

# Underfloor heating

## Comfortable, stylish, efficient ...

Underfloor heating systems can be run using most heating fuels, which means it is an option that can be considered for most homes.

Unlike central heating with radiators which mostly heat air that then travels round your home (called convection), underfloor heating provides a mix of heat radiated from the floor and convection heat - creating a comfortable and constant temperature between the floor and ceiling.

### 'Wet' underfloor heating systems

Wet systems can be run using a conventional gas, oil or solid fuel boiler, or with a biomass boiler. Other renewable technologies can also be used, particularly heat pumps, which are more efficient at the lower temperatures underfloor heating systems operate at.

In wet systems heated water is circulated along reinforced polythene piping, usually with separate circuits for different rooms or areas. Each circuit is connected to a control unit (called a manifold) which has regulating valves and a thermostat so different rooms can be heated to different temperatures and at different times, minimising unnecessary energy use. When a room reaches the desired temperature the thermostat signals to a valve on

the manifold to close the circuit in that room, until the temperature begins to drop again.

### 'Dry' underfloor heating

Dry underfloor heating uses electric wires that heat up when electricity is provided, and will either come as ready-made mats or loose wires that need to be fitted. Dry underfloor heating should also be connected to individual room thermostats, so that each room or area can be adjusted independently.

Electric underfloor heating is often preferable for existing builds as it is easier to install than water pipes, and it can also fit more awkward spaces. It is also likely to be more responsive than wet systems so will warm up a room quicker. However, electricity is considerably more expensive as a heating fuel than something like gas, so it is likely that these systems will be more expensive to run.

### Installing underfloor heating

There are three main types of underfloor heating installs (see below).

Underfloor heating can be fitted in most homes, but be aware it might mean a lot of upheaval and high costs, especially if it is being fitted retrospectively rather than in a new-build. The current flooring might need to be ripped

## 3 main types of underfloor heating:

### 1) Solid floors

This is the common choice for new-builds or larger refurbishment projects. The underfloor heating is permanent as it's built into concrete or screed floors. Insulation is laid first, with the pipes then put down in a specific pattern before the concrete or screed is poured. Many types of floor finish can be laid over it, including wood, stone, tiles or vinyl (also carpet, though careful consideration is needed to ensure it won't be affected by the heat or insulate against it).



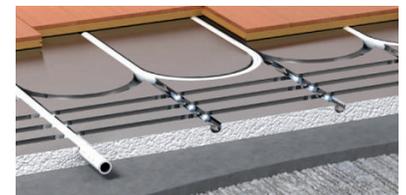
### 2) Suspended floors

The heating system is inserted between the joists or battens in the suspended timber floor, with suitable insulation below. The pipes are usually laid within a tongue and groove floorboard casing, which allows a range of floor coverings to be fitted on top, with the same considerations as described (left).



### 3) Floating floors

This is the quickest type of underfloor heating to install, and can be used above an existing solid or wooden floor and so is ideal for renovation. However, the floor level could be significantly raised. Here the pipes are inserted into preformed heat plates which rest in grooves in the insulation.



up, or the floor height might need to be raised, which will affect the door and ceiling height. This is additional work for the installer, which adds to labour costs.

### Cost

Installation costs can vary hugely, depending on whether you choose a dry or water-based system, the number of rooms you want to heat, whether you're fitting in a new-build home, extension or an older building, and what kind of flooring you have.

Prices for roll-out mats for underfloor electric heating start at about £180 for 10m<sup>2</sup> plus the costs of insulation board, floor covering and heating controls. This type of underfloor heating system is an option for a skilled DIY-er, which would help keep costs down. The price of installing a 'wet' system can vary according to factors like whether the room you're heating is on the ground floor, or how close it is to the boiler. However, it will almost certainly be more expensive than laying electric mats for a 'dry' system. It's a good idea to first speak to an engineer to help you decide whether the work and cost of the system will make it prohibitive for your home.

### Pros, cons and considerations

Underfloor heating generally takes much longer to heat up and cool down than traditional radiators. This is partly due to the heat store (called thermal mass) of the screed or concrete in which most underfloor systems are embedded. In addition, the water in wet underfloor systems is cooler than the water in radiators because the heat is spread over a larger surface area. In order for the system to provide adequate heat and be cost-effective, it is critical to ensure your property is well insulated and draught-proofed, to minimise heat loss and reduce the heating up time.

Underfloor heating is generally suited to homes where people are in most of the day, as the lag time described above means the heating is best left on a low temperature for a longer period of time. If people are only home in the morning and evening the underfloor heating system alone

may not be adequate to provide sufficient warmth. If the underfloor heating has no heat store, and is only covered by surfaces such as timber or vinyl which react quicker to changes in temperature, then this may be a solution; but be aware the running cost is likely to be higher, as you don't have the advantage of a heat store to help retain and balance the room temperature.

Running costs will vary considerably, depending on what fuel you are using to heat the system, what kind of floor covering is used and how well insulated the home is. Electricity will be the most expensive, followed by other fuels, but there are ways to bring the running costs down if you are able to consider renewables.

### Looking to go green?

Air or ground source heat pumps are particularly effective when used with wet underfloor heating, as heat pumps are designed to be left on for long periods of time and also heat water to the lower temperature that underfloor heating uses. You could even combine this with solar panels, as heat pumps still need some electricity to run. The emergence of ever-improving battery storage options would make this more efficient, as newer solar batteries can 'learn' your consumption patterns and store any excess solar electricity, using it to power the pump when electricity is not being generated. These batteries can also be set to charge from the grid at off-peak times if you have an Economy 7 or 10 tariff. This would both drastically decrease (and at certain times eliminate) the running costs of underfloor heating and greatly improve a property's environmental impact. See our factsheets on heat pumps and battery storage for details.



Mmm. Underfloor heating



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The Centre for Sustainable Energy is a national charity that helps people change the way they think and act on energy.

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