



Specialist heating and ventilation systems proposal



e:energycarbon  
Efficient low carbon heating systems





The future of heating **is here**



"Go out on a sunny day and put your hand on the pavement and you will feel the warmth. This is infrared radiant heat from the sun."

The Renewable Energy Hub



## OUR SYSTEMS WILL ADHERE TO THE FOLLOWING ATTRIBUTES

### **FIT AND FORGET**

With no ongoing burden on maintenance due to failure and a design life of 50+ years. This indicates that under normal operation replacement would not be necessary until well after the 2050 climate action target

### **GOOD COMFORT AND SAFETY**

Occupants should feel comfortably warm at all times without creating stale air and dust circulation. No hot surfaces and a balanced even coverage throughout all areas.

### **LOW ENERGY**

Providing maximum warmth with minimal energy cost and carbon footprint

### **ZONE CONTROLLABLE**

Enabling user friendly monitoring and adjustment in each area remotely and/or autonomously using occupancy controls to maximise energy efficiency

### **LOW CO2 IMPACT**

Good credentials as our FLEECE product is manufactured from recycled materials and comes with a 'Cradle to Grave' calculation of just 36kgs for the whole project

### **UTILISE THERMAL MASS**

Far Infrared heats objects rather than air. Floors, desks, furniture, worktops all offer good thermal mass that gently capture heat and release slowly back into the room during the off cycle.

# Testing proof and research

It is widely recognised that a good quality infrared heating system can deliver up to **60% energy savings\*** over a conventional electrical system. This is partly due to the fast reaction times but also to the ‘feel’ of the comfort level experienced by the occupants. The biggest saving is experienced by the nature of directly heating objects and occupants rather than through warming the air around them. This allows for greater air circulation around a room without heat loss which in turn aids air quality. In practice the user experience shows that heating can be run 2 degrees lower than it’s convection counterpart and every 1 degree is equal to an additional 6% energy saving. Smart controls allowing areas to switch on/off and warm up fast as areas are unoccupied also account for large savings.



In October 2020 we commissioned the Building Services Research and Information Association (BSRIA) to undertake thorough testing of our Far infrared heating product, FLEECE and DRYTEC. We were looking to quantify maximum surface temps, reaction times , speed of response and spread. Results of this test are summarised on the graphic on the next page and showed good results

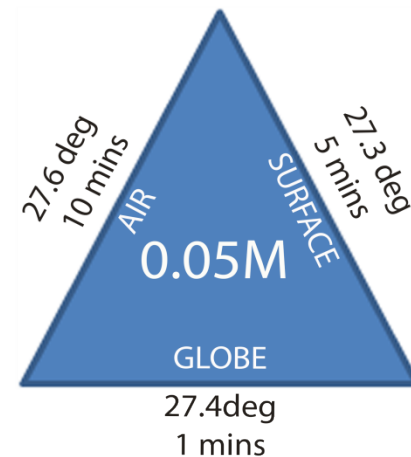
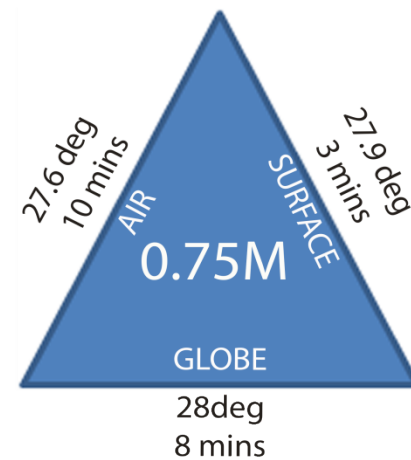
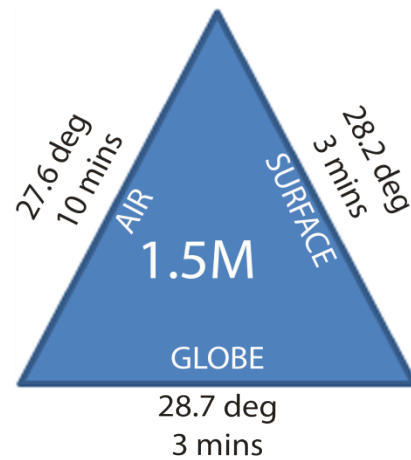


The German manufacturer commissioned testing with the University of Dresden conducted over a 2 year period running side-by-side with an air source heat pump and a gas boiler in a lived in, 170m2 family home with a 40w heat loss. This showed that overall savings per year could be achieved when compared to heat pumps and gas boilers. Graphic shown on the next page.

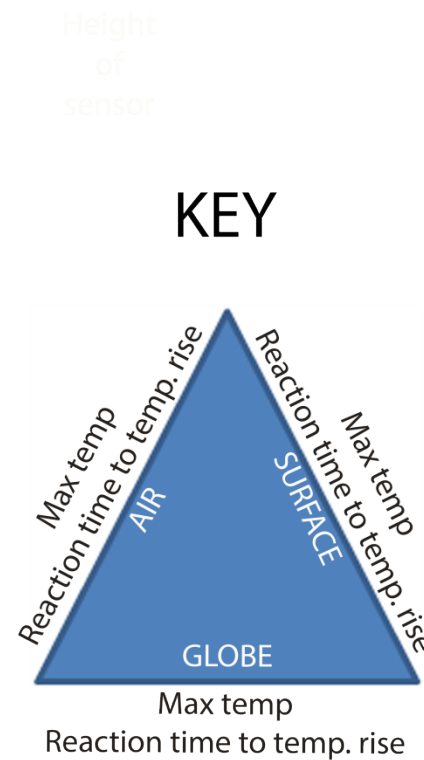




## Product test result analysis showing reaction times and temperature relationships between types of sensor

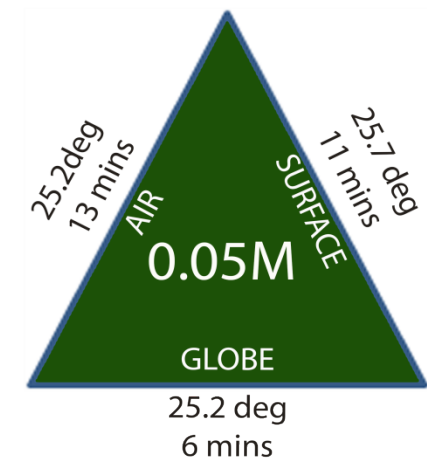
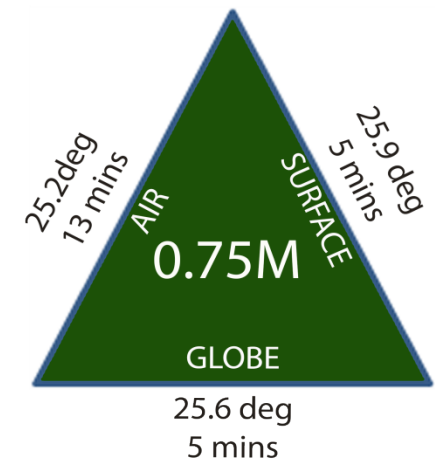
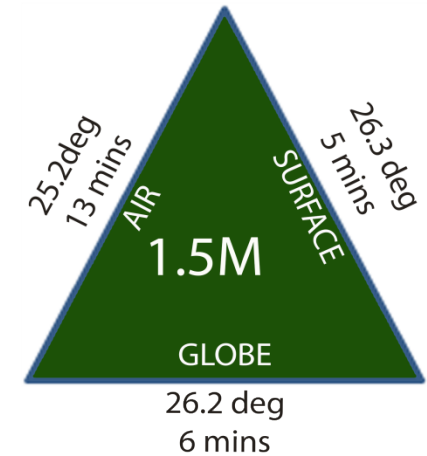


**FLEECE**  
Max. surface temp. 41.5°



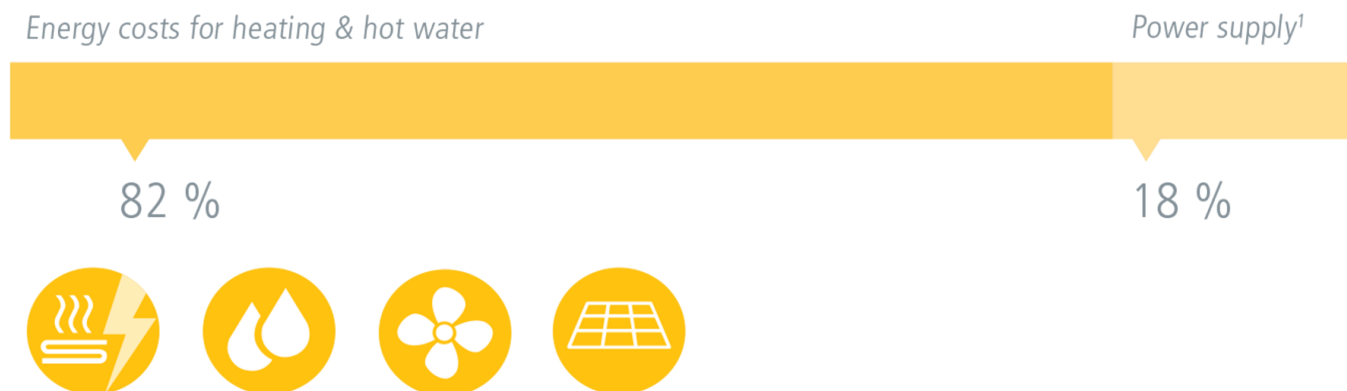
Testing carried out October 2020

**DRYTEC**  
Max. surface temp. 44.4°

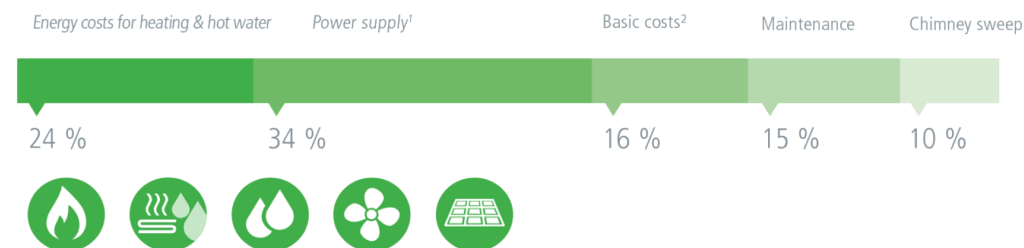


## » COMPARISON OF OPERATING COSTS

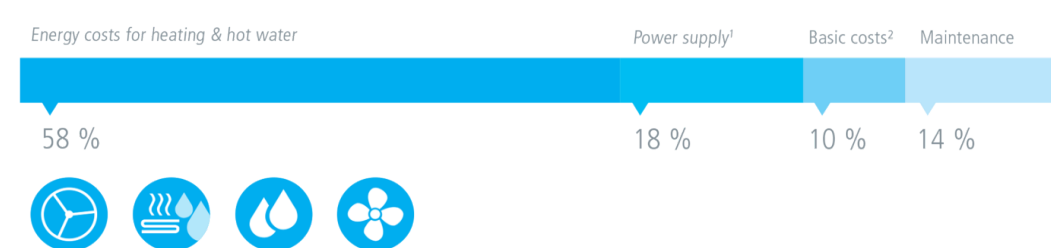
### **ELECTRIC SURFACE HEATING 627.71 € / YEAR\***



### **GAS CONDENSING BOILER 783.96 € / YEAR\*\***



### **AIR-TO-WATER HEAT PUMP 826.30 € / YEAR\*\*\***



#### **Basis of calculation**

\* Electricity costs 0.261 €/kWh

\*\* Gas costs 0,057 €/kWh

\*\*\* Electricity costs 0,20 €/kWh (separate electricity meter)

<sup>1</sup> Ventilation & circulation lines, pumps (heating, circulation)

<sup>2</sup> Electricity meter (electric surface heating) / Gas connection (gas condensing boiler)

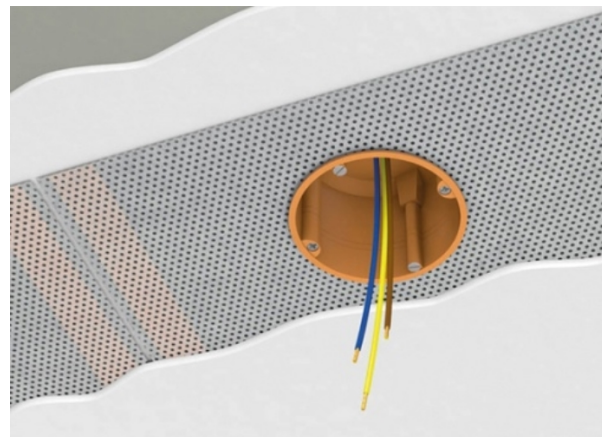
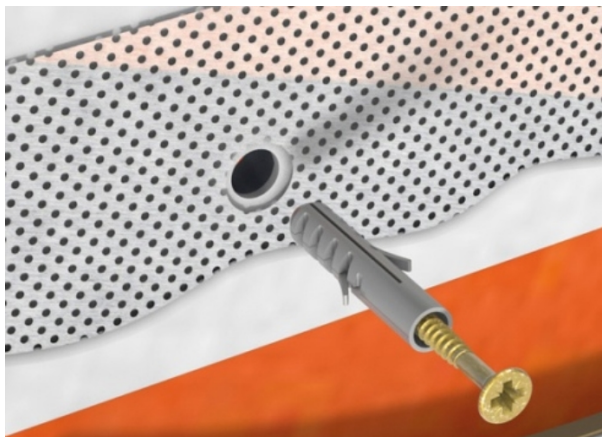
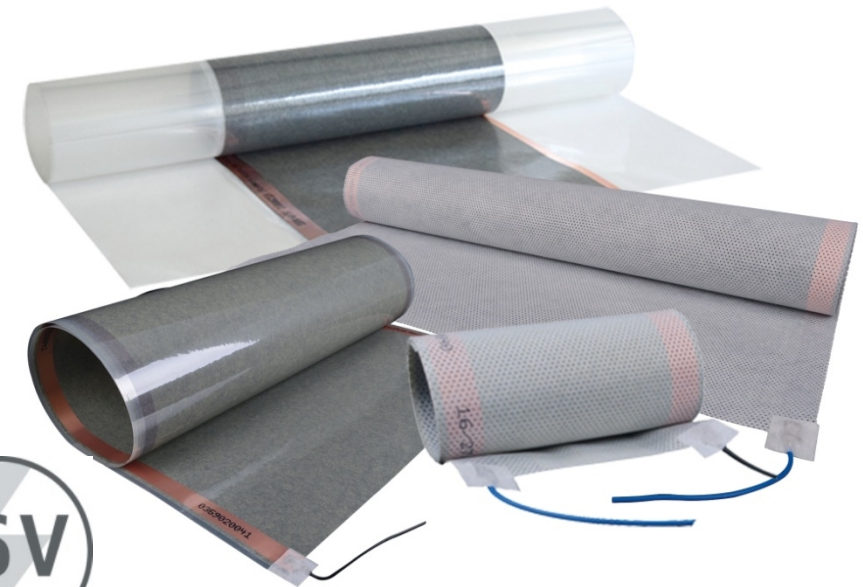


## A brief overview of the product

Energy Carbon provides an effective, low energy, low carbon footprint, infrared heating solution. It is a proven product manufactured in Germany and takes the form of a heating 'fleece' that simply fits into the ceiling or walls, either behind the plasterboard or simply skimmed into the final plaster coat. The product can also be installed under self levelling compound in the floor or under floating floors such as laminates.

Our product is easy to install, using existing trades thereby reducing costs and time spent with specialist trades. It sits invisibly within the fabric of the building and gives an even, comfortable warmth that is zone controllable using smart control systems.

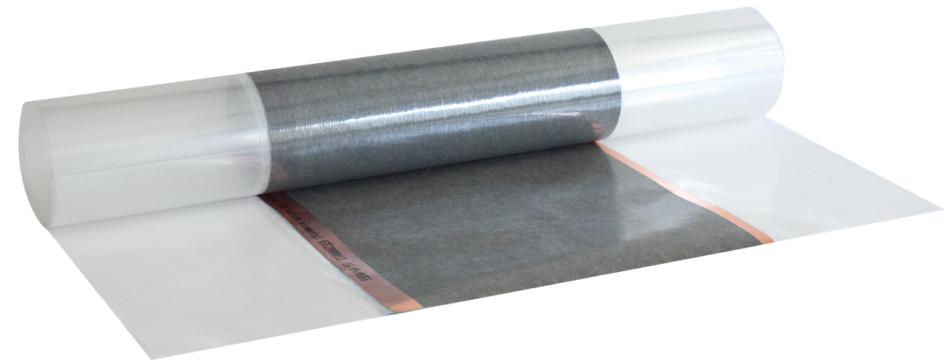
This system has been tried and tested over a 6 year period with 100,000 linear metres fitted to date. It has CE approval, is TUV tested and has and continues to undergo stringent testing including a 2 year study conducted by Dresden University where it was proven to be far more economical than other solutions.



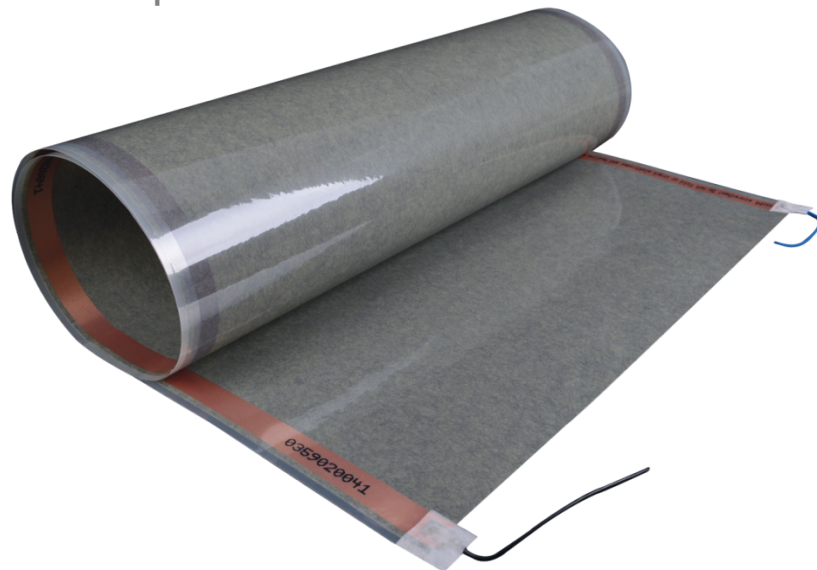
# Products



FLEECE for ceilings, walls and floors— installed behind wet plaster or self levelling compound. Available in 60w, 110w and 220w per m2



DRYTEC for ceilings— installed between ceiling joists. Available in 112.5w per m2



PET for floors— installed underneath floating surfaces such as laminates. Available in 115w



The Energy Carbon, self learning, zone control thermostat. Wifi enabled and app controlled from phones or tablets



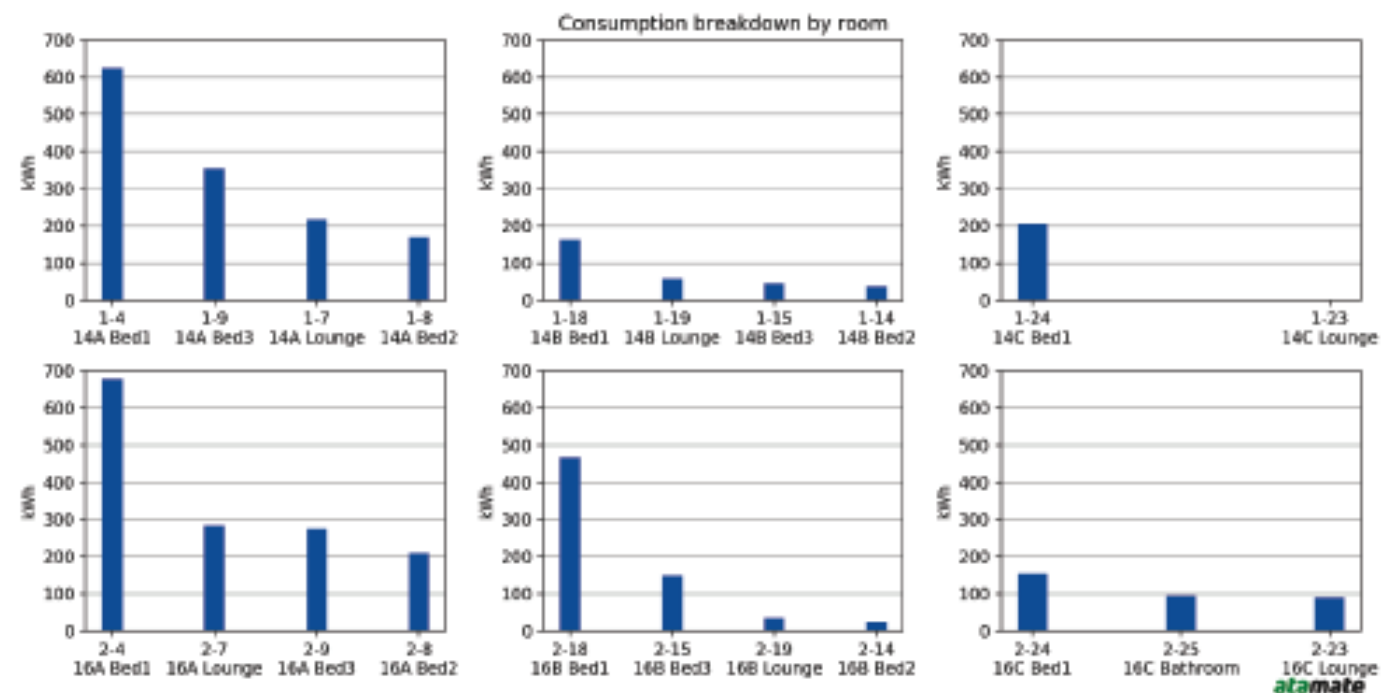
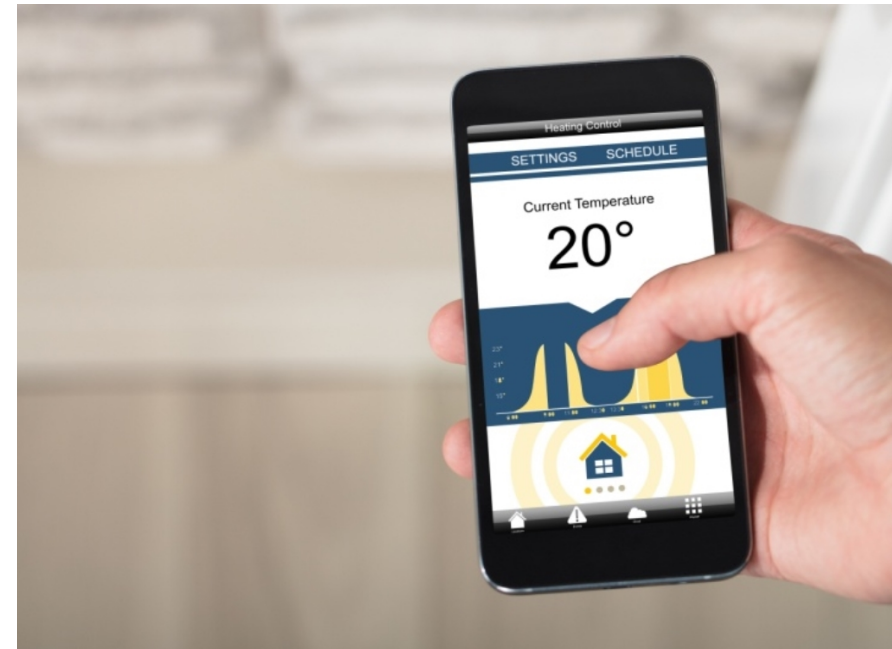
# Transformers

- Our transformers come in a range of sizes and outputs and can either be flush mounted, surface mounted - individually per zone or centrally



## Recommended control system

- The Energy Carbon heating system is extremely responsive and compatible with most smart systems available today. As smart technology improves in this area our system is 'plug and play' and will adapt making it effectively future proof.
- Today's smart controllers range from simply being able to monitor and adjust the heating remotely right through to measuring CO<sub>2</sub> levels in a room to ascertain the occupancy of motionless occupants and adjust ventilation and heating control accordingly and report on potential concerns before they exist.
- As well as our own simple AI, self learning system we recommend the Genius system easy control and to maximise energy efficiency





# Welcome to E-ENERGY CARBON

- » Reduces energy costs
- » Installed behind the final finish of the ceiling, walls or floors so no obstructive, dangerous, hot radiators required
- » Cut holes and fixings for spot lights and fixings
- » Zero maintenance.
- » Space freed up for better placement of beds, furniture & equipment
- » Provides good comfort levels without 'stuffy' atmosphere
- » Reduces dust circulation – great for those with breathing difficulties
- » Unlike boilers, this de-centralised system means no heating interruption to all rooms in the event of failure

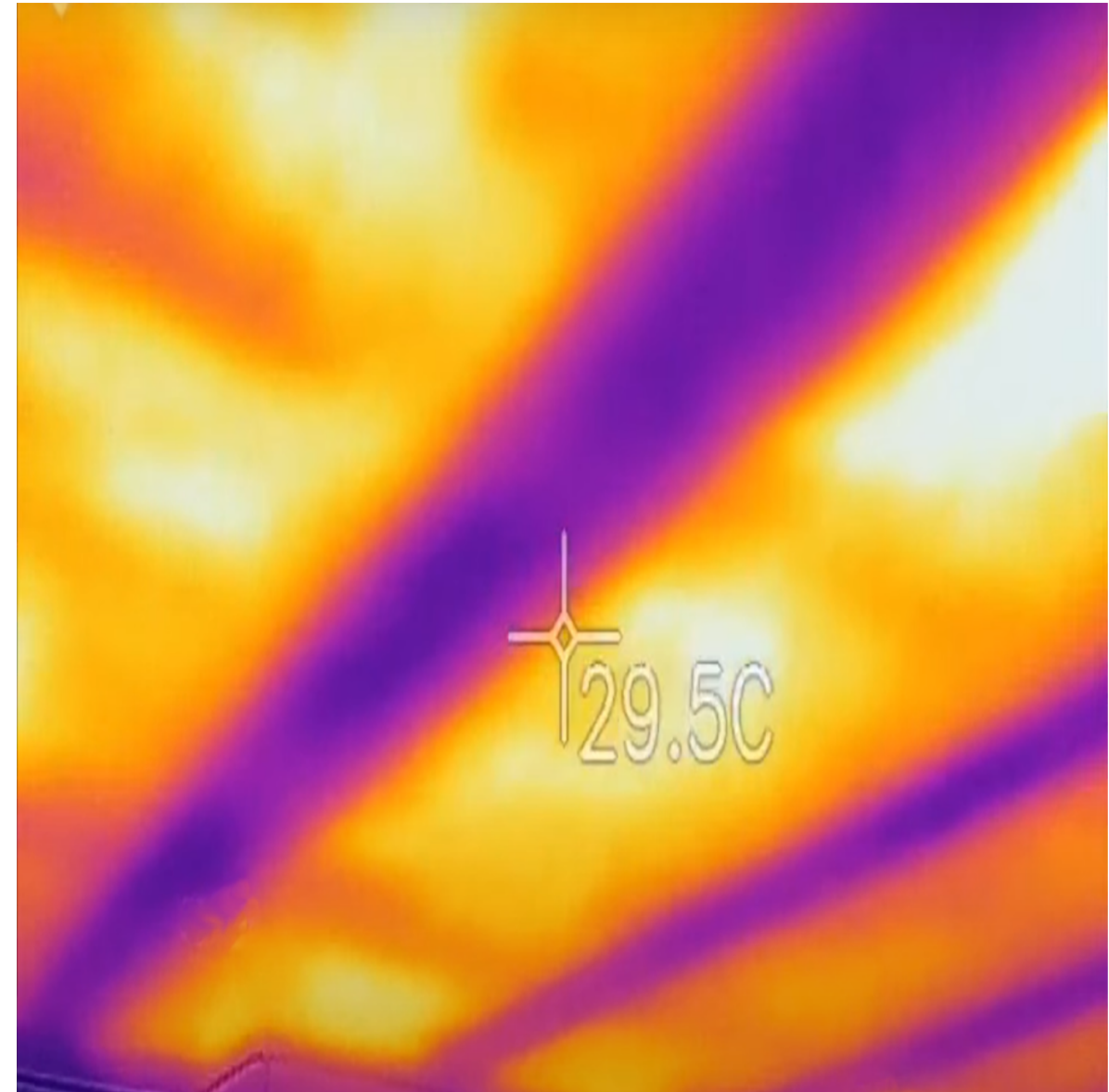


## What is Radiant heat?

Typically our buildings have been heated with radiators which transfer heat into a room primarily by convection. This draws cold air from the floor, pulls it across the heat source where it warms and then rises to the ceiling, cools and returns to the floor to begin the cycle again. To feel the benefit, this circuit needs to repeat until the air mass is warmed which can be a slow and expensive process, dragging dust and dirt along with it. Open the door and the warm air escapes to start the process over again.

Our system uses infrared radiant heat instead. A far more natural source of warmth and one that bypasses the air and warms objects and people in a room. This provides a fast heat response and we feel far more comfortable more quickly. The objects in turn warm and release their own form of heat similar to the sun warming the sand on a beach.

As our system is electric it also reacts very quickly. No other form of heating reacts so fast.



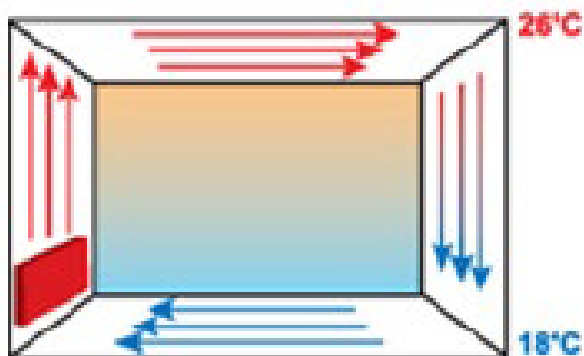
Thermal image taken of E:nergy Carbon fleece installed into the ceiling

- » Infrared radiant heat warms objects gently and not the air mass resulting in quicker comfort levels, more controllability, lower running costs and no need for hot radiators

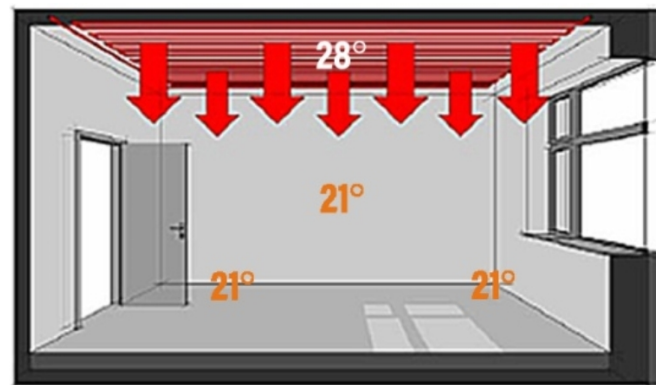


## Different ways that heat is transferred

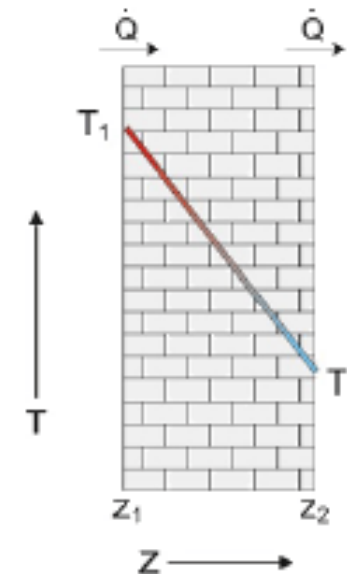
Convected



Radiated

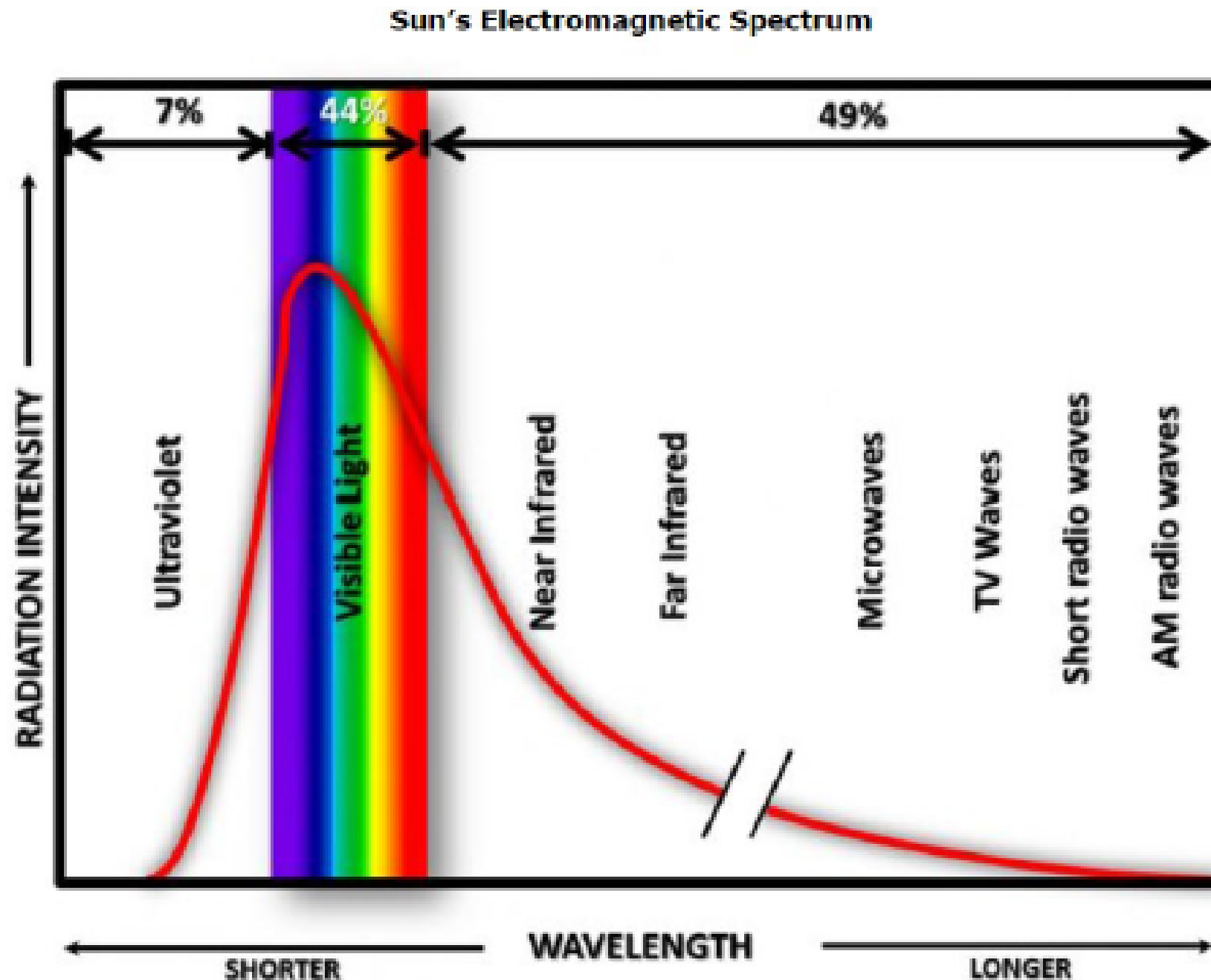


Conducted



» Each heating system always has a combination of the three heat transfer types but in different proportions

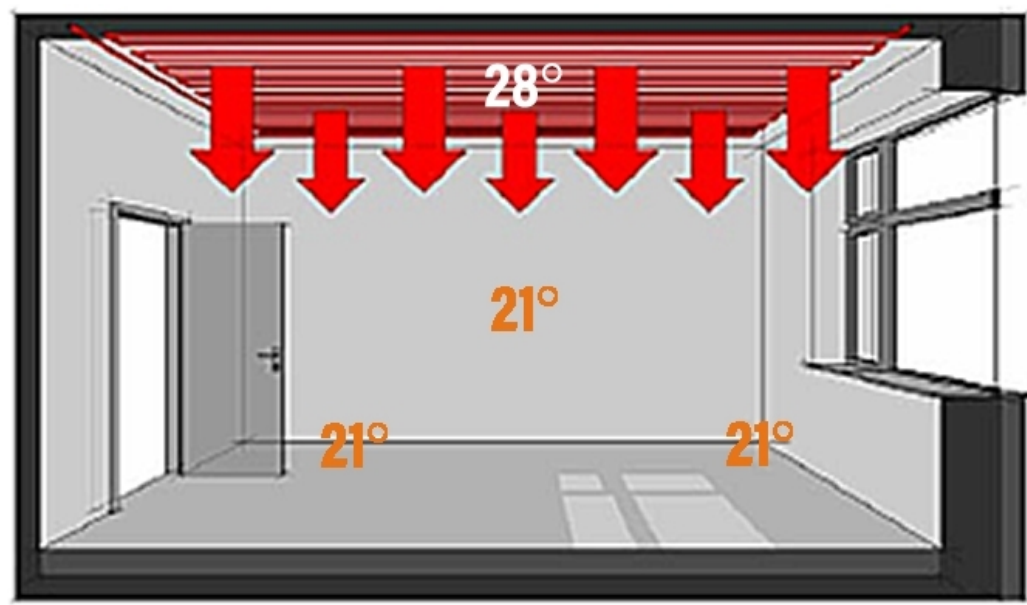
## Infrared radiant heat— part of the sunlight



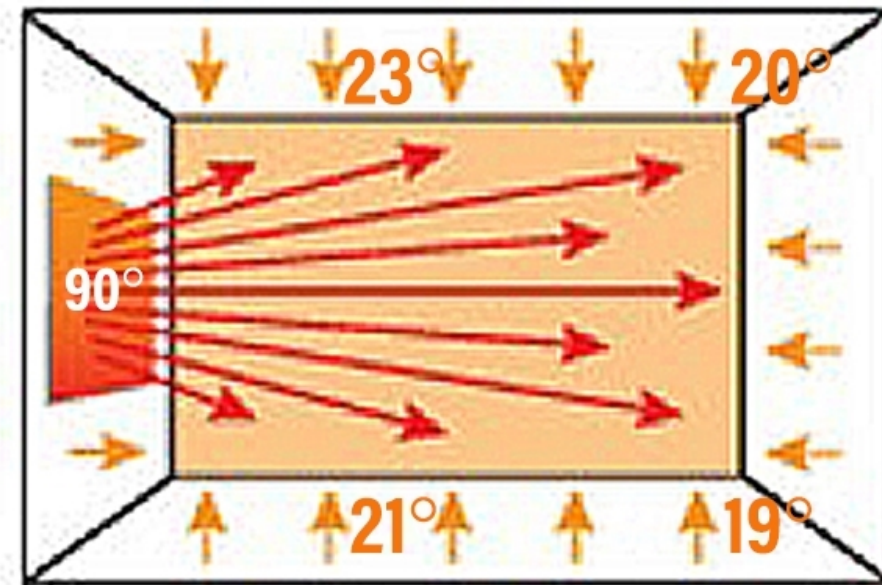


# Energy Carbon Fleece vs Panel heating systems

Low temperature – large surface area



High temperature – small surface area



- » Both heating systems work with a high proportion of radiant heat
- » The aim of both is to evenly heat the rooms ambient areas
- » 1° of heat variance is equivalent to 6% energy saving
- » Comfort = uniform heat distribution

## E-ENERGY CARBON

- » Our product is ultra light and ultra thin at just 0.4mm, becoming part of the fabric of the building.
- » Amalgamated nano carbon fibres that are as used as conductors to convert electricity into heat at 97% efficiency. Thousands of them in an extremely small space.
- » Safe, easy to use and maintenance free.
- » A real, viable alternative to heat pumps and wet systems – providing a direct electrical heating solution that fulfills the requirements of the Future Homes Standard.
- » As the heat comes safely from the ceiling, walls and floors there is no need to have chunky, hot radiators
- » Infrared heat is proven to reduce damp and, as there is very little convection, reducing dust as well.



## E-ENERGY CARBON

- » The system provides very fast warm up times and directional heat up to 3.5m, warming items such as furniture, worktops and the floors gently and safely to become heat synchs which in turn act in place of radiators that warm the air in the home.
- » Unlike all other foils, E-ENERGY CARBON FLEECE does **not** consist of individual layers, but is homogeneously melted in a patented manufacturing process.  
This eliminates the possibility of long-term defects caused by the detachment of individual layers.
- » 6 years and 100,000 metres sold with no reported failures - our product is designed to last

# E-ENERGY CARBON FLEECE – Benefits



+ Perforated for under plaster systems

+ Patented manufacturing process

+ 97% efficient

+ Zone controllable

+ Healthy heat

+ Safe low voltage (36v)

+ Smart device compatible

+ Cut holes up to 70mm for lighting etc.

+ Easy installation

+ Low energy – out performs all others

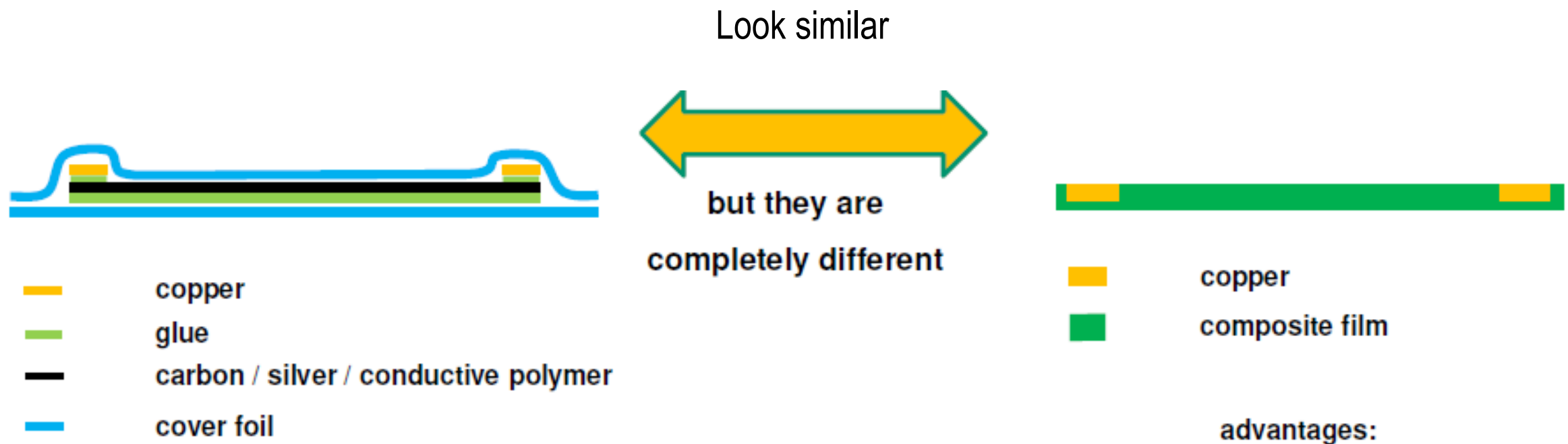
+ High heat output and fast heat up

+ Moisture protection, reducing condensation in the room



# Our USP

## The structure – Patented Manufacturing Process



### COMPETITION

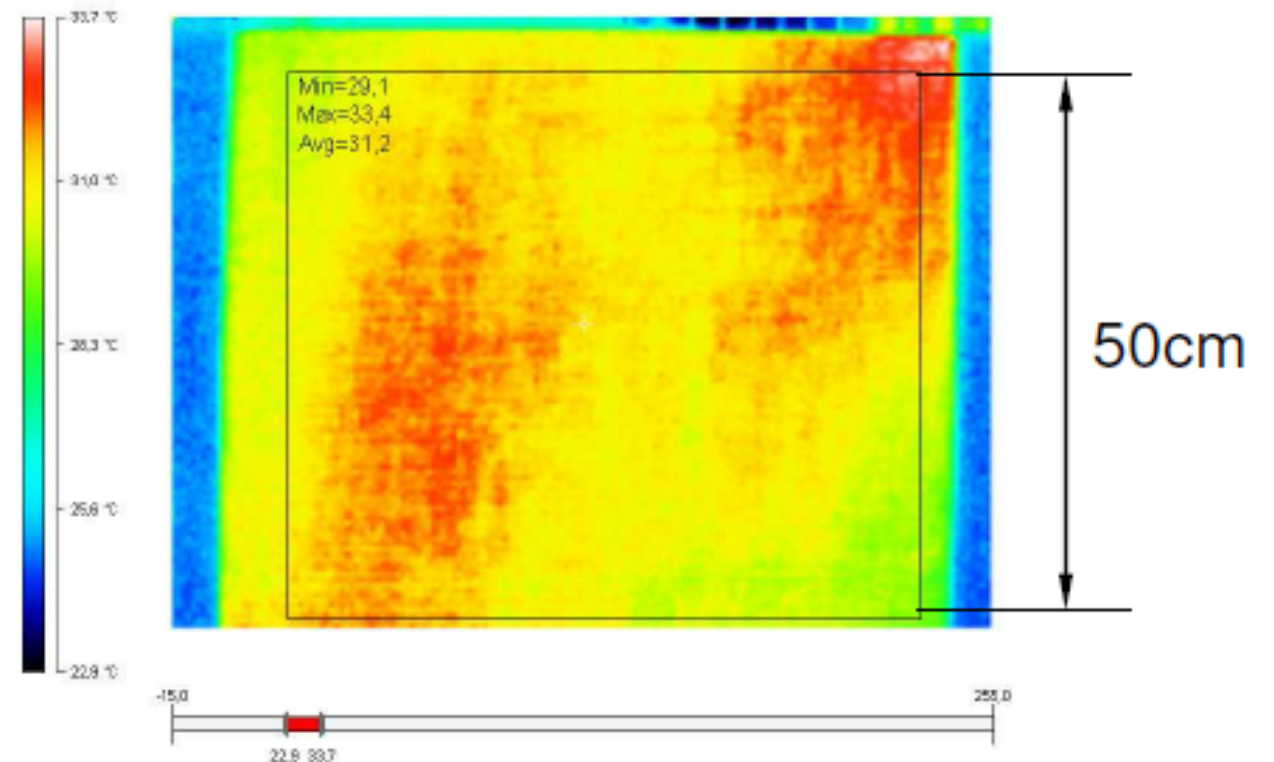
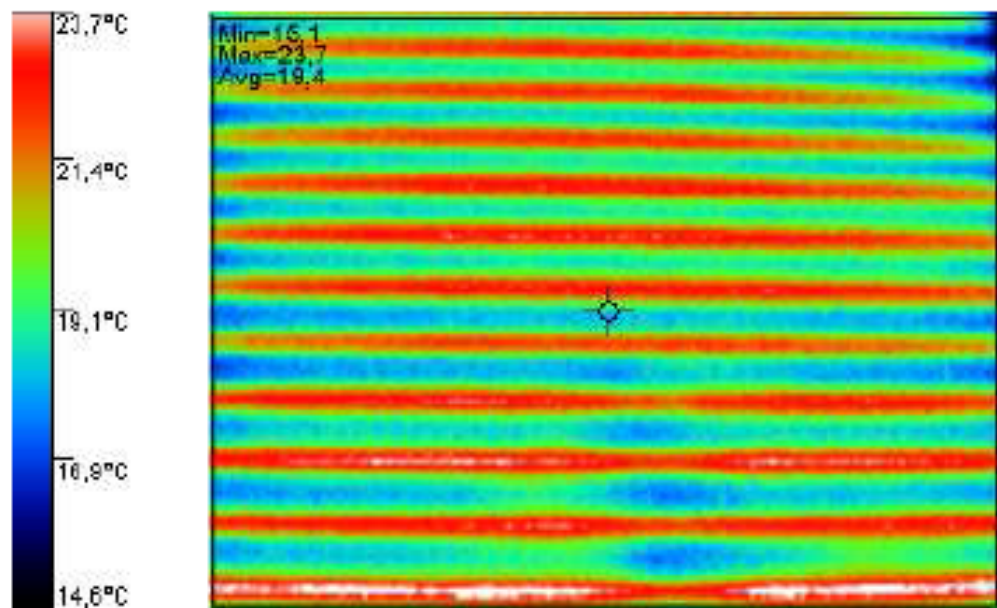
Depending on the layer structure, the probability of embrittlement, aging and resulting thermal hot spots is very high.

### E-ENERGY CARBON

No adhesive  
 No embrittlement  
 No air inclusions  
 Copper strips fully integrated  
 No dangerous hot spots

## Our USP

Full surface heat distribution



### COMPETITION

Delta T ~20K at 27°C

### E-ENERGY CARBON

Delta T ~3K at 27°C

Minimal temperature difference across the E:nergy Carbon fleece compared to others at the same output meaning no 'hotspots' and a more efficient use of the surface area.



## Installation in a new facility or retrofitted into a refurbishment

Simple to spec. and using existing onsite trades, the Energy Carbon system arrives on site made up in kit form and to an individual building design.

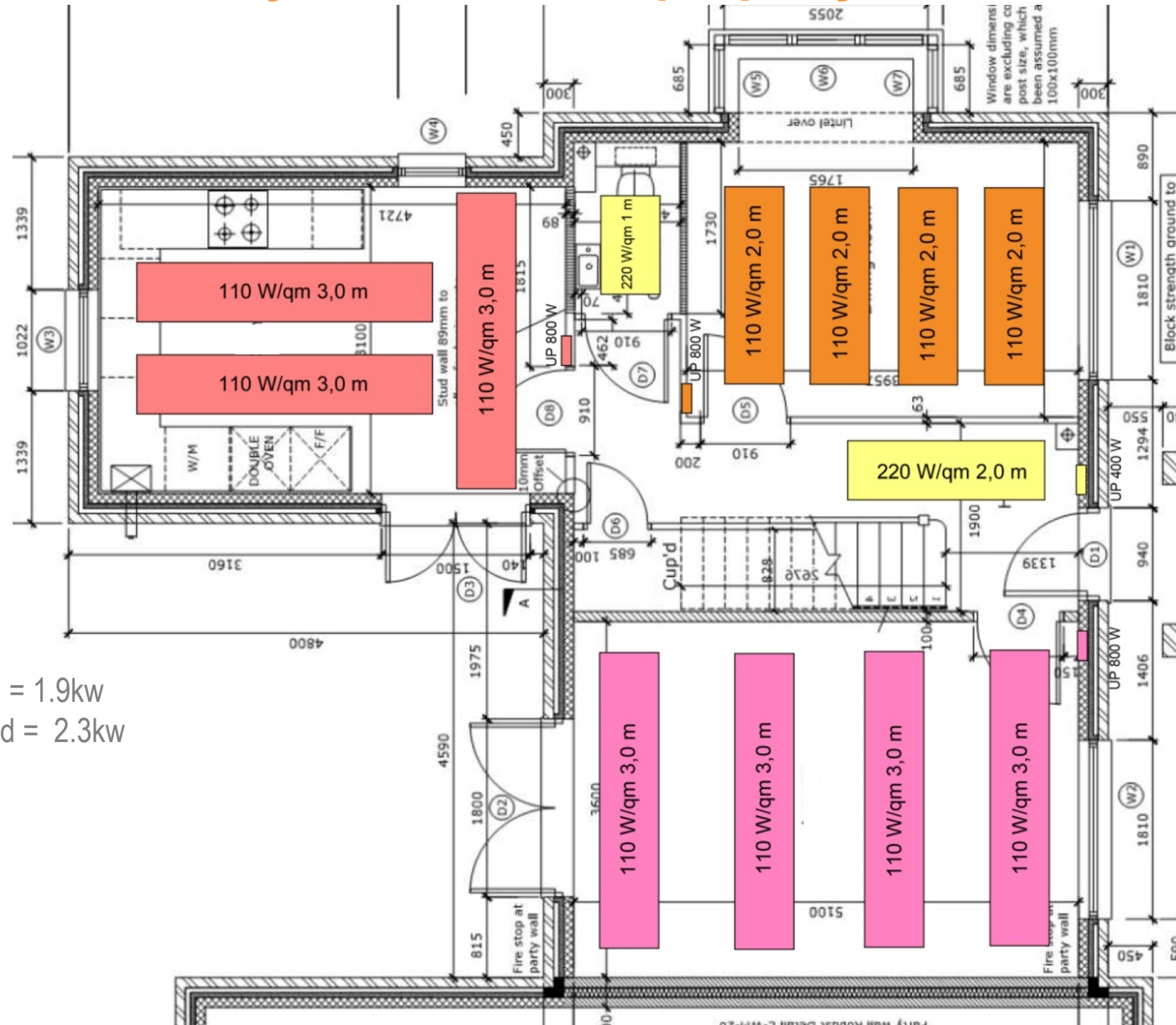
Each room is split into zones with it's own control system that can be linked to a hub. As we are using only 36v our transformers can either be located centrally or flush mounted into each room space where convenient.

Our installation plans are easy to understand as is our instruction and testing manual. Simply fit the fleece into the ceiling, connect to the transformer and controller, perform minimal tests and that's it.

As the system does not rely on pipework, radiators or ducting, a installation can be carried out on a room by room basis with minimal disruption to occupants as part of a rolling refurbishment plan.

The following pages show an example layout plan for installation demonstrating the level of coverage achieved.

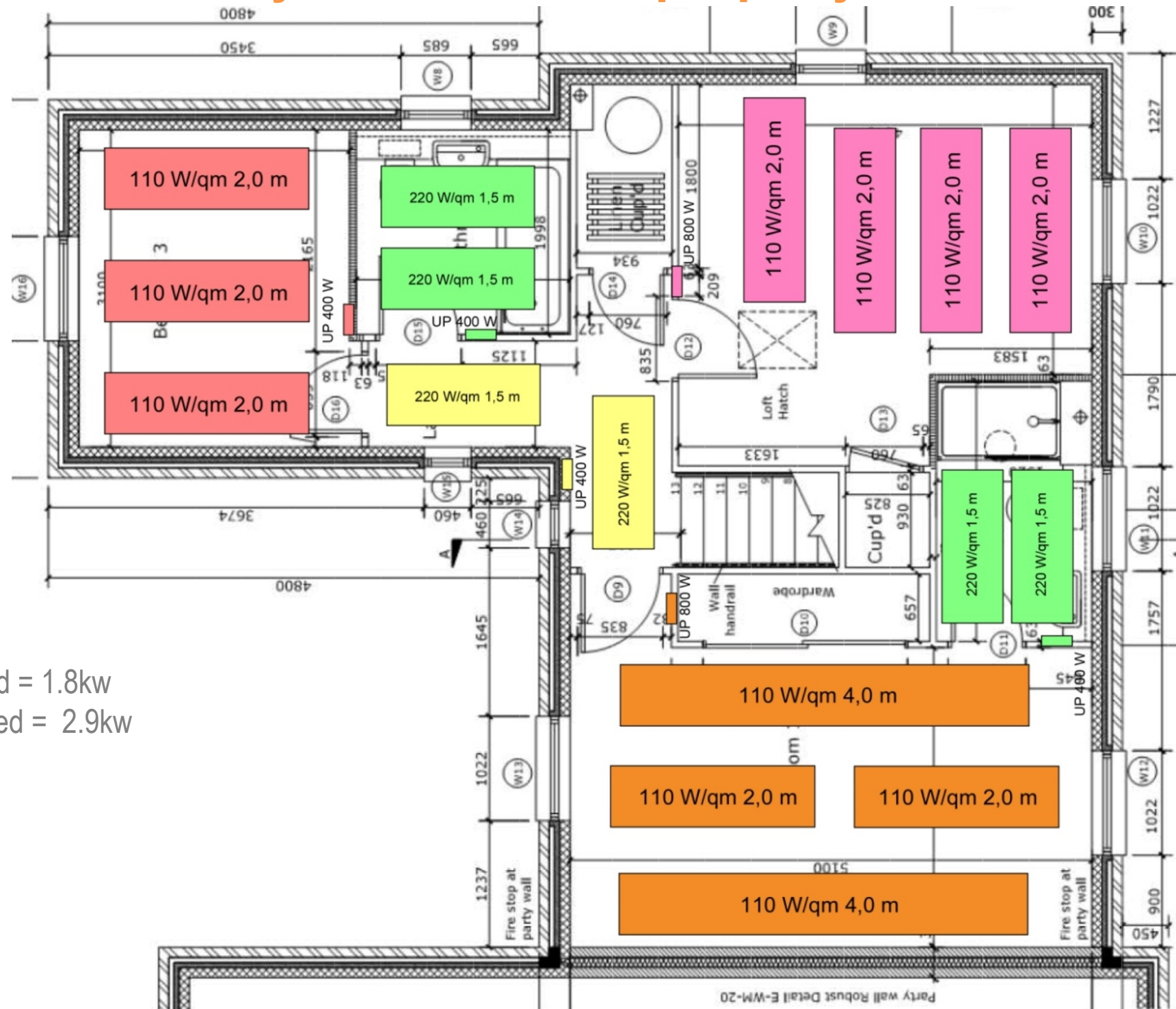
# Typical installation layout in a 100m<sup>2</sup> property



Total wattage required = 1.9kw  
Total wattage produced = 2.3kw

Ground Floor

# Typical installation layout in a 100m<sup>2</sup> property



Total wattage required = 1.8kw  
Total wattage produced = 2.9kw



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