

Green Guide to Outside Heating

A

Introduction

Since 2007 and the introduction of the smoking ban it has become more important for eating and drinking establishments to have an outside space which customers can use in comfort. The heating of outside spaces has always been an area of potential energy inefficiency because it is difficult to retain the heat.

This guide has been developed to assist organisations in selecting the most appropriate solution to their outdoor heating requirements and provide information on heater type, sizing, positioning, control and safety. The advice contained within this guide can assist you to deliver a service to your customers which is cheaper and better for the environment. The Publican estimates that outside heaters contribute £250 million in additional trade for pubs, cafés and restaurants.

The guide can also be used to assess whether your existing setup is correctly controlled, as the main areas for saving in the operation of outside heating are in the effectiveness of control so this is likely to be a worthwhile exercise.

The guide is made up of a number of sections, namely: A) Introduction; C) Performance Comparison; D) Positioning; E) Controls; F) Restaurants/Cafés; G) Licensed Trade; H) Smoking Areas.

At the end of the guidance is an appendix summarising the typical key features of the main types of outdoor heater. There is also a sizing calculator which allows you to understand the rating you will require for your area.



Look out for key points throughout the guide, indicated by a green tick in a green box.



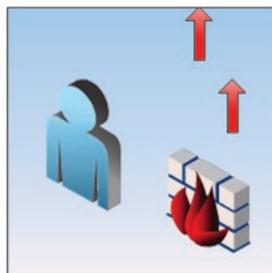
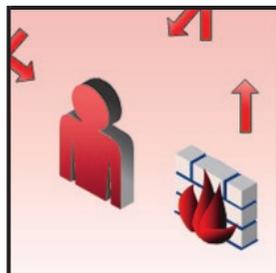
Look out for safety tips throughout the guide, indicated by a red warning triangle in a red box.

Types of outdoor heater

Convection versus radiant heaters

Flame patio heaters (almost always in the form of freestanding or table-top dome-type heaters) use either natural gas or LPG to fuel a (covered) flame. This method of heating uses convection to heat the surrounding air and pass that heat to the nearby occupants. Because this method heats the air, it is less efficient for outdoor heating. Once the air has been heated, it quickly rises or gets removed by wind, and the replacement air needs to be heated again.

Convection heaters (such as flame patio heaters) work well in enclosed spaces, but the heat rises and escapes when used outdoors.



Always ensure you choose the appropriate type of outdoor heating for your venue's requirements. Units get very hot (at least 100°C) and can be a safety hazard, especially when used in an area occupied by people who have been drinking alcohol.

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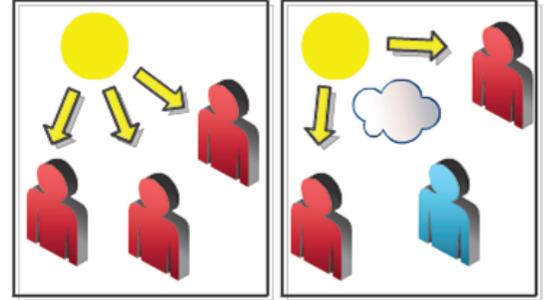
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Radiant heaters use gas or electricity to heat up an element to a high temperature, and the heat from this element is then transferred by radiation directly to an object or person in the direct line of the heater, much like the way the sun heats. The radiant heater will have little impact on the overall air temperature. As the people are being warmed directly, the heater requires less energy than a flame patio heater to achieve the same perceived temperature result. Up to 86% of a radiant heater's heat output is delivered as radiant heat. The remainder is provided through convection from heat transfer to the surrounding air.

 Convection heaters work by heating the air, and are therefore best for indoor use or outdoor areas which are well sheltered and enclosed. Radiant heaters heat objects directly and are therefore better for outdoor use or more exposed sites.

Radiant heaters work much like the sun, providing the majority of their heat only to those objects in the direct line of the heater's rays.



Freestanding, table-top or wall/ceiling/umbrella mounted heaters

Outside heaters can be positioned in one of three main ways: free-standing, table-top or wall/ceiling/umbrella mounted. For health and safety reasons, wall, ceiling or umbrella mounted heaters are most appropriate in commercial situations as the risk of customers burning themselves on the heater is significantly reduced. This option also reduces the likelihood of damage from vandalism or accidents, and frees up valuable floor and table area.

 Always use a suitably qualified contractor to install and maintain your outside heater.

Main features of commonly used outside heaters

Gas (LPG) convection	Electric radiant	Gas radiant		
				
Dome features: <ul style="list-style-type: none"> • Medium heat intensity • Best for very sheltered or enclosed area • LPG input 	Quartz features: <ul style="list-style-type: none"> • Medium heat intensity • Concentrated heat output • Electric input 	Tube features: <ul style="list-style-type: none"> • Medium heat intensity • Long length makes it suitable for larger areas • Gas input 	Cone features: <ul style="list-style-type: none"> • Medium heat intensity • Concentrated size makes it suitable for smaller areas • Gas input 	Plaque features: <ul style="list-style-type: none"> • High heat intensity • Very concentrated heat output makes it suitable for smaller areas • Gas input

 Gas/LPG installations should undergo an annual gas inspection. It is good practice to check all installations, both gas and electric, regularly.

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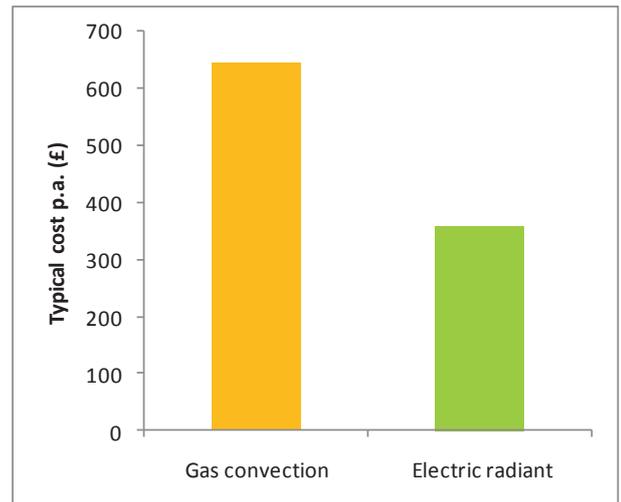
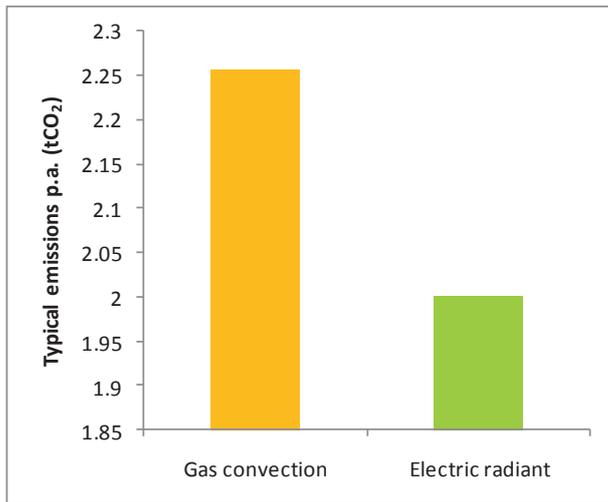
Performance comparison

The following calculation provides a working example of the savings which can be achieved by using electric radiant heaters over gas convection heaters. These savings are only achievable where the units are controlled well. Electric radiant heaters which are not controlled properly can be very environmentally damaging. The calculation shows that a saving of 12% of CO₂ emissions, 44% of operating cost and 65% of energy can be achieved by using a well controlled electric radiant heater over a gas fuelled convection heater.

	Gas (LPG) convection	Electric radiant
Average power input (S)	8.9kW	5.2kW*
Days in use (D)	237	237
Hours in use (H)	5	3
Annual energy (E = S x D x H)	10,547kWh	3,697kWh
CO ₂ emissions (tCO ₂)	2.26	2.00
Running cost p.a.	£643.37	£358.60

*Assumes 4 radiant heaters (1.3kW each) required to provide the equivalent heat coverage to one convection heater.

Typical CO₂ emissions (kg) per annum using an electricity carbon factor of 541gCO₂/kWh, an LPG carbon factor of 214gCO₂/kWh, and a cost of 9.7p/kWh for electricity and 6.1p/kWh for LPG.



 It is essential that heaters are controlled appropriately. An efficient heater will perform inefficiently if it is left running for hours unnecessarily.

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Positioning outdoor heaters

The number of different types and sizes of outdoor heater affords a reasonable amount of flexibility when it comes to locating your heating solution. There is no one solution fits all.



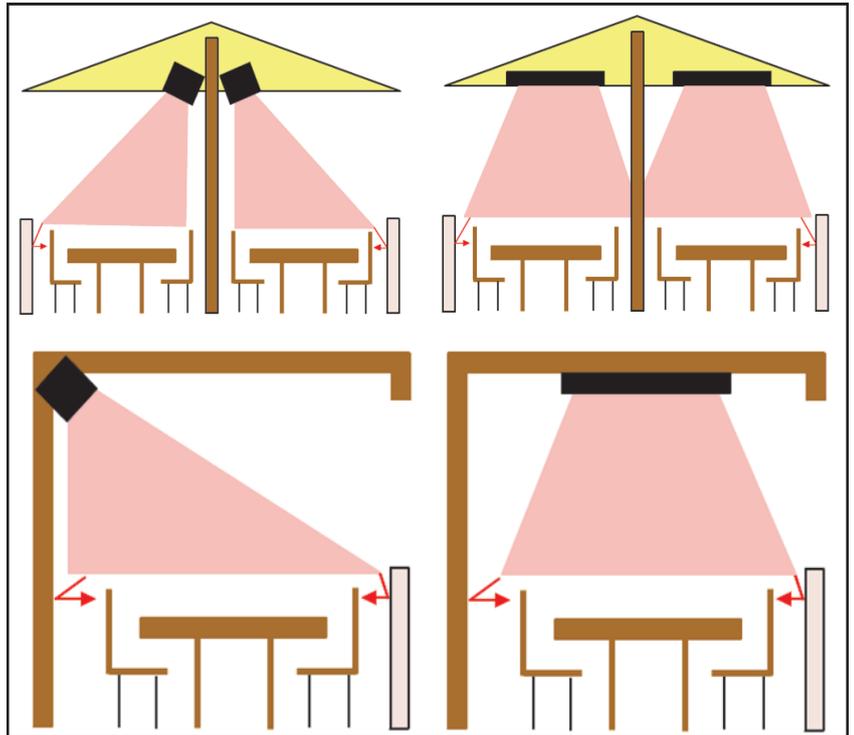
- Install coverings where possible to retain heat.
- Use overhangs to protect the area from gusts of wind.
- Use a barrier around the area for improved heat retention.
- Avoid overlapping the heat output from two or more heaters.
- Install the heater as close as possible to a horizontal position to maximise the heat output. Heaters installed at an angle cover a wider output area but the heat, and therefore possibly occupant comfort, is reduced.



Always check the distance required between the heater and another object, especially when attaching to an awning or umbrella.



Keep in mind that dark objects absorb more heat than light objects and the raised temperature of the object can pose a health and safety hazard.



Examples of installation layout for your heaters. The principles can be repeated for larger areas.

The key features to think about are:

- Some form of overhead cover. Even with radiant heaters, some of the heat will come from warming the air and overhead covers will help to keep the heated air trapped within the appropriate area.
- An overhang on an umbrella or pergola will help protect the heated area from the wind, further improving the retention of heated air within the relevant space.
- A glass or other solid barrier positioned around the heated area will help to reflect the radiated heat back into the assigned space. The best materials for this are ones which are highly reflective, such as glass or shiny metallic surfaces; however, walls, fences, promotional banners and even thick vegetation will still improve heat retention.
- Try to avoid the heat output from the heaters from overlapping. Your suitably qualified contractor should be able to find information in the manufacturer's guidance about the size of the area which the heat output covers and then locate the heaters appropriately.

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Controls

Outside heaters can be controlled in a number of ways to suit the usage of the outside area and the time and money available for this purpose. The table below lists the main options with an indication of their suitability for different uses and the relative capital cost implication of each.



 Heaters should be fitted with automatic timers to ensure they are not left on constantly. This will save money on energy costs and also reduce the fire risk.

Percussion control

PIR/motion sensor

Timer control

Type of control	Description of use	Most useful for	Relative cost
'Percussion' controls	Push on; automatic switch off after owner/ manufacturer defined period	Areas with short occupancy periods (e.g. smoking areas)	Low
Motion/PIR sensors	Switch heaters on when presence is detected within detection field; switch off after pre-defined period of no movement	Areas with sporadic use. The heater(s) will switch off during periods when the space is not used*	Medium
Centralised timer controls	Allows the owner to set pre-defined on/off periods	Areas which are regularly used at the same time each day or where there is a consistent weekly schedule	High
Temperature controls/ temperature cut out (also available with variable load control)	Automatically switches the heater off when it senses that the air temperature is at a pre-defined set point	Any area or system. Efficiency savings can be achieved where heaters are switched on in warmer conditions. Some units have a variable load control allows the unit to reduce or increase its output in line with air temperature	High

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Restaurants/café



This sheet focuses on the best solution for heating outdoor spaces in restaurants or cafés. Other options would still be suitable, but this guidance presents the best practice solution based on the following requirements:

- A regular periods of use each day or a consistent weekly schedule
- The heater stays on throughout the diner's stay
- Diners are positioned at regular intervals throughout the outside area

Best practice choice of heater setup

To take account of the extended time that dining areas will be occupied and incorporating the likelihood that the area to be heated will be larger (compared to, for example, a smoking area), the type of heating arrangement should possess the following characteristics:

- A lower intensity heat output to provide greater comfort over larger areas (e.g. avoid discomfort for those diners directly under the heater)
- A cover with a reasonably sized overhang to increase heat retention in the area and reduce heat loss from gusts of wind. This will help to maintain a constant temperature for the diners throughout their meal.
- A centralised control panel with 7 day timer to allow occupancy periods to be set by management. These periods should be reviewed and updated regularly to reflect changes in occupancy patterns. This type of controller is likely to pay back more quickly in a restaurant or café environment as there is typically a greater demand for outside heating over extended periods.
- While the energy costs incurred through heating up a system should always be taken into consideration, they are less important in this situation, as once the heater is on, it will most likely stay on for the remainder of the dining period. Therefore, the heat up cost will have less impact on the overall operating cost of the heater than it would if it were regularly being switched on and off.

 For best practice installations, choose:

- Heaters with a larger surface area
- A cover with an overhang
- A centralised control panel
- Horizontally positioned units

 Always follow the manufacturer's guidance on installation, maintenance and operation.



L to R: gas radiant heaters are available with low intensity output; radiant quartz heaters are available with low light outputs, providing greater control over mood lighting

You may find that one of the other recommended solutions in this guide is more suitable for your requirements.

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Licensed Trade (standing and seated)



This sheet focuses on the best solution for heating outdoor spaces in licensed trade premises. Other options would still be suitable, but this guidance presents the best practice solution based on the following requirements:

- Irregular periods of use each day or an inconsistent weekly schedule
- The heater is switched on and off regularly to match demand
- Customers are positioned at irregular intervals throughout the outside area

Best practice choice of heater setup

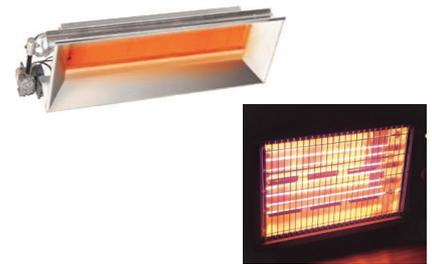
To take account of the irregular use of the outside area, the type of heating arrangement should possess the following characteristics:

- Spot heating to allow heating provision to match localised demands (e.g. plaque heaters (gas) or quartz heaters (electric))
- A cover with a reasonably sized overhang to increase heat retention in the area and reduce heat loss from gusts of wind.
- A reasonably fast heat up time and low energy input for the heat up period would be beneficial in this situation to reduce the operating cost associated with the irregular use of the heaters.
- PIR/motion sensors so that heaters switch on when the area is occupied and off when no one is nearby. It is useful to 'zone' the heater control so that not all heaters switch on if only a small section of the outside area is in use. Also try to avoid placing the sensor(s) so that it/they turn the heaters on every time someone walks passed for a purpose other than to use the outside space. This option reduces the periods during which the system is on unnecessarily, without requiring occupants who remain in the area for a longer period of time to keep turning the heater back on.

 For best practice installations, choose:

- Heaters with a concentrated heat output
- A cover with an overhang
- A fast heat up time/low energy heat up requirement
- PIR/motion sensor controls

 Always follow the manufacturer's guidance on installation, maintenance and operation.

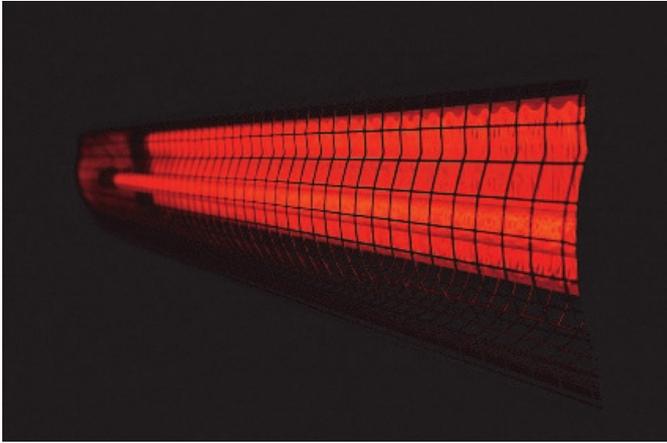


L to R: plaque heaters (gas) quartz heaters (electric) both provide 'spot' heating for a localised provision of heat.

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Smoking areas



This sheet focuses on the best solution for heating outdoor spaces used for smoking. Other options would still be suitable, but this guidance presents the best practice solution based on the following requirements:

- Irregular periods of use each day
- The heater is switched on and off regularly to match demand
- Customers are positioned in localised areas

Best practice choice of heater setup

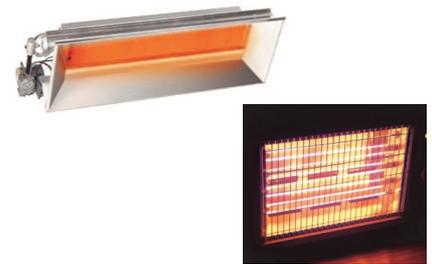
To take account of the irregular use of the outside area, the type of heating arrangement should possess the following characteristics:

- Spot heating to allow heating provision to match localised demands (e.g. plaque heaters (gas) or quartz heaters (electric)).
- A fast heat up time and low energy input for the heat up period would be beneficial in this situation to reduce the operating cost associated with the irregular use of the heaters.
- Percussion controls to allow occupants in the area to switch the heater on as they require. The heater will then switch off again after a specified period of time. This reduces the periods during which the system is on unnecessarily.
- Always follow the manufacturer's guidance on installation, maintenance and operation.

 For best practice installations, choose:

- Heaters with a concentrated heat output
- A fast heat up time/low energy heat up requirement
- Percussion controls

 Always follow the manufacturer's guidance on installation, maintenance and operation.



L to R: plaque heaters (gas) and quartz heaters (electric) both provide 'spot' heating for a localised provision of heat.

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