

EVERYTHING YOU WANTED TO KNOW

(AND DIDN'T KNOW)

ABOUT



In just...





The 5 minute guide to Herschel far infrared

There are **3** ways to transfer heat:

- **Convection** = via heating the air
- **Conduction** = passing of heat through solid objects
- **Radiate** = energy passing through the air directly heating objects



Infrared is the invisible transfer of **radiant heat**. There are different wavelengths of Infrared. Short/Medium are more intense, **Far (or Longwave)** is less intense.

It's mostly the sun's short and medium-wave infrared that reaches us here on earth, but when absorbed by the surface of the Earth, that heat is radiated back as longwave (far) infrared. So, the feeling of heat from a hot wall or beach is far infrared. This is completely **natural** and **safe**.

Our bodies absorb and emit far infrared and any object that is colder than you will absorb your heat. This loss of heat will make you feel cold. In a cold room, the building will "take" your heat and make you feel cold.

But if we heat the walls, ceiling and floor of a building ("the Thermal Mass") using Herschel Infrared, the room will *stop* taking away our body heat and radiate back the infrared, making us feel warm. This is a warmth that is almost impossible to achieve with central heating that just heats the air and does very little to heat the thermal mass of the building.

But doesn't heated air make you feel warm?

Well yes it does, but it requires constant energy to keep it warm; it doesn't create "thermal mass" (so you can still feel cold) and it escapes easily through draughts and open doors. **You have to keep central heating "on" to keep warm.** (And you cool-down fast when it's off).

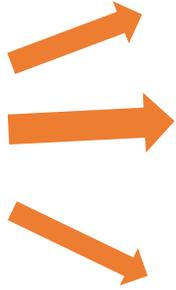
But if you heat the **thermal mass** of the building and the objects within it you can turn off the heater and the building keeps radiating. There's no hot air to lose and you only need occasional "top up" to remain warm.



This is why Herschel saves energy.



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If we are within around **3-4 metres** of a Herschel heater we will feel the infrared on our skin and will be directly warmed by it. Outside of that we are unlikely to feel the heat but it will still be gently warming the building.

Herschel offer 2 types of heaters. **Panel heaters** are for heating rooms, **space heaters** are for larger areas or outdoors.

All Electric heaters except those that give off light are almost 100% efficient – that means that a unit of electricity converts to almost the same unit of heat. However, the design and construction of the heater itself and the element to generate the heat will dictate the effectiveness of the heater. For example, an average clothes iron is 2000w (and 100% efficient) but you wouldn't think of using it to heat a large room – it is designed to conduct heat, not radiate or convect. 

Our **panel heaters** (Inspire and Select) have large surface areas with a **95C temperature** which is an ideal temperature to generate a high proportion of output as far infrared across the surface of the panel. The insulation within the panel projects the heat outwards and minimises heat transfer to the rear (into the wall or ceiling).

Our **space heaters** are made from ceramic elements and are much hotter with a lower surface area. They run at 350c + and project heat in a more directional basis.

Both types of heater take about 5 minutes to reach optimum temperature. They are either ON or OFF. They can't be turned up or down.

Geeky stuff:

1000w = 1 kilo watt (1Kw). A 500w heater will consume 0.5kw of electricity per hour.

The input electricity used is measured in Watts per hour. Our panel heaters range from 200-1200w. Our space heaters range from 1300-3600w.

Panel heaters have a lower “Watts density” than the space heaters (think of the different settings on a microwave oven).

The amount of wattage required to heat an area is calculated as watts per metre cubed. Herschel heaters use less w/m³ than convection heaters.

25w/m³ is the standard for modern houses but varies up and down depending on the building type.



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ROOM HEATING – ENCLOSED SPACES

The power (wattage) of the heater needed will depend upon the size of the room and its INSULATION levels. Better insulated rooms need less power. The aim of Infrared is to heat the “thermal mass” of the room. This can mean 2-3 days of the heaters being fully on at the start of the winter season. After that the thermal mass just needs “topping up”. We estimate an average of **5 hours total** running time every day to maintain an even temperature **for the whole day**, assuming a heating season of 180 days. This is quite unlike the 8 hours a day of central heating which leaves you warm... then cold.

Watts per mtr cubed	Insulation levels	
7wm3	Passive house	Completely airtight modern
20wm3	New Build	Standard new build
25wm3	Modern building	1950's onwards
30wm3	Old building	Pre-1950's non cavity wall



Our panels are 10-15% more effective ceiling mounted

So, a standard modern house with a 5m * 5m room and a ceiling height of 2m would need $25w * 5 * 5 * 2 = 1,250w$. Depending on the layout of the room and where we wanted the heat we could chose a combination of panels with wattages totalling at least 1250w.

As a rough rule of thumb, if we assume ceiling height at 2m, take the first digit or 2 if 1000w+ of the panel wattage and * 2 will give the floor area the heater will cover.

So a 600w panel = $6 * 2 = 12m^2$ for a modern building.

1kw hour of electricity costs around 14pence, so to calculate the running cost take the panel wattage *14p. In this case $0.6kw * 14p = 8p$ per hour.

We assume **average** running time of 5 hours per day over the heating season (180 days). So, a 600w panel would cost $5 * 14p * .6 * 180 = £75$ per year (for a 12m2 room).

The average house size in the UK is 76m2 (small 3 bed house). To heat the whole average sized house would be $76m^2 * 2m(h) = 152m^3 * 25wm^2 = 3,800w$. That's $3.8kw * 5 hours * 14p = £2.66$ per day * 180 days = **£478** per annum





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SPACE HEATING – LARGE AREAS & OUTDOORS

It is very expensive to heat very large areas such as warehouses, churches, halls. With convection heating it is not possible to create **ZONES** within a large building or large area (the air can't be contained), so the whole building / large area needs to be heated. The benefit of radiant heating is that we can directly heat people in the areas where they need to be heated, so heaters can be mounted only in those areas (we call them zones).

Heater		Zone Indoors	Zone Outdoors
IR2 / XL2 – 1300w		9m2	6m2
IR3 / XL3 – 1950w		12m2	9m2
IPR4 – 2600w		21m2	N/a
Pulsar 1800 / 2400w		15m2 / 20m2	N/a



Within the heated **ZONE** you will feel the heat and **your body will absorb the heat**. For an area around double the heated zone, the far infrared will be absorbed by the building and if there are sufficient heaters in the area to build up **THERMAL MASS** then the area will stay warm after the heaters are switched off. Note however that this depends upon the construction of the building and the number of heaters within the area, the insulation levels etc. This is a technical area which will need involvement of the Commercial and Technical Division.

For calculating running costs you need to consider the number of hours that it is anticipated the heaters will be in use. So an IR3 1950w will be $1.95\text{kw} * 14\text{p} = 27\text{p}$ per hour.



For outdoor areas, the heaters need to be under some form of cover. Herschel Far Infrared heaters emit a much gentler heat than short/medium wave infrared heaters (the ones that glow). If there is **no wind** Herschel will be a great option as there is no light and a much more comfortable heat. However, because they are not intense, they do not work well in wind or strong airflow. Think of the difference on a sunny day with no wind compared to the same sunny day in the wind.





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SUMMARY

- We heat buildings, objects and people. Once heated buildings are a store of “THERMAL MASS” which retains heat much better than air.
- You can feel the infrared from our heaters around 3 meters from the heater, but the infrared travels further than this (it just gets weaker).
- Panel heaters are 10-15% more effective if ceiling mounted (you get more heat output for the same wattage input)
- Don't obstruct the panels with furniture, it will prevent the infrared from projecting out
- It's better to have 2 or more smaller panels in a large room and spread the heat rather than one large panel
- A kilowatt hour of electricity costs around 14 pence
- For space heating you need more directional power which requires much higher wattage and higher temperatures – we are creating heated zones to directly heat people. We need around 3 times the wattage of a panel heater to create comfortable zone heating and we achieve this with higher temperature ceramic emitters.

