

# Renewable technologies from Worcester.

Home heating and hot water  
from clean, renewable  
sources of energy.



Dedicated to heating comfort



# Worcester renewable heating and hot water solutions can help save you money and help protect the environment.

Worcester is a market leader in high efficiency condensing boiler technology and is leading the way in the search for greener and more sustainable energy alternatives. All our products are designed to deliver heating and hot water comfort as well as reducing harmful greenhouse gases.

From our Greenskies solar water heating systems, through to Greensource and Greenstore heat pumps, the Worcester renewables range enables you to take full advantage of sustainable energy sources all year round.

## Solar water heating

The Greenskies solar water heating system absorbs solar energy and converts it to heat that is pumped directly to your hot water cylinder – providing hot water from a clean, renewable source of energy.

## Heat pumps

Greenstore ground source heat pumps and Greensource air source heat pumps utilise the latent energy in the ground or outside air.

This can be used to provide low cost heating and hot water for virtually any type of property. Greensource air source heat pumps are available in two options:

- air to water for providing heating and hot water
- an air to air option which is warm air heating only.

All our heat pumps are designed to meet the needs of a wide range of properties.

## Hybrid systems

The Greenstar Plus - Hybrid provides an 'intelligent' heating and hot water system which combines the energy savings offered by a gas condensing boiler and a heat pump. The system's Hybrid management control automatically decides which of the two units is more economical to use.

Inside this brochure you will find information about Worcester renewable options and how we can help make it easy for you and your qualified installer to find the right heating and hot water system for your home and lifestyle.

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# Worcester. Trusted for half a century.

Worcester is the choice of millions of quality and value-conscious households all over the UK – and it's the choice of the heating industry too, having won many awards.

A recent survey also revealed that 9 out of 10 professional installers would choose Worcester for their own homes\*. All of which gives you the reassurance of knowing that when you invest in a Worcester product, its quality is endorsed by the professionals.

## A brand you can trust

We are honoured to have received a Royal Warrant in recognition of supplying goods to Her Majesty The Queen. As a market leader, Worcester is a brand that is trusted by millions of homeowners across the UK.



## Quality is the bedrock of the Worcester brand

Since 1962, when Worcester pioneered domestic oil-fired boilers, the company's commitment to excellence hasn't changed. And that commitment has only strengthened since Worcester became a part of the Bosch Group – one of the world's leading names in innovative technology.

## The Bosch pedigree

As part of the Bosch Group, our products are designed and manufactured to provide the high levels of quality and reliability which are synonymous with the Bosch name throughout the world.



**BOSCH**  
Invented for life

The Bosch Group operates worldwide and has been committed to environmental protection for more than 30 years. Every Bosch location around the world prioritises product development in the interests of the safety of people, the economical use of resources and environmental sustainability. It makes Worcester a name that stands for reliability, quality, efficiency and value for money; a name you can trust.

## The Robert Bosch Foundation

As part of the Bosch Group, a percentage of the profits made by Worcester is donated to charities and good causes by the Robert Bosch Foundation, a non-profit charitable trust. 92% of Bosch Group shares are held by the Robert Bosch Foundation, helping the organisation as a whole to focus on long term activities, rather than concentrating on share dividends. It means that you won't see any companies associated with the Bosch Group on any stock markets. Since its founding in 1964, the Robert Bosch Foundation has spent £757 million on funding for social improvement initiatives.



### Help towards installation costs

From time to time, the UK Government provides funding incentives to those who wish to install renewable technologies. For the latest information of current renewable funding schemes, please visit [www.gov.uk](http://www.gov.uk)



### Renewable Heat Incentive (RHI)



## Considerations for choosing a renewable technology.

Choosing the right type of renewable technology for your needs can be a quite complicated. There are a lot of factors to consider. With the help of Worcester and your qualified installer, the decision making process is made simple. Look at the table below as a starting point to determine which technology is best for you.

Consideration	Solar	GSHP	Air to Water	Air to Air	Hybrid
New build project	•	•	•	•	•
Major refurbishment	•	•	•	•	•
Heating upgrade	—	•	•	•	•
Poorly insulated	•	—	•	•	—
Limited external space	•	—	•	•	•
High hot water demand	•	•	•	—	•
Mains gas available	•	—	•	•	•

***If you need to discuss your renewable technology requirements, call our customer helpline on 0844 892 4010***



## Greenskies solar thermal water heating – proven technology to provide you with total hot water comfort.

Greenskies solar thermal water heating systems help you to save money by reducing the amount of energy you use for hot water. Also, because you use less fossil fuel, you reduce your carbon footprint.

Solar water heating systems work by absorbing solar energy and could provide up to 60% of your annual hot water from a clean, renewable source of energy. The energy is transferred from the solar collector to heat the water in your hot water cylinder. They are highly efficient, completely controllable and have low maintenance requirements.

A solar water heating system is easiest to install if you already have a conventional 'system' or 'regular' boiler.

Solar water heating collectors do not rely on high temperatures or direct sunlight, they will even work on a cloudy day.

Unless your home is a listed building or in a conservation area, planning permission for solar water heating panels is unlikely to be required. However it is always best to check with your local planning office.

### Compatibility and control

The Worcester solar range includes a TDS100 controller – which allows the user to select the temperature required at the hot water cylinder. The controller then automatically decides when to run the pump to bring the energy from the panels to the cylinder.

We also have a family of intelligent heating controls that are compatible with Greenstar boilers. Part of this new family is designed to enhance the efficiency of Greenskies solar water heating systems.

### Greenskies features and benefits:

- As well as harnessing sustainable energy from the sun, there are none of the CO<sub>2</sub> emissions that are generated by burning fossil fuels
- Environmentally-friendly Greenskies solar panels can be fully recycled
- Greenskies is based on proven technology that has been tried and tested in many applications for over 20 years
- Greenskies is suitable for many locations and can be installed on or in a sloping roof, on flat roofs, or even on a wall or floor
- The Greenskies system includes a simple controller which enables you to easily view the collectors in action and monitor your hot water temperature
- Greenskies is easy to look after, requiring minimal maintenance and is extremely robust
- Greenskies panels come with a 10 year guarantee and a 2 year guarantee on other components\*.



Greenskies Solar-Lux evacuated tube and Solar-Lifestyle, Solar-Lito and Solar Lito-Mini flat panel solar water heating collectors

\*Source: Energy Saving Trust. †Terms and conditions apply.

# Worcester offers three styles of solar water heating collectors.

## Greenskies Solar-Lux

Worcester Greenskies Solar-Lux are double-walled glass evacuated tubes featuring a CPC mirror for improved solar collection.

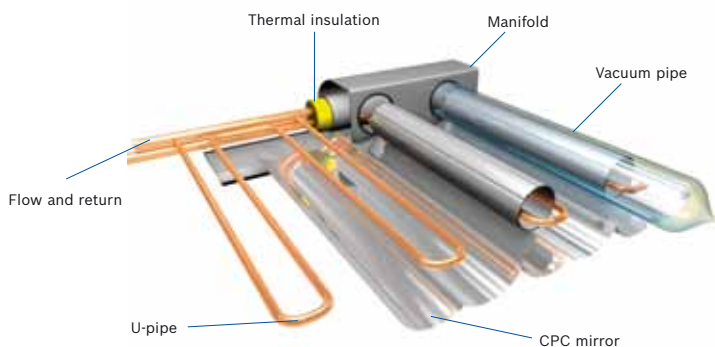
With Solar-Lux, a mixture of water and glycol flows through a U-shaped pipe inside a glass tube. This acts like a vacuum flask, trapping the heat from the solar radiation in the heating fluid with very low heat losses. Integration of the absorber into the evacuated glass tube means that less space is generally required to install the required solar heating capacity, compared to flat plate collectors.

Use of the concave Compound Parabolic Concentrator (CPC) mirror, set behind the tubes, allows heat from direct and diffuse solar radiation to be absorbed, effectively providing 360 degree absorption to the tube. Consequently, Solar-Lux collectors are less dependent on their orientation to the sun than some other designs of collector.

The combination of 360 degree absorption and low heat losses makes Solar-Lux collectors particularly suitable for use where conditions and temperatures are not optimal – for example in areas of the UK with lower than average temperatures.

Solar-Lux collectors feature a special coating that makes them highly weather resistant and able to withstand the most rigorous conditions.

## Greenskies Solar-Lux close up.



## Greenskies Solar-Lifestyle

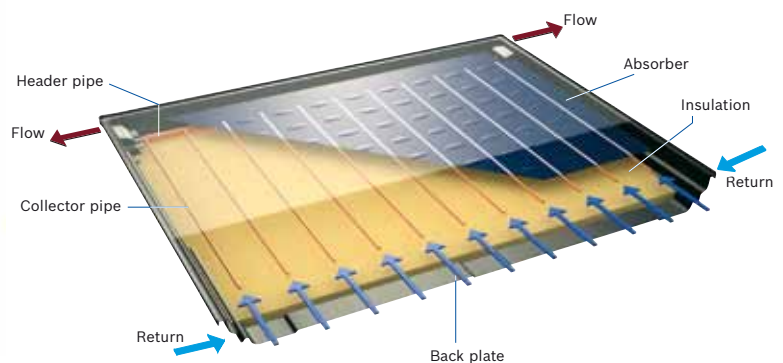
Worcester Greenskies Solar-Lifestyle flat plate collectors are designed to provide a high level of efficiency and versatility for the majority of homeowners' requirements.

Flat plate collectors incorporate an absorber plate which heats up when exposed to solar energy. This heat is then transferred to a liquid circulating through the collector, which in turn transfers the heat to the water in the hot water tank. Greenskies Solar Lifestyle collectors utilise a PVD aluminium full sheet absorber plate which is ultrasonically welded to a harp absorber copper pipe to collect the solar radiation.

Solar-Lifestyle collectors feature a modern, visually stunning one-piece panel design. They are available in portrait and landscape formats to suit the space available in a wide range of circumstances and can be sited in or on a pitched roof, mounted at an angle on a flat roof or fixed to a façade.

Solar-Lifestyle panels offer industry-leading low heat loss for a flat plate collector meaning collector efficiency is optimised for retaining useful heat. The flat plate design has higher zero losses than evacuated tubes, which means they are more efficient at collecting heat from the moment the sun starts to shine.

## Greenskies Solar-Lifestyle close up.



**All Greenskies solar collectors are Solar Keymark approved.**



### Greenskies Solar-Lito and Solar-Lito Mini

The Worcester Greenskies Solar-Lito range of flat plate collectors have been designed to provide simple and affordable solar hot water comfort.

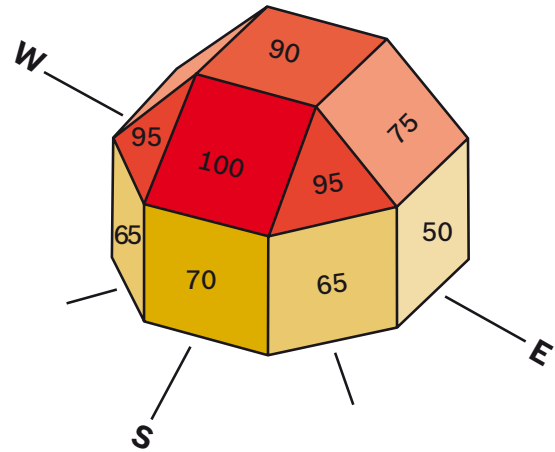
The 2m<sup>2</sup> Solar-Lito can be installed on-roof or flat-roof, whilst the on-roof only 1m<sup>2</sup> Solar-Lito Mini is perfect for roofs which are shaped awkwardly or have limited space.

They are also a perfect accompaniment to roofs with solar PV installations.

Solar-Lito Mini collectors can also be combined with existing Solar-Lito installations if additional solar hot water output is required in the future.

Worcester Greenskies Solar-Lito and Solar-Lito Mini collectors also feature an attractive one piece PVD aluminium absorber plate to compliment an aluminium frame which makes for a visually pleasing appearance. The Solar-Lito range is the perfect choice to deliver a comfortable all of the year performance level at an affordable price.

## Understanding your system.

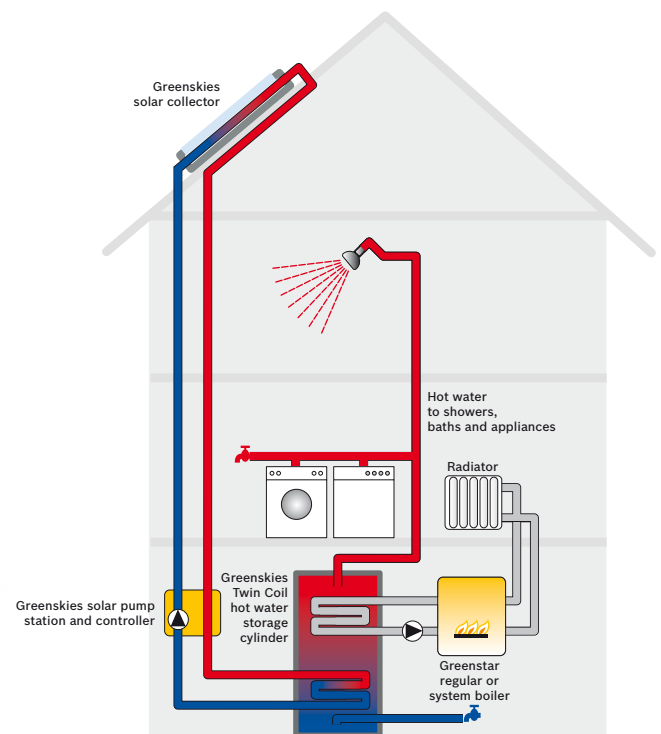
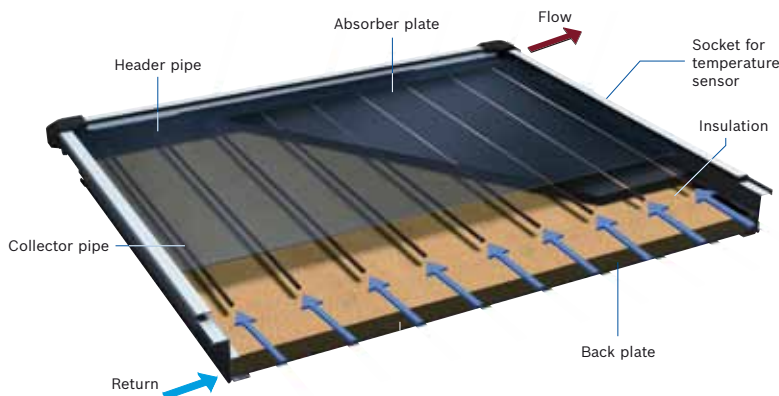


### Panel orientation

Position panels in a southerly direction for maximum potential – angled between 30° and 45°. The diagram illustrates the best siting for a solar panel – 100 being the optimum position.

Even if your property faces East/West it is possible to enjoy the benefits of solar water heating.

### Greenskies Solar-Lito close up.



This information is for guidance only. We always recommend you consult a qualified installer.

## The Greenstore TC twin-coil series.

All of the models in the TC range feature high levels of insulation and dedicated volumes of solar hot water storage. Although developed for use with Greenskies solar water heating systems, Greenstore TC cylinders can also be used with Regular and System boilers, enabling solar water heating to be added to the system at a later date without the need to replace the cylinder. Capacities range from 158 litres to 287 litres.

TC cylinders are fully compliant with both current Building Regulations and the Microgeneration Certification Scheme (MCS), as well as anticipated future legislation.



**This information is for guidance only. We always recommend you consult a qualified installer.**



## Greenskies case study.

### The Darby Family

**Family** – Jamie and Deb Darby and their three young children.

**Property** – 4 bedroom detached built in the early 1900s.

**Installation** – 2 Greenskies solar panels, a Greenskies twin coil hot water cylinder and a Greenstar gas-fired condensing system boiler.

**Installation time** – two weeks in total (allowing for a possible extension in the future).

#### Background

Jamie and Deb moved in to their house in November 2006. With three young children to look after it was essential to have instant hot water and a reliable heating system which didn't cost the earth to run.

Jamie and Deb have carried out major refurbishment on the property but the heating system was one thing that really did need replacing. The couple plan on building an extension in the future so wanted to make sure that the heating system would be able to cope with additional rooms without meaning a further investment or significantly increased fuel bills. This will also include under floor heating.

After discussing with their local installer, the couple decided to install a new Worcester Greenstar gas-fired boiler and Greenskies solar panels.

#### Results

The Greenskies solar water heating system now supplies the majority of the home's hot water. Jamie said: "When the system was first installed, we had a full tank of hot water instantly. There is a really handy control panel which tells us what the temperature of the water in the tank is – we now know that if it's 43°C or more, we have enough for a hot bath as well as the washing up."

"We are delighted that we no longer rely so heavily on gas for our heating and hot water – our friends and family have been really impressed with the system."

# Greenstore and Greensource heat pumps – the power to cut more carbon emissions.

Given today's concerns about global warming and climate change, a growing number of us are looking to use renewable energy to reduce our carbon footprint and, when it comes to providing domestic heating and hot water solutions which satisfy these demands, our Greenstore ground source heat pumps and Greensource air source heat pumps more than measure up.

By converting the latent energy that's in the ground and air into heat, these clever devices deliver green, low-cost, energy-saving heating and hot water all year round. They work on a similar principle to the domestic refrigerator but in reverse.

## Measured efficiency

The efficiency of all heat pumps is measured as a Coefficient of Performance (CoP). This is the amount of energy the heat pump produces compared to the amount of electricity needed to run the pump. For example, a heat pump which uses 1kW of electricity and then produces 4kW of usable energy has a CoP of 4.

*Heat pumps may require planning permission. For current legislation, please visit the Energy Saving Trust website – [www.energysavingtrust.org.uk](http://www.energysavingtrust.org.uk) or discuss with your installer.*



## Greenstore LECP ground source heat pumps – breaking new ground in sustainable heating and hot water for your home.

When correctly sized and installed in well insulated homes, Greenstore Low Energy Circulation Pumps (LECP) will provide economical, low carbon energy to meet all of the heating and hot water needs in your home. To suit your requirements, you can choose a system heat pump with a separate Greenstore HP cylinder, or a combination unit with an integrated cylinder. With a selection of models available, the Greenstore LECP range offers outputs to suit most properties.

The latest models feature Class A low energy circulating pumps and a controller to achieve higher energy efficiencies, resulting in an exceptional Seasonal Performance Factor (SPF) and high Coefficient of Performance (CoP).

### **Economical, low carbon heating**

Ground source heat pumps work by drawing on the renewable energy that is available in the ground, converting it to comfortable, low cost heating and hot water. For every 1kW of electricity that is used to power the heat pump you could gain up to 4kW of heat energy, so the cost-savings are very significant, providing your home is suitably insulated.

Greenstore ground source heat pumps are available in 6, 7, 9, and 11kW capacities, with the ability to configure two heat pumps in a cascade to deliver up to 22kW. They can also be combined with other heat sources, such as boilers or solar thermal systems.

Suitable for both new and existing properties with required levels of insulation, the heat pumps can be used with a range of collector types which are installed under the ground near your property. They deliver the highest efficiencies with heating systems designed for lower water temperatures, such as underfloor heating, but can be used with appropriately-sized radiators.

### **Greenstore features and benefits:**

- Energy efficient – for every 1kW of electricity used up to 4kW of heat energy is produced
- Reduced carbon footprint
- Cost-saving for lower heating and hot water bills
- Low energy circulating pump (LECP)
- Soft start as standard
- Up to 65°C water temperature (heat pump only)
- Swimming pool control
- Optional LCD room controller for greater flexibility
- Ability to add heating circuits
- Weather compensation for increased efficiency
- Option to be combined with existing heating systems – maximum input 25kW
- Comprehensive 2 year\* guarantee.

*\*Terms and conditions apply.*

Greenstore LECP Combination and System ground source heat pumps



**This information is for guidance only. We always recommend you consult a qualified installer.**

# Understanding your system.

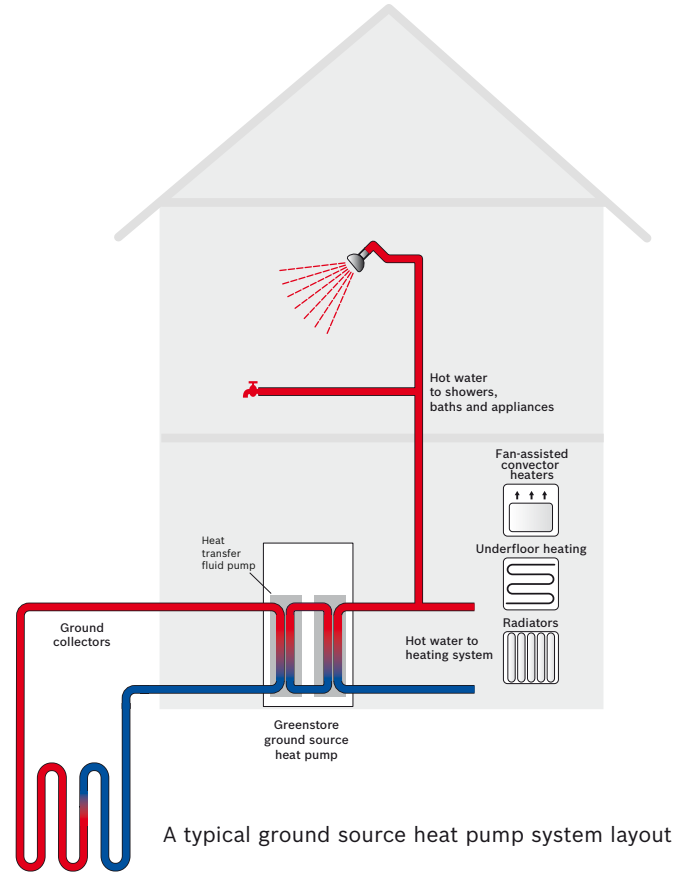
## Different types of collector systems



Horizontal collector



Bore hole collector



A typical ground source heat pump system layout

## Greenstore HP Cylinder.

Worcester offers an unvented cylinder for exclusive use with Greenstore System heat pumps. The cylinder is available in a 280 litre size, it features a tank-in-tank design whereby the domestic hot water tank is surrounded by primary water to provide a large heat transfer surface area along the cylinder to make the most of the energy from the heat pump.

In common with the Combination heat pumps, the cylinder has been approved to Part G3 of the Building Regulations which covers the storage of hot water.

The cylinder includes integrated indirect heat exchange coils in the lower section of the tank to allow Worcester Greenskies to be connected to provide solar water heating in conjunction with the heat pump.



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## Greenstore case study.

### The Pickett Family

**Family** – Scott and Julie Pickett and their two teenage children.

**Property** – 4 bedroom detached 1970s family home.

**Installation** – 9kW Greenstore ground source heat pump.

**Installation time** – 5 days.

#### Background

Scott and Julie have their own heating business and have been actively promoting ground source heat pumps to their customers for some time.

This corresponded with the renovation of their home, which had previously been a small B&B.

During the initial building work they already had the idea of installing a heat pump, which is why they fitted an underfloor heating system at the start of the project. Several months later, when they took a closer look at their existing central heating system they realised that it needed replacing. This was the perfect opportunity to fit a ground source heat pump.

#### Results

Scott commented: “We’ve been amazed by the results we’ve already seen. To monitor the heat pump’s electrical consumption, we installed a separate electric meter and, despite some particularly cold spells, we’ve been pleased by how little electricity is needed to power the heat pump.

We’ve also been monitoring our fuel bills, and although our electricity bill has increased slightly, our gas bill has fallen dramatically.

Now the installation is complete and the lawn is taking shape, the project looks to be a great success. Our fuel bills have been significantly reduced and we feel happy that we’re not only doing our bit to help the environment, but we’re also encouraging our customers to do the same.

We’ve been using our home as an example of how heat pump technology works, which has sparked off lots of interest from our customers. I also feel so much more credible when I’m talking about the benefits of the technology to customers.”

# Greensource split air to water heat pumps.

Greensource split air to water heat pumps deliver energy-efficient, low cost heating and hot water by extracting heat from outside air, even when temperatures are as low as -20°C. With the ability to generate up to 4kW of heat from every 1kW of electricity consumed by the heat pump, Greensource units have an exceptional Seasonal Performance Factor – which adds up to lower bills for heating and hot water.

Split air to water heat pumps comprise an outdoor inverter heat pump and an indoor unit connected by refrigerant pipework and operate on a similar principle to your refrigerator. They absorb heat from the outside air into a refrigerant circuit in the outdoor unit, which is then compressed to a high temperature. The heat generated can then be used by the indoor unit to meet your heating and hot water requirements.

Greensource split air to water heat pumps are available with two types of indoor unit:

- Hydrolight for use in combination with a gas, oil or electric boiler up to a maximum input of 25kW
- Hydrocomfort for a stand-alone heating solution with an integral electric heater.

Greensource split air to water heat pumps are available in 8, 11, 14 and 16kW capacities (single phase) or 14 and 16kW (three phase). They are ideal for use with low temperature heating systems such as underfloor heating, or with appropriately sized radiators.

## Greensource split air to water features and benefits:

- Energy efficient – up to 4kW of heat for every 1kW of electricity
- Can be used as a low energy alternative to a traditional boiler, or in combination with a gas or oil-fired boiler to minimise fossil fuel consumption
- Reduced heating and hot water bills
- Integrated indoor cylinder
- Weather compensation for increased efficiency
- Optional LCD controller for greater flexibility
- Up to 55°C water temperature – heat pump only. Higher temperatures are achievable with boiler input
- Produces heat at outdoor temperatures as low as -20°C
- Peak domestic hot water feature
- Easy to install and maintain by a qualified refrigerant engineer
- 12 different kits available to suit most homes
- Outdoor unit can be installed up to 70m from your property
- Suitable for all types of wet heating system
- Comprehensive 2 year guarantee.\*

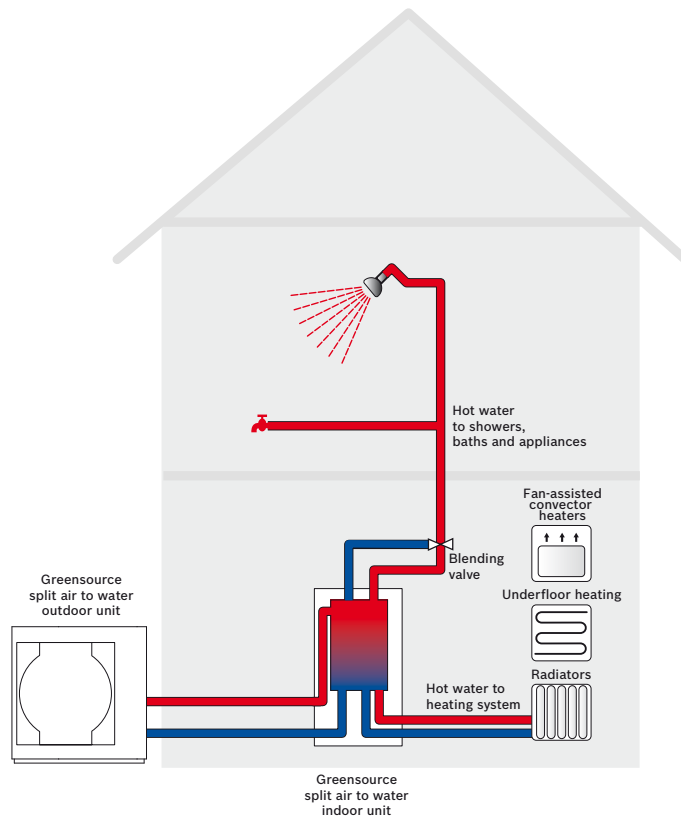
*\*Terms and conditions apply.*



**This information is for guidance only. We always recommend you consult a qualified installer.**



# Understanding your system.



A typical split air to water heat pump system layout



The Greensource split air to water heat pump indoor unit



## Greensource split air to water case study.

### The Cogger Family

**Family** – Mitch Cogger and his daughter, Alice.

**Property** – 3 bed detached bungalow.

**Installation** – Greensource split air to water Hydrolight 11kW heat pump and Camray 18/25 oil-fired boiler.

**Location** – Worcestershire.

#### Background

When Mitch and Alice moved into their three bedroom bungalow in rural Worcestershire in 2011, it was heated by a non-condensing oil-fired boiler. The property was badly insulated and also only had single glazed windows.

With efficiency in mind, Mitch was keen to incorporate renewable technology to his home, particularly as the home was off-mains gas. After investigating the possibilities, he was advised that a combination of a Greensource Hydrolight split air to water heat pump with the support of an efficient Worcester Camray condensing oil-fired boiler would give him the best use of energy, savings on bills and provide all the heat and hot water the family needed.

With the boiler and the heat pump working in tandem, the technology effectively operates between either the renewable air source or with support from the oil boiler in extreme cold temperatures, dependent upon which will provide the most optimum energy.

The house was also fully insulated and double glazing was installed.

#### Results

Having allowed £80 a month for his total electricity bill as the heat pump is electrically driven, Mitch has been delighted with the results. After the installation of this technology combination he finds the boiler is only used a minimum amount with the heat pump doing majority of the work. In fact his complete heating bills cost just £50 each month between December 2011 and May 2012 (fixed tariff).

Mitch commented: “Worcester’s split air to water and boiler systems have proved ideal as it means we can make the most of the renewable energy source where ever possible but know that the boiler is available should we need to increase requirements. The reduction in bills is greater than even we imagined and it is safe to say I am very happy with the results.”

## Greensource air to air heat pump.

Air to air heat pumps work in a similar way to air to water heat pumps, but instead of generating hot water, the heat generated is turned into hot air by the indoor unit which is distributed into the property. In addition, Greensource air to air heat pumps can also operate as an air cooler during warmer months and advanced air purification technology is particularly beneficial to asthmatics and allergy sufferers.

Air to air heat pumps are an attractive alternative where external space is limited, making them ideal for a wide range of property types, including apartments, smaller homes, church or village halls.

The indoor unit is designed for quiet operation and the system is operated using a remote control with an easy to read LCD display.

Air to air heat pumps are also perfect for conservatories. Building Regulations prevent the use of radiators in conservatories, so the only alternative to air to air is a portable heater, which creates condensation, or underfloor heating.

### Greensource air to air features and benefits:

- Energy efficient – for every 1kW of electricity used up to 5kW of heat energy could be produced
- Active Plasmacluster ion air purification technology, ideal for asthmatics and allergy sufferers
- Compact design requiring only an outside wall and a small area of indoor and outdoor space
- Suitable for a wide variety of property types, including apartments, conservatories, village halls and churches
- Ideal for use in conservatories where radiators are not permitted under the current Building Regulations
- Quiet operation
- Easy to install and maintain by a qualified refrigeration engineer
- Can be used to provide cool air in the summer
- Inverter technology – modulates with high demand, making it more effective
- Low maintenance
- Comprehensive 2 year\* guarantee.

*\*Terms and conditions apply.*

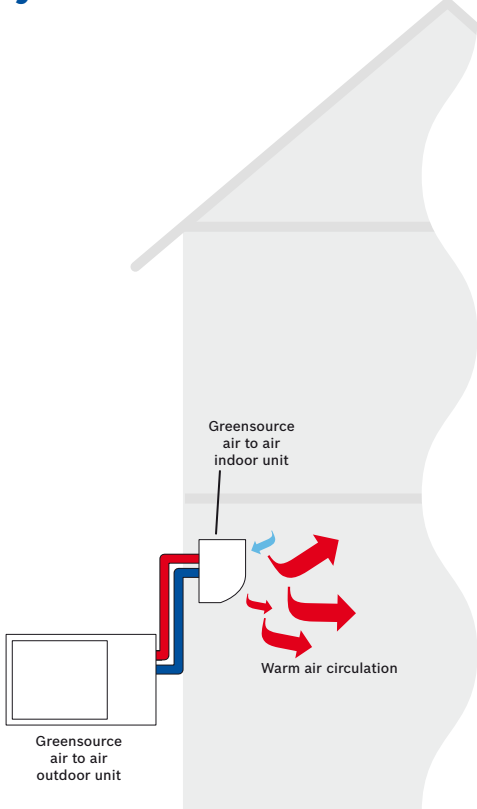


Greensource air to air heat pump remote control

The Greensource air to air heat pump outdoor unit

**This information is for guidance only. We always recommend you consult a qualified installer.**

# Understanding your system.



A typical air to air heat pump system layout





## Greensource air to air case study.

### Winchmore Hill United Reformed Church

**Installation** – 6 Greensource air to air heat pumps.

**Installation time** – 3 days.

#### Background

When the 100 year old heating system finally broke down, the immediate view from the Church was to replace it like for like with a new boiler system. However, once they started looking into it they soon realised that other options needed to be considered.

The old heating system used an inefficient floor standing gas boiler which fed both radiators and a number of two inch thick iron barrel pipes. Although the system was capable of making the Church nice and warm it would need to be switched on several hours before Church services or events to ensure it had enough time to heat the building properly. This meant that it was expensive to run and as the years went on more and more maintenance was required.

Sally Woolley, who looks after the management and maintenance of the Church, recalls “The contractor suggested we look at alternatives, including low-level and wall-mounted gas heating as well as air to air heat pump

systems. The gas heating options were ruled out on grounds of cost and noise, as well as the inconvenience of having to remove some of the pews.

We were then given the opportunity to view a Worcester Greensource unit in-situ at a newly built multipurpose village hall. We liked the look of it and also the fact that it seemed fairly quiet in operation. We were also assured that it was cost effective to run, energy efficient and therefore better for the environment, all important considerations for us.

We appointed E.A. Services to install the six units. Installation was quick and efficient and included the de-commissioning of the old boiler. Esas and his team arrived early on the Monday morning and the job was finished by Wednesday, with very little disruption.”

#### Results

Although it is too early to know how much the Church will save in heating bills the cost reduction is expected to be significant. Whilst heating was the core objective, with the Greensource units they had the added benefit of being able to cool the Church on hot days too.

# Greenstar Plus Hybrid.

The Greenstar Plus Hybrid system combines the energy and cost saving benefits of gas condensing boilers and heat pumps in a single unit, with intelligent fuel management controls to ensure economical operation.

The system comprises a variable speed electric (inverter) heat pump, outdoor unit, a buffer tank and a controller. When the system is combined with a new high efficiency Greenstar gas condensing boiler (natural gas or LPG), the integral Hybrid Manager, which incorporates weather compensation, ensures that either the boiler or the heat pump is used to deliver maximum economy, depending on indoor/outdoor temperatures, time of day etc.

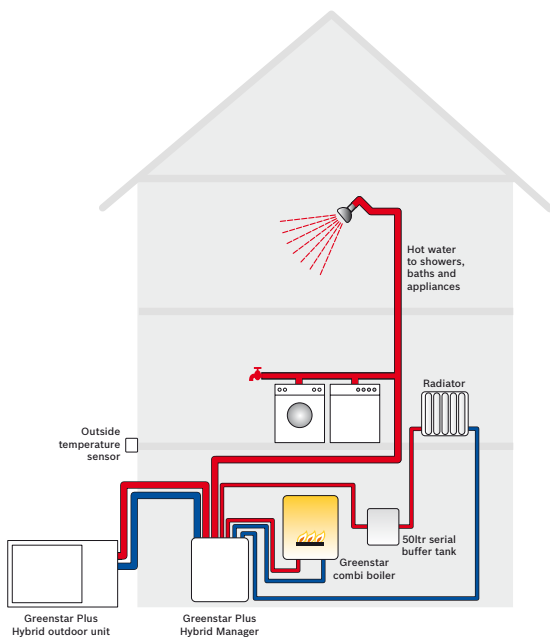
For example, you can enter your current gas and electricity tariffs into the Hybrid Manager and it will automatically determine whether is more economical to use low carbon energy from the heat pump or to use gas to run the boiler. And if you change your energy provider, you simply enter the new tariffs to maintain maximum economy.

For additional energy savings, the Greenstar Plus Hybrid features a low energy circulation pump, compliant with future legislation.

The compact design of both indoor and outdoor units, combined with very quiet operation, ensure that the Greenstar Plus Hybrid is very discreet and unobtrusive.

## Greenstar Plus Hybrid features and benefits:

- Money saving – significant energy savings compared to traditional boiler-only system
- Reduces carbon emissions and environmental impact
- Optimises low carbon, renewable energy from the heat pump
- Provides additional heat energy from a high efficiency condensing boiler
- Compatible with Greenstar CDi Classic, CDi Compact, Si and Highflow CDi combi boilers and Greenstar CDi Classic System and i System system boilers
- Manages the system in-line with your energy provider's tariffs
- 5kW outdoor air-to-water heat pump
- Up to 30kW gas-fired condensing boiler
- Weather compensation for improved heating control
- Natural gas or LPG
- Low energy circulation pump
- Low refrigerant charge (2.5kg)
- Easy to install and maintain by a qualified refrigerant engineer
- Comprehensive range of accessories available.



A typical hybrid system layout with combi boiler



**This information is for guidance only. We always recommend you consult a qualified installer.**



# Greenstar Plus Hybrid case study.

## The Dixon Family

**Family** – Russell and Sally Dixon and daughter Alice.

**Property** – 3 bedroom detached home with 1 bathroom.

**Installation** – Upgrade to a Greenstar system gas-fired boiler, Greenstore TC 210 cylinder, Greenstar Plus Hybrid system and Greenskies solar thermal system.

**Location** – Worcestershire.

### Background

When the Dixon family decided to replace their Band G gas boiler, they felt it was an ideal time to look at whether a combination of renewable and gas heating and hot water technologies would offer better efficiency for their home.

The family opted for a Greenstar Plus Hybrid heat pump system, to provide their home with heating and hot water using renewable technology. They also changed their old boiler for an efficient A-rated Greenstar system model, and upgraded the original single-coil cylinder to a Greenstore TC 210 twin-coil hot water cylinder, to enable the solar thermal system to contribute to the hot water production.

### Results

The Dixon's have been impressed with the savings they have seen so far. With the renewable technologies working in tandem to supply the majority of the heat and hot water, the family have found they have only needed to fall back on the boiler a limited number of times throughout the year when temperatures have dipped dramatically.

They've saved £217 in fuel costs in the first year (6,500 kWh of energy being provided by renewable sources).

“We are really over the moon with this system. Since we upgraded to Worcester's Greenstar Plus Hybrid system we have found it so controllable that our home and hot water is warm exactly when we need it. Our boiler is now more of a backup rather than the main energy source as the heat pump and solar thermal panels adequately meet our needs on a day to day basis.”

# Greenfloor heating – energy efficient heating beneath your feet.

Whether you are updating your existing heating system or are embarking on a self-build project, Worcester Greenfloor underfloor heating could be the perfect solution for your home. Acting as efficient low-level radiators, a Greenfloor underfloor heating system (UFH) uses a heated water filled pipe buried under the floor to deliver heat energy evenly into each room, gently warming the living space through a combination of radiant heat and heat conduction. As it is the entire floor area in a room that provides the heat, the actual temperature needed to heat it is much lower than with a traditional radiator system, eliminating any of those annoying cold spots around the room.

Greenfloor UFH is suitable for use throughout the home and with any type of floor covering from tiles to carpet. The benefits do not stop there. Greenfloor UFH is low maintenance and in a modern, well insulated home, can even act as the primary heat source, replacing the need for radiators completely and freeing up wall space so there are no restrictions on where you can put your furniture.

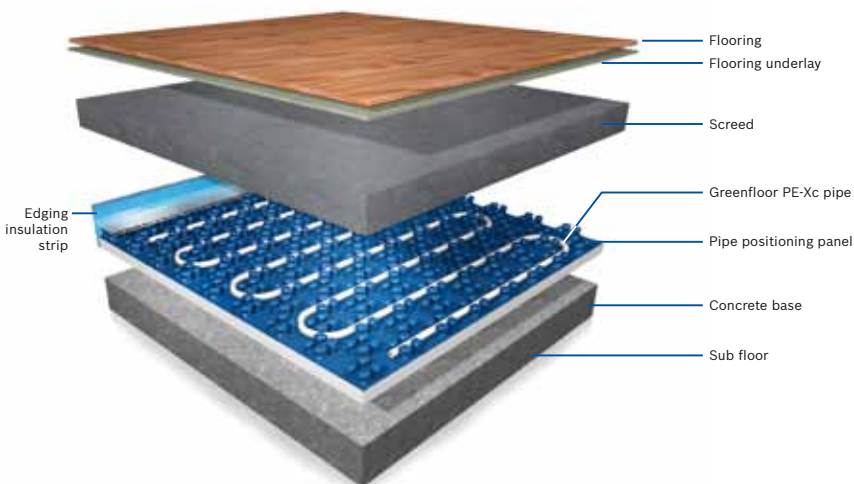
## Maximum warmth from lower temperatures

Research shows that an even heat rising from the floor providing maximum warmth to the feet and cooler but more comfortable temperatures at head height are favourable to the output of a traditional radiator system where the maximum temperature is at ceiling height and the lowest is at floor level. There are also additional health benefits, as underfloor heating provides radiant heat and doesn't rely on convection like traditional radiators. As a result, the amount of dust circulated around the room will be considerably less, providing cleaner air.

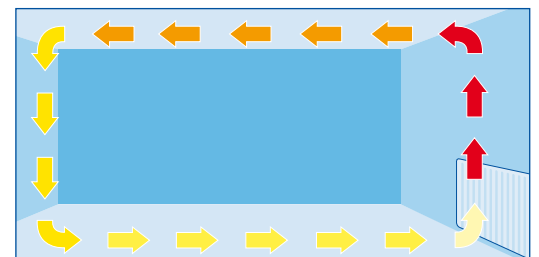
## Greenfloor features and benefits:

- Energy efficient – can offer savings on fuel bills when used with a Greenstore ground source heat pump or a Greensource air to water heat pump
- Can be used throughout the home and with any type of floor covering
- Suitable for new properties and refurbishments
- Reduces dust compared with a conventional radiator system
- Frees up wall space
- Low maintenance.

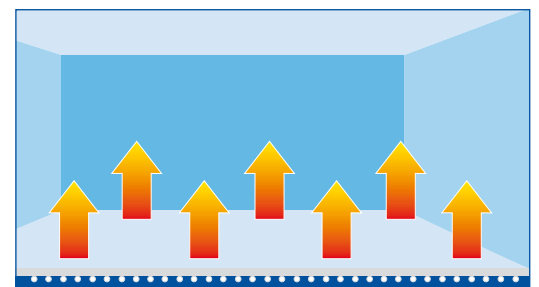
A typical underfloor system layout



## How an underfloor system provides heat



Heat from a radiator travels up and around the walls and ceiling of a room first, losing much of its useful heat in the process...



...while the heat from underfloor heating is evenly distributed from the surface of the floor throughout the whole living space.

**This information is for guidance only. We always recommend you consult a qualified installer.**





# Frequently asked questions about renewable technology.

## **What is sustainable energy?**

Sustainable energy is best thought of as energy which can be replenished within a human lifetime and which causes no long-term damage to the environment. Solar energy, wind energy and geothermal energy, amongst others, are all self-sustaining. They all have sources that cannot be depleted. Extended use of these energy sources aids the conservation of other non-renewable energy sources such as fossil fuels.

## **Is there any Government funding available?**

From time to time the Government provides grants for the installation of renewable technology products. To find out more visit: [www.energysavingtrust.org.uk](http://www.energysavingtrust.org.uk)

## **Greenskies solar thermal panels**

### **How does solar energy work?**

The idea behind technologies which use solar energy is to harness the freely available rays from the sun in a useful form. The basic principle uses an absorber plate which is heated by the sun's energy. This heat is collected in a transfer liquid which is in turn used in a heat exchanger to heat water.

### **Do I still need a boiler?**

Yes. Solar heating on a normal domestic scale in the UK will provide around 60%\* of the average annual household hot water requirements. Although a well designed system could provide most of the hot water required in summer, the winter results, due to the lower intensity of the sun and the shorter daylight hours, will be reduced. As such, the householder will need a boiler to make up the difference in domestic hot water requirement and for the central heating of the house.

### **Do I need to have a particular type of roof for solar installation?**

No. A variety of brackets and frames are available for solar systems to suit different roof types (pitched and flat) and different types of roof tiles. Panels can also be mounted in the roof or even on a wall.

## **Greenstore ground source heat pumps**

### **How does a ground source heat pump work?**

Heat pumps take advantage of the principles of thermodynamics in order to achieve their results. A water and glycol mixture is pumped around the collector circuit and causes the refrigerant in the evaporator to turn into a gas. This refrigerant passes through the compressor, causing the temperature to rise significantly. The hot gas moves to the condenser, where it condenses and the latent energy is released into the heating circuit.

## **How is energy collected from the ground?**

There are 2 options to obtain the energy from the ground. In a horizontal collector, lengths of pipe are buried underground to a depth of around 1 metre. An alternative to the horizontal collector types is the vertical collector. A bore hole is drilled to a depth of between 60 and 200 metres (this will depend on the heat pump output and ground conditions), and the collector is fed into the hole. A vertical collector minimises the amount of land required on the surface of the collector.

## **What type of ground source heat pumps are available?**

Worcester has a range of 8 system and combination heat pump models, available in outputs ranging from 6-11kW.

## **Will I also need a boiler with the Greenstore system?**

In the majority of circumstances, the answer is no. Worcester's system is all you need to satisfy your total heating and hot water requirements. However, we recommend you consult a qualified installer for advice.

## **Can I keep my existing radiators with a ground source heat pump?**

Ideally, for maximum benefit and efficiency, a ground source heat pump is best used with underfloor heating, but appropriately sized radiators are also an option. Always consult your installer to carry out a heat loss calculation.

## **Greenstore air source heat pumps**

### **How do air source heat pumps work?**

The technology inside an air source heat pump works on similar principles to the way a domestic fridge works. Heat pumps take advantage of the principles of thermal energy in order to achieve their results.

Both types of air source heat pump operate in a similar way. The external fan unit draws in the outside air and converts the latent heat it contains on even the coldest of days into warm/cold air or hot water, depending on the type of heat pump.

### **How efficient are air source heat pumps?**

When properly installed, an air source heat pump can produce up to 4-5 times more heat energy to the home than the electrical energy it consumes. This will vary dependent on the outside temperature.

## **Can I keep my existing radiators with an air to water heat pump?**

Unless the radiators have already been appropriately sized they will probably have to be replaced by larger ones to ensure a higher CoP from the heat pump. Always consult your installer to carry out a heat loss calculation.

**Still have unanswered questions?**

**Call 0844 892 4010 or visit [www.worcester-bosch.co.uk](http://www.worcester-bosch.co.uk)**

# What next?

In order to check the suitability of the product you are interested in for your property then we would suggest you either contact an qualified installer or phone our technical pre-sales helpline.

## Installation advice

A qualified installer is a great source of advice and we can also help you to find a Worcester Accredited Installer who is local to you. Just call **0844 892 3366** or visit our website and use the 'find an installer' facility.

## Pre-Sales Technical Helpline

Our award winning technical advisors are all highly trained and passionate about helping our customers. With a wealth of industry knowledge, qualifications and experience the team can assist with all enquiries. We have over 40 advisors offering advice and assistance for all kinds of projects and problems for every one of our products. The technical support team are available to answer your call on **0844 892 3366** or email from 7am until 8pm on weekdays and from 8.30am until 4pm on Saturdays.

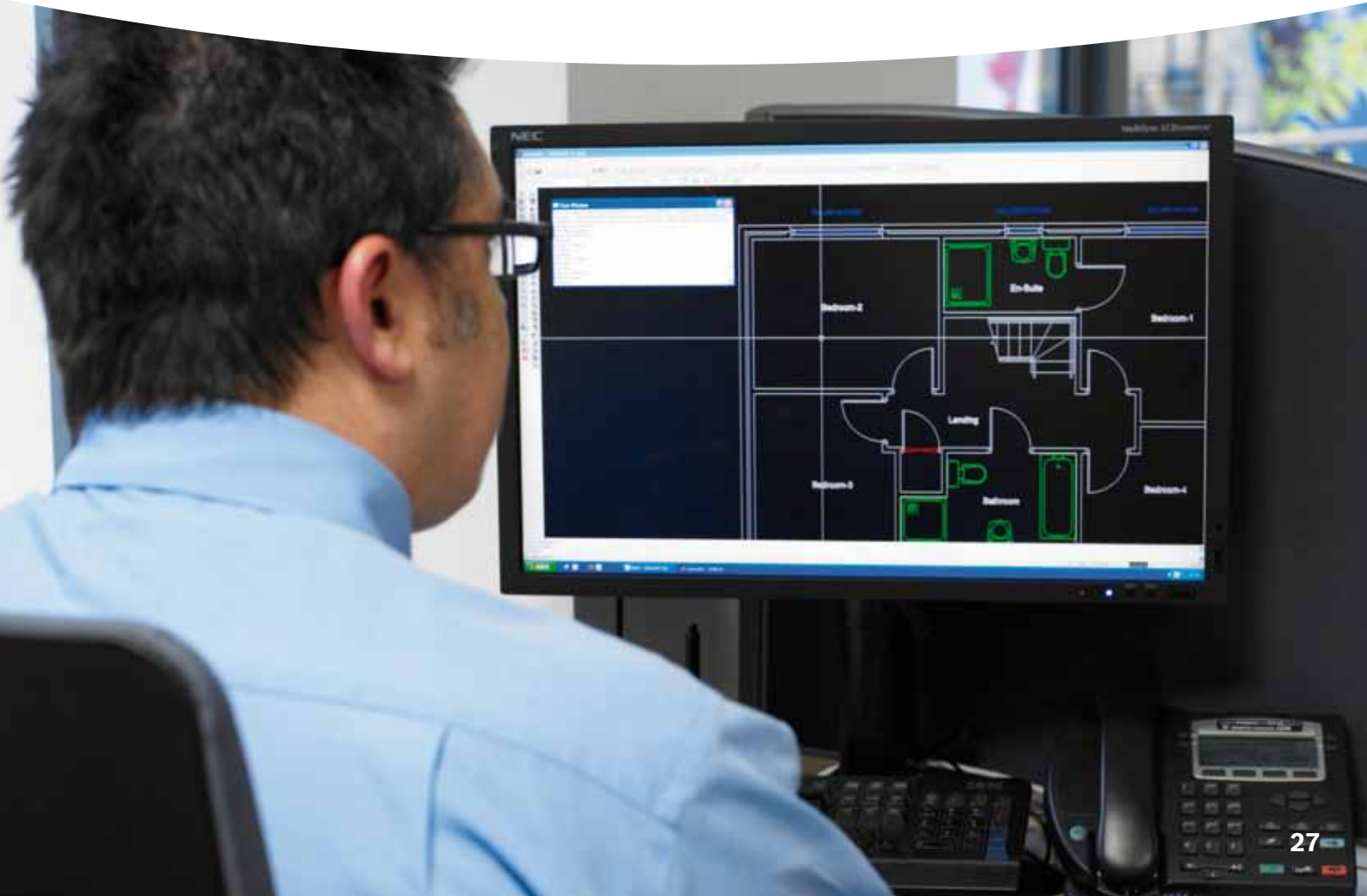
## Choosing the right product for your needs

To help you choose the correct Worcester ground source or air to water heat pump or underfloor system for your property, we offer a FREE sizing calculation service. A full system design is available for these products, the cost of which is refundable if you subsequently purchase either.

We also offer a commissioning service on Greenskies solar, Greenstore ground source and Greensource air to water heat pumps. For further details call the Renewable Team on **0844 892 3366**.

## Heating Design Service

Worcester's design team offers design support across of our product range. The design team can provide technical drawings and specification advice for all our customers. All of our team are authorised SAP assessors and hold an IDHEE Domestic Heating Certificate.





Worcester.  
At your service.

## After-sales support when and wherever you may need it

We're always on hand to help, whether you're just starting to think about buying a Worcester product or you've owned one for years.

Our experienced and award-winning technical support team is available on the phone or online to offer help and information about any Worcester renewable product. We are placed in the top 10 of the top 50 UK call centres.

Worcester quality standards are impressive, but they don't just apply to the design and quality of our products. We have a nationwide network of over 300 Service Engineers – all employed and trained directly by ourselves – to help if your Worcester product needs attention.

### **Guarantees for extra peace of mind**

To give you even more reassurance, we offer comprehensive guarantees on all our products. To find out more, visit [www.worcester-bosch.co.uk/guarantee](http://www.worcester-bosch.co.uk/guarantee)



# Even more ways of providing heating and hot water comfort to you.

## Market-leading condensing boilers

For the ultimate in economy, cost savings and total heating and hot water comfort, combine your renewable solution with a new Worcester Greenstar high-efficiency condensing boiler. Greenstar system and regular condensing boilers are designed to be compatible with Greenskies solar water heating so providing a total heating and hot water package.

In the 2012 survey of Which? members who own a boiler, no other brand beat the Worcester Greenstar range of gas-fired condensing boilers for efficiency and reliability for the second year running. This is why all of the boilers tested from the Greenstar range qualify to be a Which? Best Buy.



- **Top efficiency rating.** As on appliances such as fridges and washing machines, boilers carry an energy efficiency rating. Every Greenstar boiler is 'A' rated – the highest efficiency band achievable
- **Big savings.** 'A' efficiency rating reduces gas consumption and bills by as much as 30%
- **Better for the environment.** Outstanding efficiency also means a significant reduction of 'greenhouse gas' emissions.

If you would like to know more about what Greenstar boiler options may be available to you, call our Consumer Helpline **0844 892 3366**, visit our website at **www.worcester-bosch.co.uk** or consult your local professional installer.



## Information whenever you need it

To help you make the most of your heating and hot water system, Worcester has produced an informative 'handy hints' guide. To obtain a copy or to find out more about Worcester's full range of heating and hot water solutions, visit **www.worcester-bosch.co.uk** or call our literature line on **0844 892 9800**.





We're as committed to the environment as we are to our customers.

The environment is an issue that affects everyone. At every level, from global to individual, we are all being asked to act to protect the planet by making sure we don't consume more than our fair share of limited natural resources. We are being encouraged to take more responsibility for using what is available more efficiently and to find new and more sustainable sources of energy.

The more we can do, the more progress we will make towards improving our own quality of life as well as protecting the environment that our children and grandchildren will inherit.

In the short term, there is also a more immediate benefit, because reducing the amount of energy we use could also help us to beat the rising costs of our own domestic fuel bills.

#### **Doing more today to help tomorrow**

Whether it's energy efficient boilers, or sustainable heating solutions, Worcester's commitment to the environment goes back many years.

Our greatest contribution is aiming to make every one of our products as fuel efficient as technology will allow, or uses completely sustainable fuel like solar energy.

But that's not all. In 2000, The Environment 2020 Awards were initiated to celebrate and promote activities dedicated to conserving the environment for future generations. The initiative includes an annual children's art competition. For more information visit our website.

Worcester is also behind a forward-looking scheme to educate younger generations on environmental issues. A free book, 'Picture a Greener Future', is available from our website at [www.worcester-bosch.co.uk/greenerfuture](http://www.worcester-bosch.co.uk/greenerfuture) and, through a fun story, shows how we can all reduce our energy consumption and shrink our carbon footprint.



Worcester has also accomplished its environmental commitment by reaching 100% recyclability for all of its Greenstar boilers, thereby achieving its zero waste to landfill objective.

In addition, a partnership has been set up with a Swansea-based company which now transforms Worcester's previously non-recyclable waste, including some plastics, into an eco-friendly concrete replacement which is now used in housing, meaning that Worcester's range of Greenstar boilers are now 100% recyclable.

#### **Worcester energy houses**

Our energy efficient solutions have been installed into a network of 'energy houses' around the country, so you can see real-life examples of the difference that Worcester products can make to energy usage. To take a look at how we could help you reduce your energy consumption, visit our site at [www.worcesterenergyhomes.co.uk](http://www.worcesterenergyhomes.co.uk)

#### **Making a difference**

Since 1996, the combined energy savings of all the products we've sold have helped reduce Bosch Thermotechnology's carbon footprint by 20%. As domestic boilers currently account for 21%\* of the UK's total CO<sub>2</sub> emissions, the fact that a Worcester condensing boiler also delivers dramatically reduced emissions of both CO<sub>2</sub> and NO<sub>x</sub> (Nitrogen Oxide) helps in the battle against climate change.

\*Source: Energy Saving Trust.



## Useful numbers

### Consumer Technical Helpline (Pre & Post Sales)

Tel: 0844 892 3366

Fax: 01905 752741

### Renewables Technical Helpline

Email: [renewable.energy@uk.bosch.com](mailto:renewable.energy@uk.bosch.com)

or telephone 0844 892 4010

### Literature

Email: [literature@uk.bosch.com](mailto:literature@uk.bosch.com)

or download instantly from our website

or telephone 0844 892 9800

## Customer Service

### Engineer Appointments

Email: [appointment.worcester@uk.bosch.com](mailto:appointment.worcester@uk.bosch.com)

or telephone 0844 892 3000

### Enquiries

Email: [service.mailbox@uk.bosch.com](mailto:service.mailbox@uk.bosch.com)

or telephone 0844 892 3000

### Guarantee Registration

To register your Worcester guarantee,

please visit our website or

telephone 0844 892 2552

Calls to the listed 0844 numbers are charged at up to 3 pence per minute from BT land lines.  
Calls from mobiles and some other networks may vary. Calls to and from Bosch Thermotechnology Ltd  
may be recorded for training and quality assurance purposes.

# [www.worcester-bosch.co.uk](http://www.worcester-bosch.co.uk)



In partnership with



energy saving trust™



Worcester, Bosch Group is a brand name of Bosch Thermotechnology Ltd.

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Part No. 8 716 115 755 Iss D 03/13



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