and ventilation. Shutters are a versatile and effective strategy for controlling indoor temperature and reducing energy consumption.

**Summer installable kits solutions for home**  
Deliverable 3.2

Raising summer energy poverty awareness to reduce cooling needs

Coordination and support action  
Call H2020-LC-SC3-EC-2-2020: Mitigating household energy poverty

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Grant Agreement No. 101013263.

### Installation recommendations

- i.1** - Replace first the bulbs you use the most at home.
  - Make sure the power supply is disconnected before proceeding to remove the bulb from the socket.
  - Recommended to replace the bulbs during the daytime, while there is enough daylight.
- i.2** - For a more efficient cooling effect, choose plants with high transpiration rates, such as ferns and palms.
  - Plants with larger leaf surface areas are better at cooling down the air, and those with thicker leaves are better at conserving moisture.
  - Plants with lighter-colored leaves reflect more light and heat, which helps to keep the space cooler.
- i.3** - Try to ensure air flow, avoiding placing it in corners.
  - Orient the fan so that it draws air in from cooler areas and blows it out to the hottest areas.
  - The cooling effect can be enhanced by placing a bowl of ice in front of the fan.
  - In the bedrooms, the use of a ceiling fan is recommended.
- i.4** - Thoroughly clean the area where the solar film will be installed.
  - It is recommended to install the film on the outside of the window to prevent heat from penetrating the glass.
  - Install at a time when the windows are not hot.
- i.5** - Consider the angle: The angle of the awning is important for providing maximum shade and protection from the sun.
  - Light-colored fabrics help to reflect solar radiation.
  - Micro-perforated fabrics offer good thermal performance, and prevent moisture when rolled up/folded.
- i.6** - Disconnect the equipment from the power supply before operating it.
  - The filters are usually accessed from the front cover of the unit.
  - It is recommended to clean them with water, soap and a soft sponge.
  - Allow them to dry before reinstalling them.
- i.7** - Clean the area where the weather strip will be installed to remove any dirt or debris. This will ensure that the weather strip adheres properly and provides a good seal.
  - Maintenance: Check the weather strip regularly for signs of wear or damage, and replace it as needed to ensure that it continues to provide an effective seal.
- i.8** - Place the shutter on the outside of the window, as its function is to protect the inside of the house from the heat during the day. It is better to leave the blinds down to prevent heat from entering the house during the hottest hours.
  - Allow air to pass through during the coolest hours.

Requires property approval		Level of skills needed		Costs of the solution		
No	Yes	Less	More	Low	Medium	High
No	Yes	Less	More	Low	Medium	High