

**WELCOME TO SUNFLOW LTD.
WORLD LEADERS IN HEATING DESIGN**

SUNFLOW INVINCIBLE HEATERS™



Incredibly well built. The only British manufactured heater featuring low temperature heating using a baked kiln clay core.

SUNFLOW



**The Warm Heart of
Heating**



INTRODUCING THE INVINCIBLE™ RANGE OF ELECTRIC HEATERS

Our aim is to design, develop and manufacture the best, most efficient electric heaters possible. Made to order, these superior heaters are comparable on price with foreign mass-produced heaters which may look similar in the photos but are inferior in a number of areas. Sunflow heaters are vastly different to the majority of electric heaters on the market because our heaters are based on low temperature electric technology. These pages explain how this is better for you and better for your pocket.

TOPICS COVERED IN THE BROCHURE:

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YOU CAN TRUST IN OUR QUALIFICATIONS



*British Standards
Institution Kite Mark*





OUR TECHNOLOGY

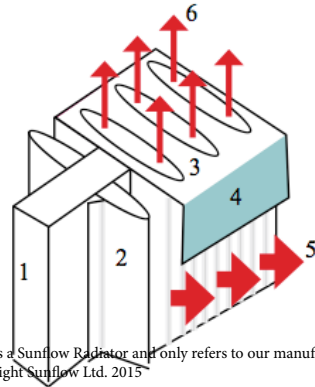
WHY SUNFLOW INVINCIBLE™ HEATERS ARE DIFFERENT

The idea of large, thick firebricks taking in a charge of cheap rate electricity has been around for more than sixty years. Unfortunately, these storage heaters rely on very high temperatures, in the region of 1000°C to 1500°C, and use massive amounts of electricity.

So concerned were German legislators about the amount of electricity being used by these heaters, that they passed a law in 2009 (ENEV 2009) stipulating that old night storage heaters had to be ripped out of German buildings by 2020. This law was repealed in 2013 as there was an outcry over the cost of doing this in such tough economic times. Currently, in Britain, night storage heaters are not allowed in new build houses because they burn too much electricity.

The Sunflow Invincible™ technology is different. Our efficiency is based on low temperature heating. Our scientists know that it is not necessary for elements to run at 1000°C in order to heat a room up to 21°C, in fact, our heater elements are limited to just 200°C. An added advantage is this restricts the elements from glowing red, increasing the life of the element and preventing dust burn off. This is why our heaters carry a ten year guarantee* and are engineered to last thirty or forty years.

Our next efficiency was to eliminate air by encasing our elements within a super heat-releasing medium, baked kiln clay. It is a known law of physics that air is an insulator. Baked kiln clay is strong and very dense, much denser than porous fire-brick. This means the heater is transferring heat directly from the embedded heating element rather than trying to go through air. Given the efficient heat transfer, and by using thinner blocks of kiln clay, we were also able to overcome a big disadvantage of storage heaters (and also concrete style underfloor heating systems) by being able to bring a room up to temperature in a short period of time, typically 20 to 30 minutes. This means that Sunflow Invincible™ heaters easily compete in warm-up times with traditional central heating systems.



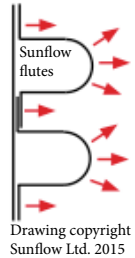
This is a Sunflow Radiator and only refers to our manufacturing process, copyright Sunflow Ltd. 2015

1. Refractory clay core with embedded element
2. Deep flutes for natural convection
3. Top cover
4. Premium powder coating
5. Radiant heat
6. Convected heat

* Five year guarantee on the controls.



Our engineers were not content to stop there. A large part of any heat requirement is through convection. Rather than using forced convection, Invincible TM uses natural convection facilitated by deep flutes. This creates a gentle upward movement front and back to create more even heat and to combat heat loss. Unlike cheaply made heaters, each deep flute is individually made and welded with a rounded front to throw radiant heat in all directions.



Our scientists also decided on high quality, intelligent controls which eliminate temperature cycling. This means that we modulate the power all the way from 0% to 100%, which means that as the heater approaches the set temperature we start to reduce power input into the heater. For example, if the target temperature is 20°C and the actual room temperature is 19.9°C, the actual power demand at that point will be reduced to about 25%. If the temperature rises further it will be turned down more, if it falls it will be turned up more. The result is a completely stable room temperature with no cycling at all.

COMPARISONS WITH OTHER HEATING SYSTEMS

Cheap Electric Heaters

They may be cheap to buy but they are certainly not cheap to run. The easiest problem to identify is poor quality thermostats. These may be several degrees out and that adds enormously to the running costs. A number of organisations quote figures. For example, The Energy Savings Trust say that reducing your heating by one degree centigrade can save 10% on your heating bills, so imagine what harm three degrees would have on your finances.

Most fan heaters, convectors and even night storage heaters rely on forced convection to heat the room. Due to the extremely high temperatures of the elements, reaching between 1000°C and 1500°C, cold air is drawn or forced through the appliance, causing excessive air movement. All buildings have a certain level of humidity as they have to breathe. Excessive drying means that the natural moisture reaching the body evaporates and makes the apparent temperature feel cooler. This leads to thermostats being turned up unnecessarily. This effect is especially noticeable after bathing, particularly if you leave a warm moist bathroom and enter the drier atmosphere in a bedroom.

HUGE SAVINGS - As design engineers, patent holders and manufacturers, we are able to keep our overheads low so you can be assured of the very best heaters at the lowest price possible.



Breathing dry air is a potential health hazard which can cause respiratory ailments such as bronchitis, sinusitis, asthma and nosebleeds.

Sunflow heaters are specially designed to heat a room using low temperature heating and natural convection. This gentler, unforced heating does not produce rapid air movement and the problems associated with forced convection. The deep Sunflow flutes assist with natural convection whereas most cheap heaters are flat sided forcing air up through an open-ended box.

It is useful to note that poorly sized heaters will run virtually continuously as they struggle to heat a room. Constant running is very expensive.

Night Storage Heaters - often called E7 / Economy7 or NSH

This type of heating has been available for approximately 60 years. It was born in the days of very cheap electricity when efficiency was not important. Storing heat for a long time is a lot less efficient than storing electricity and we explore this in greater detail in the 'New Home (and Small Business) Technology' section.



Photo taken in the Sunflow factory storage yard.

Night Storage Heaters awaiting recycling

Sunflow replace a large number of night storage heaters and can categorically prove that when we take out a 3.4-3.7 kilowatt NSH, we will replace it with a 1.5 - 2 kilowatt rated Sunflow heater. The NSH has the added disadvantage of not having time or temperature control. A big problem with NSH is anticipating the weather. In Spring and Autumn the cool nights can make it very difficult to judge. Too hot in the daytime, or switch off so you are cold at night?

Night storage heaters also give uneven and decreasing temperatures as the evening wears on. Just when you need extra heat, the

night store goes cold. Sunflow Invincible™ heaters are slimline, attractive and they react to any changes in temperature, automatically, in each room.

E7 electricity tariffs can be problematic. You may be paying a low rate for seven hours but the day rate may well be over the odds. Paying an extra 2, 3 or even 5 pence per kilowatt hour for the other 17 hours per day can really add up. Given a reasonably well insulated property, savings with Sunflow heaters can be up to 40%.



Comparisons with Gas / Oil / LPG Central Heating Systems

There is a misconception about gas central heating being the cheapest system to run. This may be because the price of gas is cheaper per kilowatt hour. Unfortunately you have to use a lot more of it. One hundred percent of Sunflow electricity consumption is used in the room containing the heater. Not so with gas, oil or LPG central heating systems. Modern boilers with computer control are claimed to be 90% efficient (seasonally adjusted) at burning gas in the boiler. Where does the rest of the gas, oil and LPG go? From there, heat loss accelerates according to the location of the pipework, the length of pipe runs, etc.. The last radiator in a system may well have less than half the efficiency of the first.

Even with thermostatic radiator valves (TRV's) on a wet system, hot water still has to circulate past every single radiator even if the TVR is turned very low or off. There is an opinion that TVR's interfere with the function of the boiler computer, causing further problems. Replacing a boiler computer can cost up to £1000.

The elephant in the room as far as these systems are concerned is maintenance. Ongoing maintenance is both necessary and a legal requirement. Annual service costs have to be added to the running costs, whether with actual service costs or monthly insurance. There is a lot of debate about boilers. What is the average life of a boiler? Older boilers used to last 10-15 years. Now however, manufacturers are writing to their customers telling them their boiler is obsolete after just eight years. So, if a Sunflow heater lasted forty years, you would have to factor in the depreciation of five boilers!

One cautionary point. If keeping existing radiators when installing a new boiler, by law you must have a power flush to the system. Not only is this expensive, the danger is that the chemical mixture leaks! Your entire system is only as good as the weakest joint in your pipe work. Check the small print.

Gas Fires

Many homes still have gas fires in the lounge. Taken from a manufacturers brochure, these fires require 6.95 kilowatts of gas per hour input to get 2.3 kilowatts per hour of heat output. So over two thirds of the energy used goes straight out the flue! Don't forget, you must have a cold air inlet in the room to operate these fires or run the risk of death from carbon monoxide poisoning.

Maintenance and Depreciation

Sunflow Invincible™ Heaters have a 10 year guarantee with a five year guarantee on the controls. No servicing needed. A gas or oil boiler needs servicing every year - an annual bill or monthly insurance charge.

If a boiler has to be replaced after 8 years it becomes worthless.

SUNFLOW HEATING = NO MAINTENANCE



Legislation

The Climate Change Act 2008 is the legal framework which binds us to comply with our international (and EEC) agreements to reduce our carbon output. However, despite passing the 5th Carbon Amendment in July 2016 which deals with carbon reduction targets for 2028 - 2032, there is no clear policy on how this is going to be implemented, except for a Briefing Paper Number CBP555 dated 19 March 2018 CBP-7555.pdf. This contains links to many reports which includes some surprising assumptions, such as a reduction in domestic fuel demand despite an increase in population and that the rising price of gas will curb domestic demand. Several very mild winters may account for the assumption of lower usage but the harsh winter of 2017/18 may require a major readjustment in their thinking. If so, the already predicted shortfall in carbon reduction targets will rocket (in a bad way) and more stringent measures to reduce the burning of fossil fuels will have to be introduced if the government is to meet its own targets. The report also suggests the U.K. is adopting more stringent targets than the rest of the EU. What are they? The following are links to EU legislation:

http://ec.europa.eu/clima/policies/strategies/2020/index_en.htm

<http://ec.europa.eu/energy/en/topics/energy-efficiency>

http://ec.europa.eu/clima/policies/strategies/2050/index_en.htm

Denmark has already announced that it is banning gas boilers as soon as 2020. We are not saying that gas and oil for domestic use will be restricted in the U.K. anytime soon, however, the government briefing paper seems to contain scenarios that are little more than wishful thinking. If we have many mild winters over the next ten years, use less fossil fuels and the price of gas increases significantly they may get close to their targets. What if there are several bad winters? What about pollution, said to cause 50,000 deaths in the U.K. in 2015 (according to a report in the Lancet)? Why does the government champion (and subsidise) poor technologies? Sunflow primary electric heating is the smart, proven technology and is ready now. After all, 2028 is only 10 years away, why install a potential obsolete technology?

KEY ADVANTAGES WITH SUNFLOW INVINCIBLE™ ELECTRIC HEATERS

- Very accurate individual room control
- 100% of heat remains in the room
- Built to last a lifetime
- No maintenance
- Manufactured here in Britain
- 10 year guarantee on the heaters
- 5 year guarantee on the controls
- Natural convection - comfort warmth
- Bespoke - built to order for accurate heating requirements and custom colours



Available wall mounted or on feet or castors. Huge range of colours. Also available in white.



SUNFLOW INVINCIBLE™ HEATERS - INTELLIGENT CONTROL SYSTEM

Intelligent Controls

Our British designed range of easy-to-use controls all share one important feature. The LED light on the heater alerts you to the fact that the heater is giving it's optimum performance.

Red - the heater is drawing full power

Green - means the heater is on but not drawing electricity e.g. when the inside heater temperature is hot enough that there is no need to draw power

Amber - this is where the heater is approaching full temperature and the controls tell the heater to draw reduced power to avoid overusing electricity. A major design innovation.

This feature is available with both our wireless and manual controls.

Precision Temperature

Many thermostats have a switching differential (hysteresis) of about 1.5°C. This means they switch heaters on at full power until the room reaches the target temperature, then switch them off until the room has cooled to the target temperature minus 1.5°C. As a result the room temperature cycles up and down by at least 1.5°C, often more because it takes time for heat to reach from the heater to the thermostat, especially if it is remote.

Even a 1°C change is noticeable. For instance, suppose you find that 20°C is comfortable but begin to feel cold at 19° or 18°C. You would have to set a normal thermostat to 22°C all the time to feel warm. However, this is a waste of energy because for much of the time the room is hotter than it needs to be.

Turning the thermostat down by just 1°C saves considerable energy. Sunflow allows you to do this because we have eliminated the temperature cycle altogether.

Proportional Control

We have eliminated the temperature cycle by using technologies in both the heater PCB and the thermostat. In our heater PCB's we do not simply switch the heater on or off, we modulate the power all the way from 0% to 100%. We use a combination of methods to achieve this including chrono-proportional control. This means that as the room approaches the set temperature we start to reduce the power input into the heaters.



Heating a Conservatory

Conservatories are notoriously difficult to heat. Even with special glass, you still have a higher heat loss than a normal, well insulated room. Although you cannot expect the same economy as an interior room, a correctly sized Sunflow Invincible™ heater will efficiently and economically heat a conservatory and allow you to use the room all through the winter.

The reason why a Sunflow heater works so well is because the exterior flutes set up a natural convection which forms a heat barrier around the interior perimeter of the conservatory. A lot of people, even organisations that should know better, draw buildings with arrows pointing from the inside to the outside to show heat loss. In fact, cold air is actually trying to enter the conservatory from the outside in. Without a heat barrier, cold air simply falls through the glass in every direction. This is why a lot of heater types such as fan heaters or convectors do not work very well.

One of the solutions to conservatory heating often offered by less-than-professional plumbers is to extend an existing wet central heating system into a conservatory without offering a separate circuit and set of controls. This is against the law and contravenes the building code. Because water in the conservatory radiator cools faster than the rest of the house which is better insulated it causes the boiler to work overtime. This extra wear considerably shortens the life of the boiler.



We are very happy to survey conservatories because those customers often come back for Sunflow heaters for the rest of their house when the boiler inevitably breaks down.

Heating a Bathroom

There are strict rules applying to heaters in a bathroom. Sunflow bathroom heaters are manufactured to IPX4 and, of course, carry the BSI Kite Mark for safety. Our electricians always fit to current standards and, where required, our work is certified by the Association of Plumbing and Heating Contractors.



FUTURE TECHNOLOGY

Here at Sunflow we firmly believe that our on-going programme of research and development is worth the significant investment we have made over the last few years. We have registered both British and European patents. Quite an achievement considering just how few patents come from small/medium British companies. However, we know that there are going to be significant changes to how energy is delivered and charged for. As gas and oil are phased out heading towards 2030, the focus is already turning to the electricity market and several utility companies, such as Good Energy, are already providing competitively priced electricity from 100% renewable sources.

Sunflow Invincible™ Heaters are Designed to Work With Home Batteries

If you are considering, or already, generating your own solar energy, there are already a number of solar energy storage batteries on the market. Earlier in this brochure we explained how Sunflow Invincible™ heaters use low temperature heating and high efficiency to reduce consumption. This makes our heaters an ideal system for use with battery storage systems. Although Sunflow do not offer Solar PV systems or home batteries, we do have some recommendations for consideration.

Most PV installations incorporate both direct current (DC) and alternating current (AC) systems and, when a battery is added, the energy output from the solar array can be connected to either the AC or the DC side. Although the DC batteries are cheaper to install, they are not suitable for PV installations that incorporate micro-inverters, they may affect your feed-in tariff income due to battery/conversion losses and many will not operate during a power cut.

In AC coupled systems the batteries are installed on the grid side of the system so do not affect your feed-in tariff. It is relatively simple to add an AC coupled system if you already have solar PV panels and, although they are generally more expensive than DC-coupled batteries, you can expect significantly better payback by accessing mains charging, night tariffs, emerging smart tariffs.



Photo copyright Sunflow Ltd. 2015



COMPLETE OIL / GAS / SOLID FUEL OR NIGHT STORAGE HEATER REPLACEMENT

If your current system is nearing the end of its life, now would be a good time to obtain a completely free, no-obligation, system replacement quote from Sunflow Ltd..

We are one of the few specialist companies that can quote for the whole job, even gas removal as we are Gas Safe registered. Our registration number is 528940 and you can check our credentials on the Gas Safe website.

You can completely replace your old expensive wet system and enjoy the warmth and practicality of Sunflow heating for the rest of your life.

Our surveyors can advise on complete or partial removals of existing systems as well as quoting for provision of hot water solutions.

WHY THE NEED FOR A SURVEY?

We get calls all the time asking for prices over the phone or “please include a price list”. As a professional, primary heating company, we cannot guess what your needs may be. After all, this is where many problems have started in the first place. If we tried to produce a price list for all the variations in size and output that we can achieve it would be a massive task. We can usually give a rough guide but, for primary heating, we have a legal duty of care to make sure we get it right.

We realise that in the age of the internet there are companies willing to sell you anything for a cheap price but we are absolutely adamant that for primary heating you must get it right or you will pay in higher fuel bills or by needing supplementary heating.

GUARANTEES AND CONFORMITY

What does a foreign manufacturer’s “25 year manufacturers guarantee” mean? It means that you may well have to return your heater to Germany, Spain, etc.. Have you looked at the small print? The controls are usually guaranteed for two years (the EU minimum requirement) and not the five years offered as standard on all Sunflow heaters.

These foreign imports usually carry a CE mark. The CE mark is a self certification that claims a product complies with EU standards. It is not checked, inspected or tested. Sunflow Invincible Heaters carry the British Standards Institution Kite Mark - tested, inspected, safe.

If you would like to arrange a free, no-obligation survey, our scheduling team can be contacted on 0800 158 8272. Sunflow are not a pressure sales company and no discount is offered for “sign on the night deals”.



Photo copyright Sunflow Ltd. 2015

Sunflow Heaters are all built from prime 1.2mm cold rolled British steel. We cut it, we bend it, we paint it. We make our own elements which are hand embedded in the clay cores and then we wire it, test it, ship it in our own re-useable, re-cyclable packaging and we guarantee it.

Sunflow Heaters are all individually built here at our Arley Works factory in Royal Wotton Bassett.

Built by Hand - Built by Us
Built with pride in Britain



Photo copyright Sunflow Ltd. 2015

Sunflow Ltd.
Arley Works
Templars Way Industrial Estate
Marlborough Road
Royal Wootton Bassett
SN4 7SR

Tel: 0800 158 8272

email: info@sunflowltd.co.uk
web: www.sunflowltd.co.uk