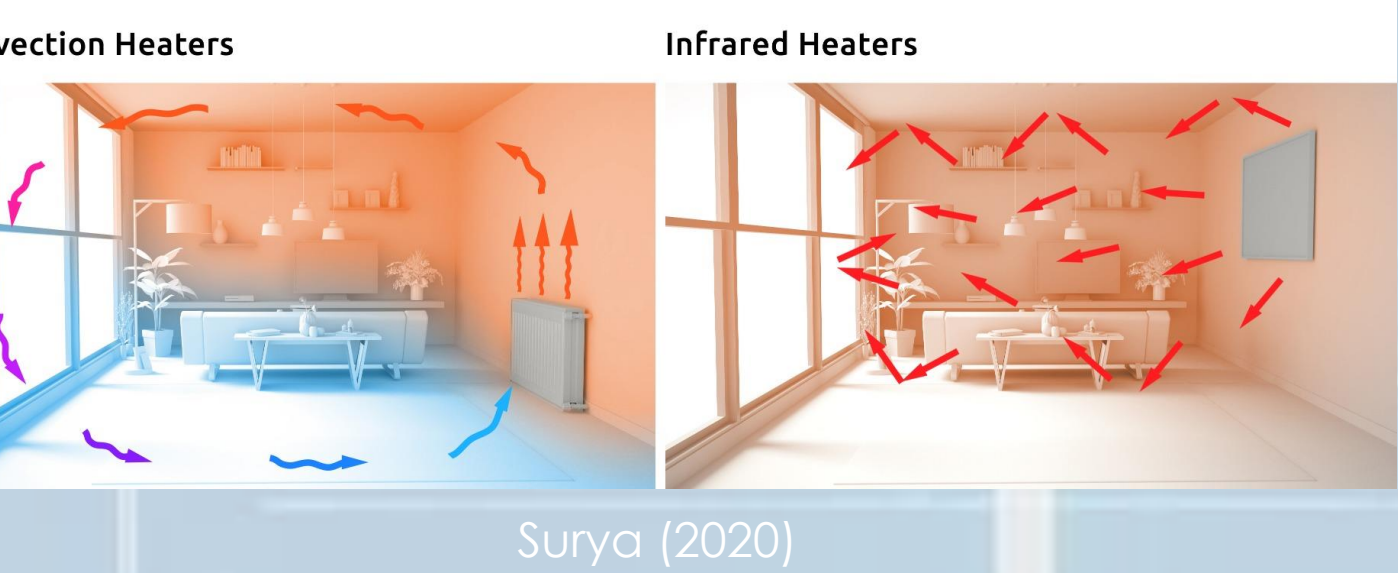


# Infrared Panel Heaters – Retrofitting Traditional Buildings

## Why Electric Energy?

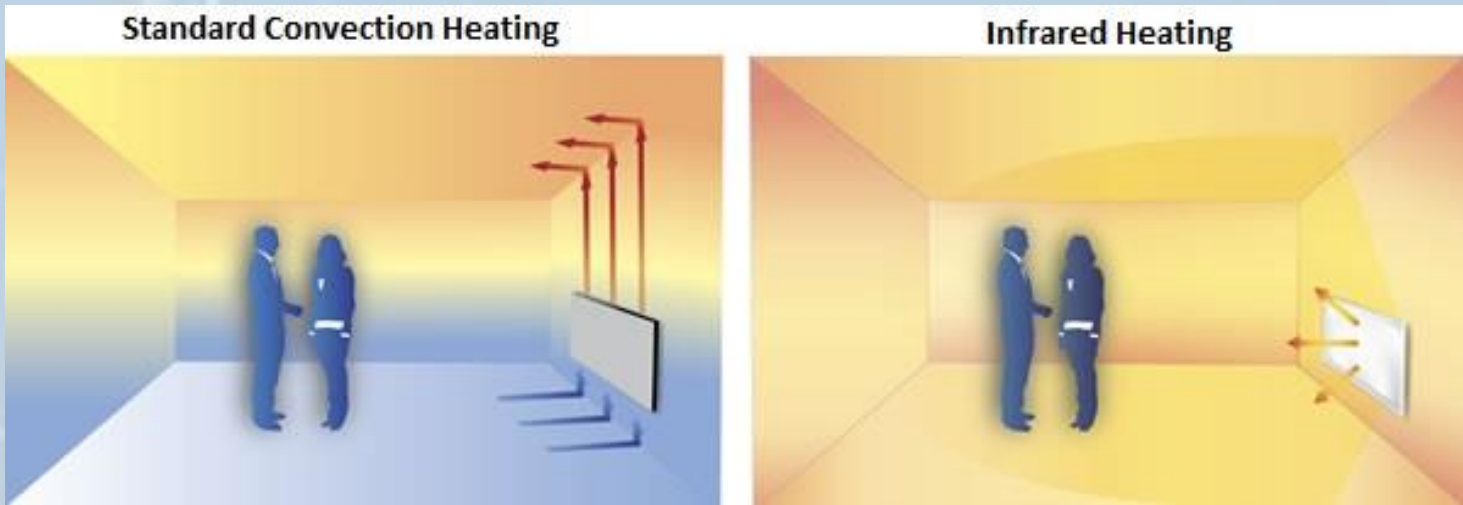
- **Future proof**  
Easier to remove and upgrade individual units and compatible with smart controls to monitor energy usage.
- **Easier to switch to renewables**  
Large amount of current electricity generated from fossil fuels, however, using an electric heating system allows easier switch to electricity generated from renewables.
- **Adaptability**  
Can be used in conjunction with other technologies, solar and battery systems to improve sustainable credentials and lower carbon footprint.



Surya (2020)

## Why Infrared Heating?

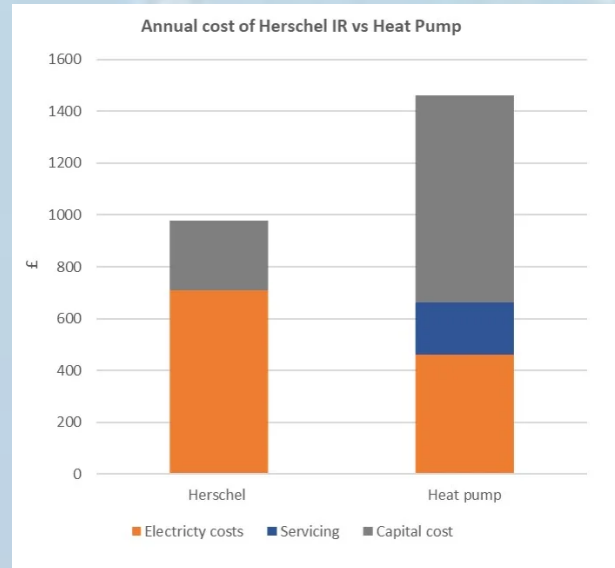
- **Direct transfer of heat from heater to object can be 100% efficient** Herschel (2022) The human body is adapted to naturally absorb infrared radiation (from the sun) Petráš (2000)
- **Ease of installation**  
While traditional “wet” heating systems require a qualified plumber, a panel heater can be installed by simply plugging into an existing electrical socket. They can also be installed on ceilings if wall space isn't available.
- **More efficient than other types of electric heaters**  
By radiating heat rather than convection, objects are heated rather than air. Therefore a room can be heated more efficiently using less energy. Roth (2007). Some other electric heaters use fans which can circulate dust.



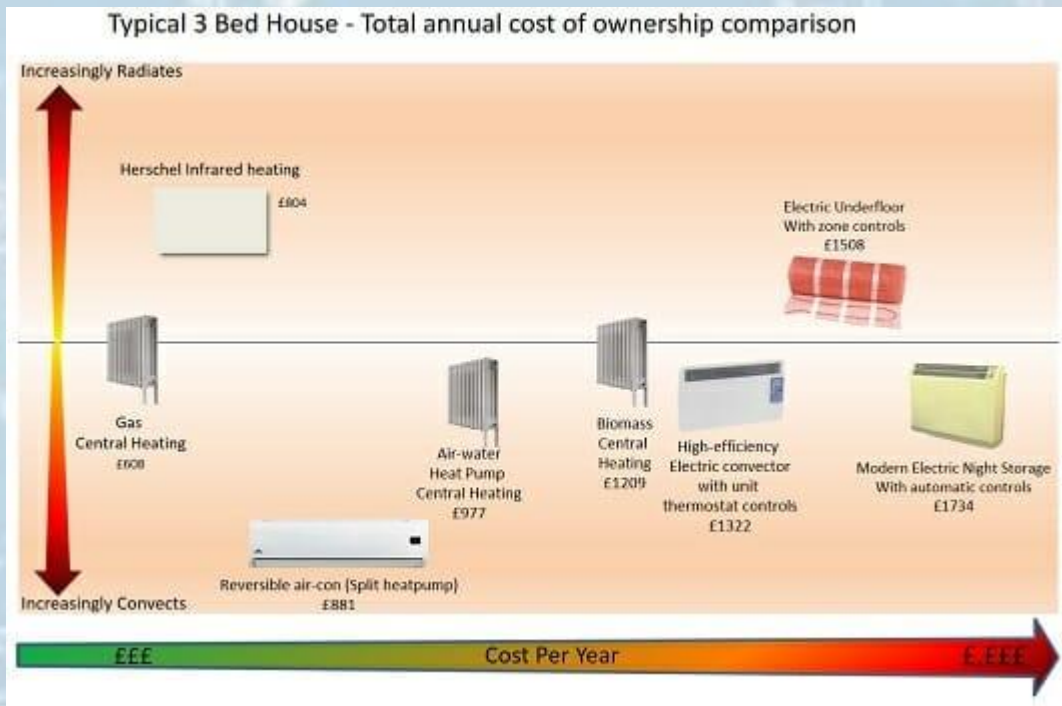
Renewable Energy Hub (2018)

## Cost Comparison with other heating systems

- Material cost – Vs Traditional wet system (Based on 10 rooms)**
- 1kw Panel Heater - £200 (x10) + water heaters £55 (x2) + Electric shower £100 (x1)  
Total £2,210
  - Wet system – 1.2 x 0.6m Double Rad £75 (x10) Baxi Gas Combi Boiler £1,300 (x1) Pipe £100 (30m)  
Total £2,150
- Running cost – Vs oil filled electric heater**
- Based on 4 hrs/day to heat a room to 18° at 35p/kwh
  - Oil filled electric heater (1.5kw) £63/m.
  - Infrared panel heater (960w) £40/m



Herschell (2022) 2



Herschell (2022) 2

## PAS 2035 & 2038

Panels present a low effort way to minimise carbo footprint helping to achieve Net Zero by 2050. Highly linkable with renewable energy technologies such as solar PV or wind turbine and batteries such as tesla Powerwall. Energy efficiency is easy to measure to help achieve PAS 2030 compliance. Retrofit Academy (2022) Other than hot water production the system doesn't negatively impact any other sustainable measure in a building Can be used as a supplementary system to boost heating and reduce usage of fossil fuel reliant traditional heating.

## Downsides

- **Hot water**  
Most traditional central heating systems are also used for water heating. With an infrared heating system, an additional method would be needed for heating water. Increasing the overall cost. Compatible systems would be instantaneous under sink water heaters.
- **Need for extra plugs**  
In an older house there may be a shortage of available plugs, or the electrical system may not be able to handle the increased load, upgrading of the electrical system (full or partial rewire) could be necessary but add to costs.

## Suitability for traditional buildings

In listed buildings, is often a need to maintain the original appearance (internally or externally). The ability to disguise a panel heater as a painting or mirror, means it can be implemented to provide heating in a building which wouldn't have originally had heating, thus making the building usable without compromising historical accuracy.

The infrared heating method is more suitable to solid wall construction. By heating objects rather than air, there is far less damp caused by condensation. Warm air holds more moisture than cold air, Williams (2013). Traditional convection heater rely on heating air, then the warm air heating cold objects. This is often the cause of condensation and damp in older colder buildings



Herschell (2022)

| Infrared vs. other heating systems                 |             |
|----------------------------------------------------|-------------|
| Heating System                                     | Annual Cost |
| Gas central heating with zone controls             | £608        |
| Jigsaw infrared with zone controls                 | £804        |
| Reversible air con with zone controls              | £881        |
| Air-water heat pump with zone controls             | £977        |
| Biomass                                            | £1,209      |
| Electric convactor heating with zone controls      | £1,332      |
| Electric underfloor heating with zone controls     | £1,508      |
| New electric night storage with automatic controls | £1,734      |

Based on a 2-bed property and May 2022 energy prices. Heating only.

The Green Age 2022



Historic Scotland 2012



InfraDum (2020)

ManoMano (2020)



The Green Age 2022

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