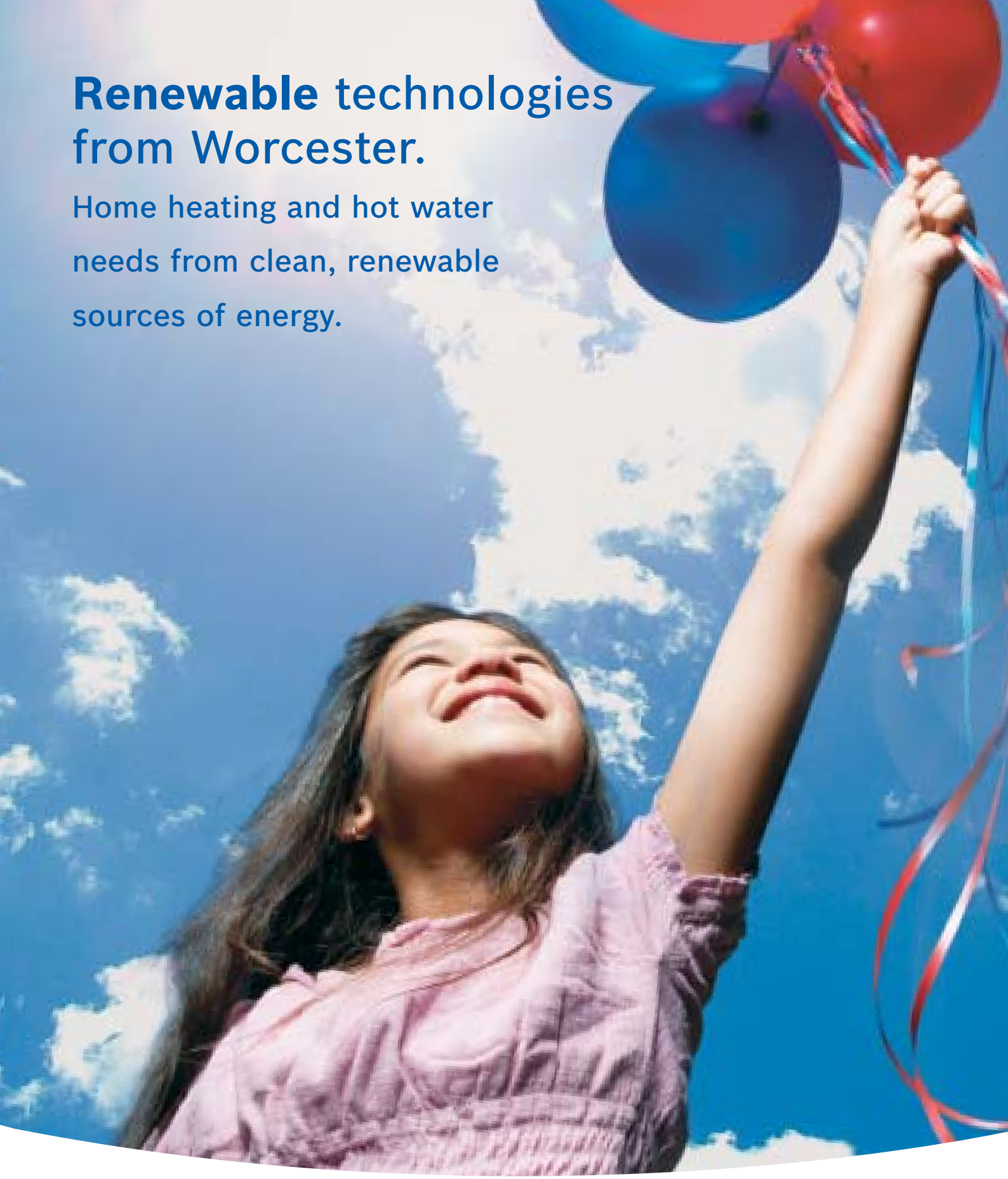
# **Renewable** technologies from Worcester.

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



WORCESTER
Bosch Group

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 all our products are designed to deliver heating and hot water comfort as well as reducing harmful greenhouse gases.

We're also committed to doing even more for the environment. Worcester is leading the way in the search for greener and more sustainable energy alternatives.

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 use the latent energy in the ground or the outside air to provide low cost heating and hot water for virtually any type of property. Greensource air source heat pumps are available in 2 options: air to water for providing heating and hot water and an air to air option which is heating only. All our heat pumps are designed to meet the needs of a wide range of properties.

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.

**Contents** **Page**


| | |
|---|---|
| Worcester. Trusted for nearly half a century. | 4 |
| Greenskies solar water heating. | 6 |
| Greenstore and Greensource heat pumps. | 9 |
| Greenstore ground source heat pumps. | 10 |
| Greensource air to water heat pumps. | 12 |
| Greensource air to air heat pumps. | 14 |
| Worcester offers so much more. | 16 |
| Environmental commitment. | 18 |
| Greenskies and Greenstore case studies. | 20 |
| Frequently asked questions about renewable technology. | 22 |
| Technical overviews. | 23 |

# Worcester. Trusted for nearly 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.

Industry experts voted Greenskies solar thermal panels CORGI's Energy Efficient Product of the Year and OFTEC's Green Product of the Year.


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

### 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.

** Source: Worcester Customer Satisfaction Survey*

### 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 government provides grants for the installation of renewable technology products. Visit **www.berr.gov.uk** to find out the latest information on available grants.

Installing a Worcester Greenskies or Greenstore system (or both) could entitle you to a grant under the government's Low Carbon Buildings Programme*, including £400 for Greenskies solar and up to £1,200 for Greenstore ground source heat pumps.

## Microgeneration Certification Scheme

The MCS gives consumers the guarantee that certified microgeneration products and the installers of those products have conformed to a rigorous set of standards. To qualify for grants such as the Low Carbon Buildings Programme, both the microgeneration product and the installer must carry the MCS mark (solar thermal products can be certified under the Solar Keymark scheme).

Frequently, Worcester runs special promotional offers on renewable products. Find out more by visiting **www.worcester-bosch.co.uk**

To qualify for Worcester promotional offers you must have the work carried out by a Worcester Accredited Installer. Details of installers who have been fully trained by Worcester can also be found on our website.

All renewable technologies installed by a qualified installer attract a reduced rate of VAT at 5%.

** Correct at time of printing*

Worcester's Energy Houses, where our energy efficient boilers and renewable energy solutions are providing environmental and cost saving benefits in real life environments.

Worcester, Bosch Group headquarters in Worcester

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

If you'd like to reduce the amount of fossil fuels that you depend on to heat the water in your home and, at the same time, significantly lower your carbon dioxide emissions, why not consider installing a Worcester Greenskies solar water heating system?

Solar water heating systems work by absorbing solar energy. The energy is transferred from the solar panel to heat the water in your hot water cylinder. Highly efficient, completely controllable and low maintenance, a solar water heating system is easiest to install if you already have a conventional 'system' or 'regular' boiler and could provide up to 60%* of your annual hot water from a clean, renewable source of energy.

### Works come rain or shine

Our solar water heating panels do not rely on high temperatures or direct sunlight to work. Even on cloudy days, they can deliver significant energy savings. That's because they work on the principle of light absorption, rather than needing heat or direct sunlight.

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. For renewables planning guidance visit **www.energysavingtrust.org.uk**

### Greenskies features and benefits:

- **Sustainable energy.** As solar energy harnesses the energy from the sun, it produces none of the $CO_2$ emissions of using fossil fuels
- **Environmentally-friendly.** Greenskies solar panels can be fully recycled
- **Proven technology.** Greenskies is based on technology that has been working for more than 20 years
- **Suitable for many locations.** Greenskies can be installed on or in a sloping roof, on flat roofs, or even on a wall or floor
- **You're in control.** The Greenskies system includes a control, which enables you to set the hot water temperature you require with ease
- **Easy to look after.** Greenskies requires minimal maintenance and is extremely robust
- **Guarantee.** Greenskies panels come with a 10 year warranty and a 2 year warranty on other components

**To read a real life case study see page 20.**

## GOVERNMENT GRANTS

Through the government's Low Carbon Buildings Programme a grant is available towards the cost of installing a Greenskies solar water heating system. It is currently £400 or 30%† of the relevant eligible cost, whichever is lower. For full details of the grant and how to apply, visit **www.lowcarbonbuildings.org.uk**

*† Grant amount correct at time of printing*

Greenskies solar thermal panel

** Source: Energy Saving Trust (Publication CE102)*

## Greenskies Cylinder series

The Worcester Greenskies cylinder is a mains pressure twin coil storage cylinder specifically designed to be installed in conjunction with Worcester Greenskies solar system along with a regular or system gas- or oil-fired boiler to cater for a range of hot water requirements. The Greenskies solar cylinder is made from Duplex stainless steel for excellent corrosion resistance. Greenskies cylinders have a strong rust-proofed steel case and are well insulated with environmentally friendly foam. They are available in a range of 4 sizes from 180-300 litres.

Greenskies cylinders are WRAS and BBA approved to show compliance with Building Regulations G3 and Part L and carry a 25 year warranty.

*Only for use with one fossil fuel appliance and one solar system (the use of two fossil fuel appliances is not permitted).*
*WRAS: Water Regulation Advisory Scheme*
*BBA: British Board of Agreement*

## Greenskies compatibility and control

All Worcester Greenstar gas- and oil-fired system and regular boilers are designed to work in harmony with Greenskies solar water heating to provide you with extra economy.

Worcester Greenskies can also be used in conjunction with Greenstore ground source heat pumps.

The Worcester solar range includes a TDS10 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 have also introduced a new family of intelligent heating controls for the Greenstar CDi boiler series. Part of this new family is designed to enhance the efficiency of Greenskies solar water heating systems.

The TDS10 solar controller

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

**More technical information can be found on page 23.**

# 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.

**Measured efficiency**

The efficiency of all heat pumps is measured as 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 to produce 4kW of usable energy has a CoP of 4 and is therefore 400% efficient.

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

When correctly sized, a Greenstore ground source heat pump can provide all the heating and hot water needs for your home. The ground source heat pump works by drawing on the natural, renewable energy in the ground to deliver low cost, comfortable heating and hot water that uses sustainable energy and causes no direct emissions or other damage to the environment.

### A system to suit every property

Worcester offers two types of ground source heat pump. You could choose a system heat pump which requires a separate cylinder and can be used with a Greenskies solar water heating system. Alternatively, there is a combination unit, with an integrated cylinder. All models offer outputs to suit most needs and size of property.

Ground source heat pumps work better with the lower water temperatures required by underfloor heating systems, but they can also be used to heat appropriately sized radiators.

Greenstore ground source heat pumps are suitable for both new and refurbished properties with required levels of insulation and can be used with a range of collectors. The collector system is installed under the ground around your property. To see if a ground source heat pump is suitable for your property visit our website at **www.worcester-bosch.co.uk/gshp**

### Greenstore features and benefits:

- Energy efficient – efficiency of up to 400% with a CoP of up to 4
- Environmentally-friendly
- Weather compensation control for increased efficiency
- Ground source heat pumps can replace the need for a boiler
- Significantly reduce your heating and hot water bills
- Ideal for use with underfloor heating or appropriately sized radiators
- Comprehensive 2 year* warranty

**To read a real life case study see page 21.**

## GOVERNMENT GRANTS

Through the government's Low Carbon Buildings Programme a grant is available towards the cost of installing a Greenstore ground source heat pump. It is currently £1,200 or 30%† of the relevant eligible cost, whichever is lower. For full details of the grant and how to apply, visit **www.lowcarbonbuildings.org.uk**

*† Grant amount correct at time of printing*

** Terms and conditions apply*

Greenstore Combination ground source heat pump

Greenstore System ground source heat pump

## £2,000 cash-back

**on Greenstore ground source heat pumps until end of 2009.**

**Visit www.worcester-bosch.co.uk/cashforgshp for more details.**

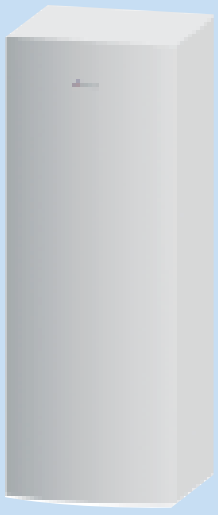
## Different types of collector systems

Horizontal collector

Compact collector

Bore hole collector

## Greenstore Cylinder series



Worcester offers a range of 2 unvented cylinders for exclusive use with Greenstore System heat pumps. The cylinders are available in 180 and 280 litre sizes according to hot water requirements. Greenstore cylinders feature 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 cylinders have been approved to Part G3 of the Building Regulations.

Both cylinders include 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.

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

**More technical information can be found on page 24.**

# Greensource air to water heat pumps.

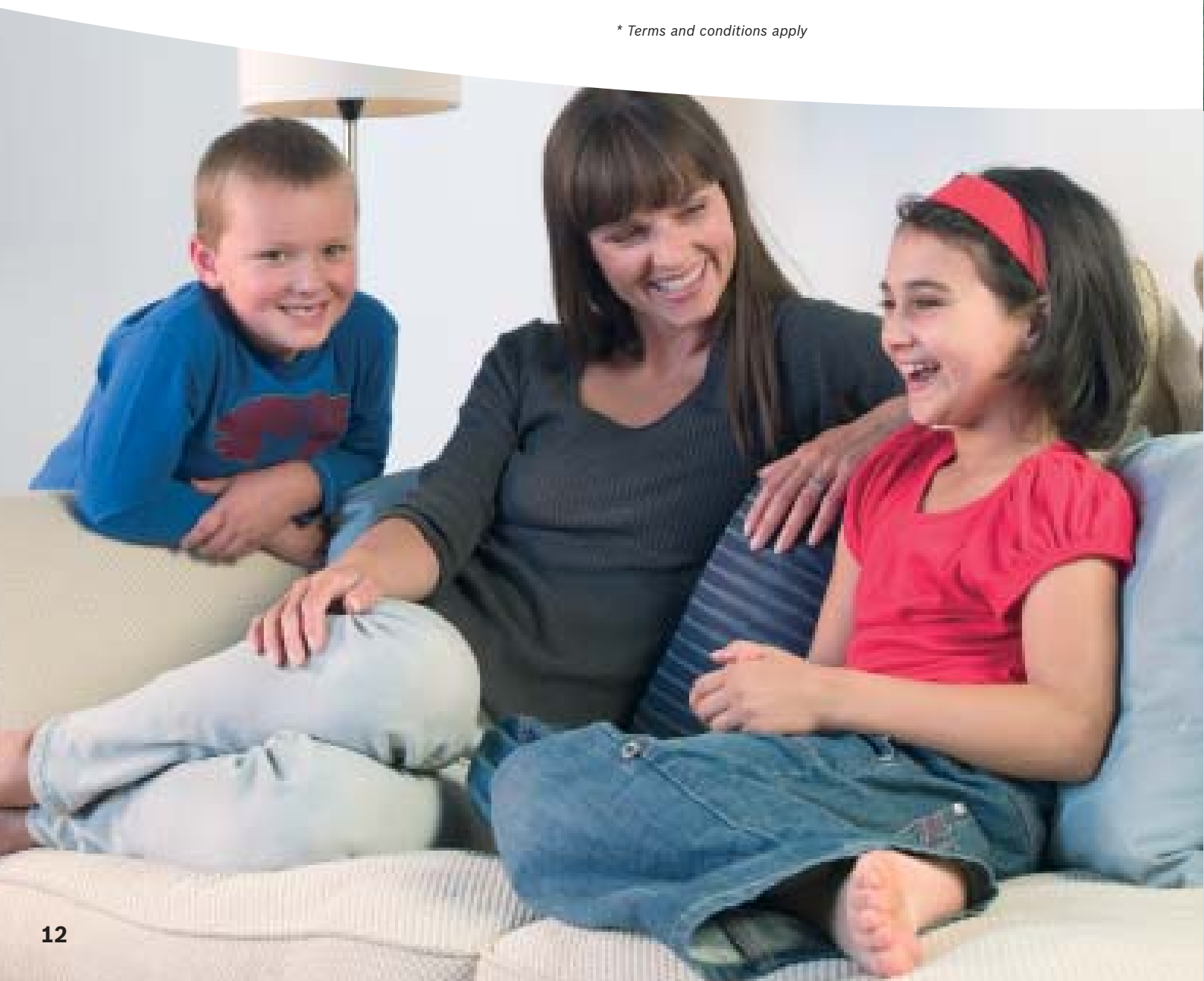
Air to water heat pumps operate on a similar principle to an ordinary refrigerator. Heat from the atmosphere is extracted by an outdoor unit and is absorbed by a refrigerant solution which is then compressed to a high temperature. The heat generated is used by the indoor unit to create hot water for a traditional pressurised heating and hot water system.

Greensource air to water heat pumps can provide an outgoing flow temperature of 65ºC. However, they are ideally suited for low-temperature underfloor central heating systems and appropriately sized radiators, as well as for baths and showers, providing a low cost solution throughout the year.

**Greensource air to water features and benefits:**

- Energy efficient – efficiency of up to 400% with a CoP of up to 4
- Maximum 65ºC outgoing temperature – provides hot tap water
- Works down to outdoor temperatures of -20ºC
- Suitable for use with underfloor heating and appropriately sized radiators
- Indoor integrated cylinder
- Easy to install and maintain by a qualified installer
- Can be installed up to 15 metres from a property
- No major ground works required
- Designed for connection to all types of wet heating systems
- Proven technology that saves you money
- Comprehensive 2 year* warranty

** Terms and conditions apply*



The Greensource air to water heat pump outdoor unit

## Indoor unit features

- Weather compensation control for increased efficiency
- Compact size 600mm sq floor area
- Peak domestic hot water use boost feature
- Hot water capacity of 151 litres with thermostatic blending valve which effectively increases hot water availability for washing and showering
- Built-in electrical supplement to automatically provide extra heating when required
- G3 approved cylinder

The Greensource air to water heat pump indoor unit

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

**More technical information can be found on page 26.**

# Greensource air to air heat pumps.

Air to air heat pumps work in a similar way to air to water heat pumps, but instead of generating hot water, the heat from the compressed refrigerant solution 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 allergy sufferers.

Air to air heat pumps are an attractive alternative where external space is limited as they require nothing more than a suitable outside wall, making them ideal for a wide range of property types, including apartments and smaller homes.

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

**Greensource air to air features and benefits:**

- Energy efficient – efficiency of up to 500% with a CoP of up to 5
- Compact design requiring only an outside wall
- Suitable for a wide variety of property types, including apartments and conservatories
- Quiet operation
- Easy to install and maintain by a qualified refrigeration engineer
- Can be used to provide cool air in the summer
- Active Ion-technology air purification technology, ideal for allergy sufferers
- Inverter technology – modulates with high demand, making it more effective
- Low maintenance
- Comprehensive 2 year* warranty

** Terms and conditions apply*

The Greensource air to air heat pump outdoor unit

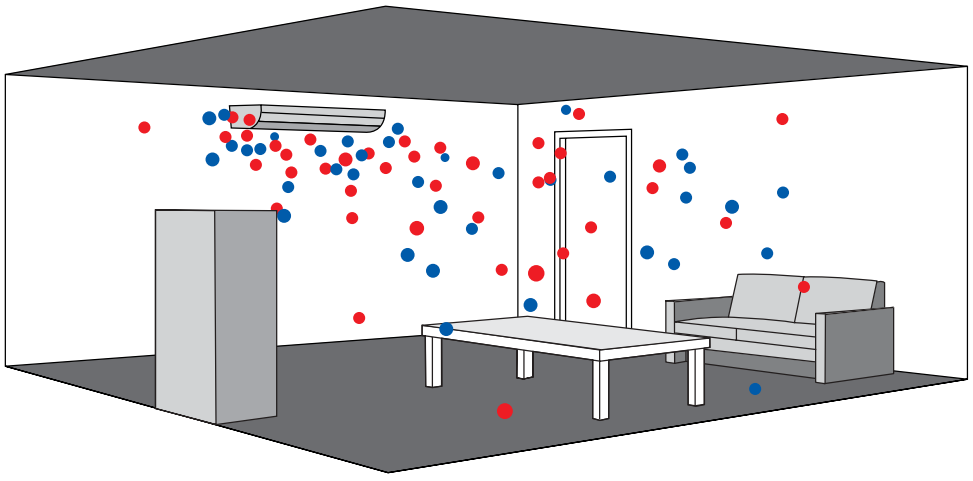
The Greensource air to air heat pump indoor unit

Greensource air to air heat pump remote control

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

**More technical information can be found on page 27.**

## Benefit of Greensource air to air heat pump: Plasmacluster Ion-technology



The Greensource heat pump's unique active air purification system emulates nature's own air purification process. It emits positive and negative Plasmacluster ions (positive hydrogen ions and negative oxygen ions are surrounded by multiple water molecules to form a cluster, hence the description "cluster ions") that spread throughout the room to purify the air by attacking harmful airborne substances such as bacteria, viruses and allergens, including cigarette smoke. These ions are the same as those found in nature; they are completely safe.

# Worcester offers so much more.

### Choosing the right product for your needs

To help you choose the correct Greenstore ground source heat pump or Greensource air to water heat pump 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. You will need to supply detailed floor plans and elevational drawings of your property.

We also offer a commissioning service on Greenskies solar, Greenstore ground source heat pumps and Greensource air to water heat pumps.

For further details and cost call the Renewable Team on **01905 752780**.

### 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.

- Top efficiency rating. As on appliances such as fridges and washing machines, boilers carry an energy efficiency rating. Every Greenstar boiler is rated in SEDBUK Band 'A' – the highest efficiency band achievable
- Big savings. Band '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 **08705 266241**, visit our website at **www.worcester-bosch.co.uk** or consult your local professional installer.

### 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. Of course, a qualified installer is also a good source of advice, and we can also help you find a Worcester Accredited Installer who's local to you. Just call **08705 266241** or visit our website and use the 'find an installer' search facility.

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 boiler, solar system or ground or air source heat pump installation needs attention. The engineers are supported by over 80 Worcester-based customer service advisers, 7 days a week.

### Warranties for extra peace of mind

To give you even more reassurance, we offer comprehensive warranties on all our products. To find out more, visit **www.worcester-bosch.co.uk/warranty**

In addition to the cover provided by our standard warranties we can also provide optional annual service and maintenance contracts which are designed to give you complete peace of mind when you invest in a Worcester product.


WORCESTER
Bosch Group

# 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** and, through a fun story, shows how we can all reduce our energy consumption and shrink our carbon footprint.

We're also working with The Woodland Trust to help reduce our own carbon footprint. For every Worcester boiler installed, we'll help plant a tree in the UK with The Woodland Trust. All you need to do is register your product details at **www.worcester-bosch.co.uk/plantatree** and we'll do the rest.

## 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.worcester-bosch.co.uk/energyhouses**

## 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 $CO_2$ emissions, the fact that a Worcester condensing boiler also delivers dramatically reduced emissions of both $CO_2$ and NOx (Nitrogen Oxide) helps in the battle against climate change.

** Source: Energy Saving Trust*

# Greenskies case study

## The Darby Family

**Family** – Jamie and Deb Darby and their three young children
**Property** – 4 bedroom detached, mock tudor house, built in the early 1900s
**No. of bathrooms** – 1 family bathroom, 1 en-suite, downstairs WC
**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 and inherited an old, inefficient gas-fired boiler. With three young children to look after as well as pets, it was essential to have instant hot water and a reliable heating system which didn't cost the earth to run.

Since moving in, 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 which is SEDBUK 'A' rated for efficiency, combined with a large twin coiled hot water cylinder and Greenskies solar panels.

### Installation

The installation took about two weeks to complete as the cumbersome old boiler was removed and the new Worcester Greenstar 40CDi boiler was installed. The two solar panels were fixed to the roof and connected to the twin coil hot water cylinder and boiler. The boiler and hot water cylinder were installed in the loft, freeing up space in the cellar, where the previous boiler was housed. The cylinder is slightly larger than would ordinarily be installed to ensure that when the Darbys build their extension, there will be adequate hot water to meet their needs.

### 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 degrees or more, we have enough for a hot bath as well as the washing up."

"It's still quite a novelty and 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 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, so they were pleased when Worcester launched its Greenstore range.

This corresponded with the renovation of their home, which had previously been a small B&B. They were keen to change the layout and décor to create a modern family home.

During the initial building work they already had the idea of installing a heat pump in their minds, which is why they fitted an underfloor heating system at the start of the project. Several months later, when they took at 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: “The main installation of the heat pump and collectors took about five days, and 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, which means we are making significant savings on our fuel bills each year.

Now the installation is complete and the lawn is taking shape, the project looks to be a great success. The heat pump now efficiently meets our heating and hot water needs, 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. Undoubtedly fitting the technology in my own home has made me better able to explain what’s involved in installing a heat pump. I also feel so much more credible when I’m talking about the benefits of the technology to customers.”

# 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.berr.gov.uk

For details of grants available under the government's Low Carbon Buildings Programme visit: www.lowcarbonbuildings.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 3 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. Worcester offers compact collectors which reduce the amount of space required for the collector by increasing the amount of pipework in a given area. 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.

## Greensource 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.

## Still have unanswered questions?
## Call 08705 266241 or visit www.worcester-bosch.co.uk



** Source: Energy Saving Trust (Publication CE102)*

# Greenskies solar technical overview.

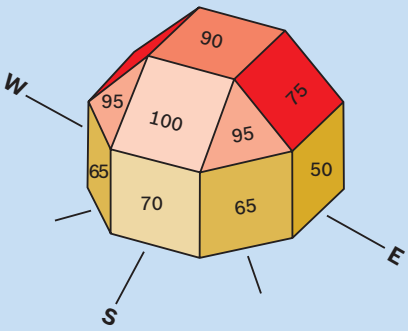
### FKC standard solar panels

| | Greenskies FKC-1S solar panel | Greenskies FKC-1W solar panel |
|---|---|---|
| **Orientation** | Portrait | Landscape |
| **Dimensions (mm) (w x h x d)** | 1145x2070x90 | 2070x1145x90 |
| **Gross collector area (m²)** | 2.37 | 2.37 |
| **Solar glass transmission (%)** | 91.5 ± 0.5 | 91.5 ± 0.5 |
| **Absorption (%)** | 95 ± 2 | 95 ± 2 |
| **Emission* (%)** | 12 ± 2 | 12 ± 2 |
| **Weight - empty (kg)** | 41 | 42 |

### FKT high performance solar panels

| Greenskies FKT-1S solar panel | Greenskies FKT-1W solar panel |
|---|---|
| Portrait | Landscape |
| 1145x2070x90 | 2070x1145x90 |
| 2.37 | 2.37 |
| 91.5 ± 0.5 | 91.5 ± 0.5 |
| 95 ± 2 | 95 ± 2 |
| 5 ± 2 | 5 ± 2 |
| 44 | 45 |

** Emission is the percentage of absorbed solar energy reflected back into the atmosphere by the collectors*



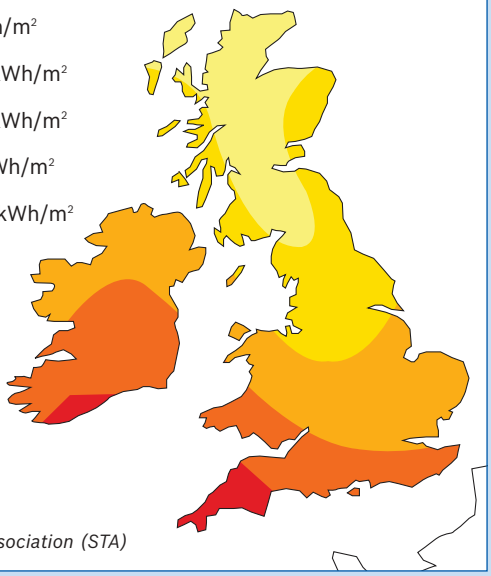

## Panel orientation

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

This map gives you an idea of the average irradiation that can be expected in your region.

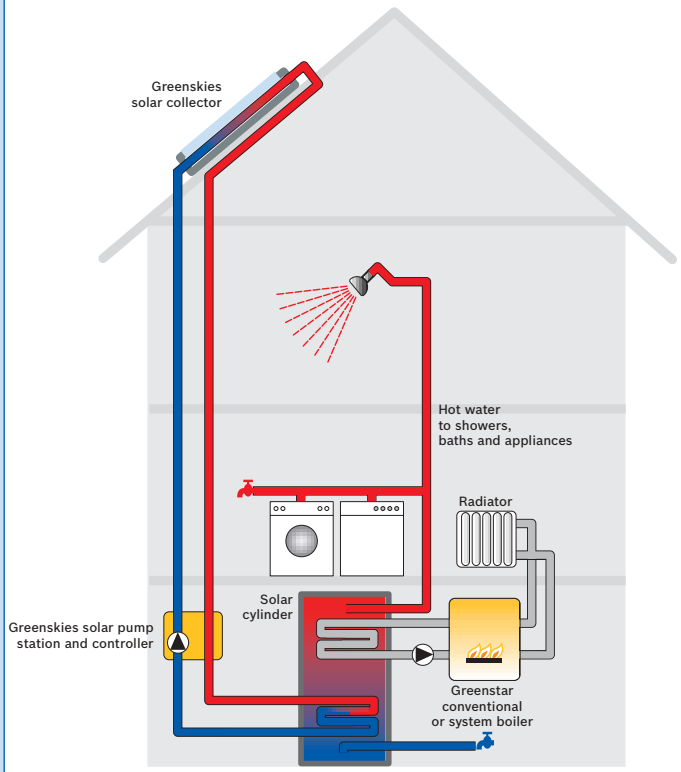
Average irradiation in the British Isles

- Over 1200 kWh/m²
- 1100 to 1200 kWh/m²
- 1000 to 1100 kWh/m²
- 900 to 1000 kWh/m²
- Less than 900 kWh/m²



*Source: Solar Trade Association (STA)*

A typical solar system layout



# Greenstore System ground source heat pump technical overview.

| | Greenstore 6 System | Greenstore 7 System | Greenstore 9 System | Greenstore 11 System |
|---|---|---|---|---|
| **Height (mm)** | 1520 | 1520 | 1520 | 1520 |
| **Width (mm)** | 600 | 600 | 600 | 600 |
| **Depth (mm)** | 600 | 600 | 600 | 600 |
| **Weight (kg)** | 149 | 153 | 155 | 164 |
| **Emitted/supplied output at 0/45ºC[1] (kW)** | 5.19 / 1.80 | 6.55 / 2.20 | 8.20 / 2.67 | 9.63 / 2.92 |
| **CoP 0/35ºC[1]** | 3.8 | 3.9 | 4.1 | 4.6 |
| **CoP 0/45ºC[3]** | 2.89 | 2.97 | 3.06 | 3.29 |
| **CoP 0/50ºC[2]** | 2.8 | 2.9 | 3.0 | 3.2 |
| **Electrical supply** | 230V 1PH 50Hz | | | |
| **Max. outgoing temperature to the heating system (ºC)** | 65 | 65 | 65 | 65 |
| **Compatible with 180/280l cylinders** | • | • | • | • |
| **G3 approved** | • | • | • | • |

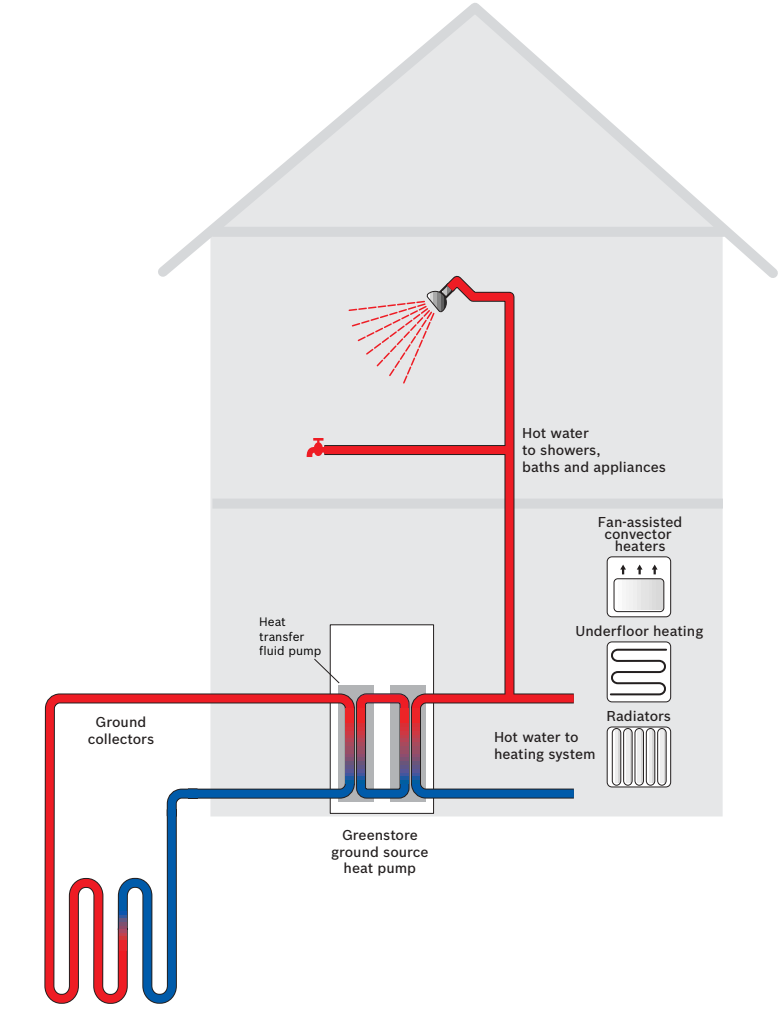
*1 Data at 0/45ºC according to the European standard EN 14511. Data applies to a new unit with clean heat exchangers*
*2 Calculated values at 1m distance according to EN ISO 11203*
*3 According to EN 14511*
*CoP: 0ºC = outside flow temperature 45ºC = temperature to heating system*

# Greenstore Combination ground source heat pump technical overview.

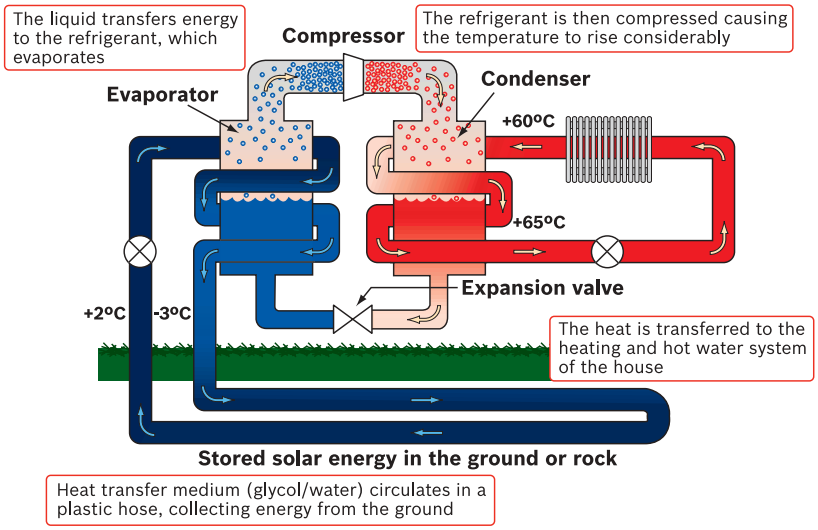
| | Greenstore 6 Combination | Greenstore 7 Combination | Greenstore 9 Combination | Greenstore 11 Combination |
|---|---|---|---|---|
| **Height (mm)** | 1800 | 1800 | 1800 | 1800 |
| **Width (mm)** | 600 | 600 | 600 | 600 |
| **Depth (mm)** | 600 | 600 | 600 | 600 |
| **Weight – empty (kg)** | 213 | 217 | 219 | 222 |
| **Weight – full (kg)** | 438 | 442 | 444 | 447 |
| **Emitted/supplied output at 0/45ºC[1] (kW)** | 5.19 / 1.80 | 6.55 / 2.20 | 8.20 / 2.67 | 9.63 / 2.92 |
| **CoP 0/35ºC[1]** | 3.8 | 3.9 | 4.1 | 4.6 |
| **CoP 0/45ºC[3]** | 2.89 | 2.97 | 3.06 | 3.29 |
| **CoP 0/50ºC[2]** | 2.8 | 2.9 | 3.0 | 3.2 |
| **Electrical supply** | 230V 1PH 50Hz | | | |
| **Max. outgoing temperature to the heating system (ºC)** | 65 | 65 | 65 | 65 |
| **Volume of integrated hot water cylinder (l)** | 185 | 185 | 185 | 185 |
| **Primary water volume (l)** | 40 | 40 | 40 | 40 |
| **G3 approved** | • | • | • | • |

*1 Data at 0/45ºC according to the European standard EN 14511. Data applies to a new unit with clean heat exchangers*
*2 Calculated values at 1m distance according to EN ISO 11203*
*3 According to EN 14511*
*CoP: 0ºC = outside flow temperature 45ºC = temperature to heating system*

A typical ground source heat pump system layout




How a ground source heat pump works



# Greensource air to water heat pump technical overview.

### Greensource air to water heat pump outdoor unit

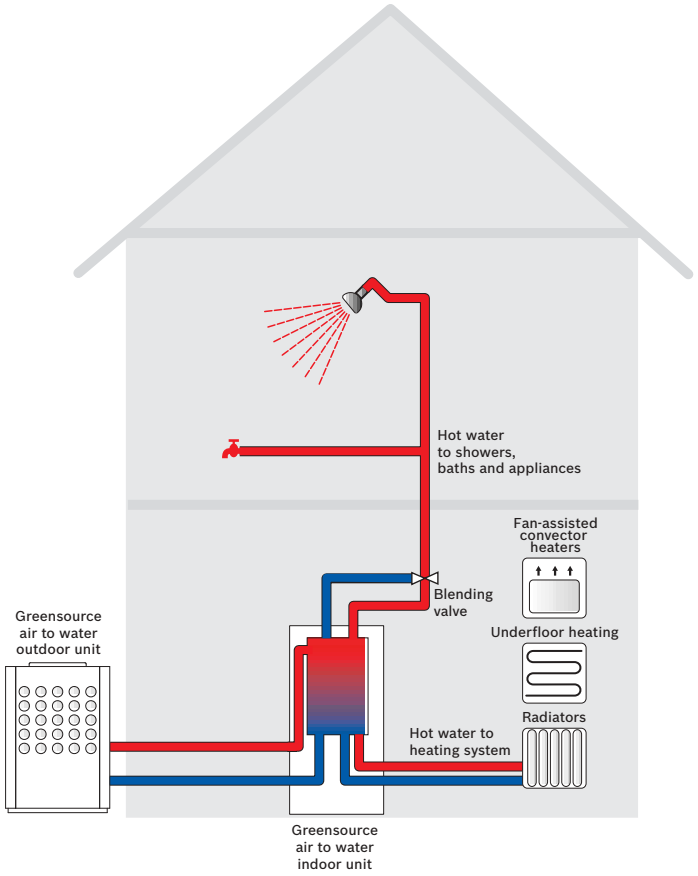
| | 6kW | 7kW | 9.5kW |
|---|---|---|---|
| **Dimensions (mm - w x h x d*)** | 820x1190x640 | 820x1190x640 | 820x1190x640 |
| **Weight (kg)** | 140 | 145 | 155 |
| **Outer casing** | Galvanised powder coated steel | | |
| **Emitted/supplied output at +7/35ºC** | 5.5/1.5kW | 7.1/2.1kW | 8.8/2.3kW |
| **Emitted output at +7/45ºC** | 5.1/1.7kW | 6.9/2.5kW | 8.5/2.8kW |
| **Air flow** | 2200m³/h | 2200m³/h | 2200m³/h |
| **Electrical supply** | | 230V 1PH 50Hz | |
| **Highest outgoing heat carrier temperature** | 65ºC | | |
| **Underfloor heating flow temperature** | 40ºC | | |
| **Radiators flow temperature** | 50ºC | | |

**Values without feet, additionally depending on the adjustment Min. 20mm – Max. 30mm*

### Greensource integrated cylinder for use with air to water heat pump

| | |
|---|---|
| **Dimensions (mm - w x h x d)** | 600x1660x615 |
| **Weight without water (kg)** | 122 |
| **Weight with water (kg)** | 347 |
| **Output of the electric heater** | 4,5kW |
| **Mains electrical voltage** | 230V 1N AC 50Hz |
| **Volume DHW cylinder/CH** | 151/55 litres |

A typical air to water heat pump system layout




**Please note: these products can only be purchased as a package and will not operate independently**



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

# Greensource air to air heat pump technical overview.

### Greensource air to air heat pump outdoor unit

| | |
|---|---|
| **Dimensions (mm - w x h x d)** | 780x540x265 |
| **Weight (kg)** | 39 |
| **Single phase voltage** | 220-240V |

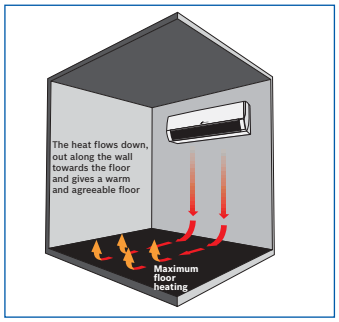
### Greensource air to air heat pump indoor unit

| | |
|---|---|
| **Dimensions (mm - w x h x d)** | 860x292x205 |
| **Weight (kg)** | 9 |
| **Max heat output** | 6.0kW |
| **Max cooling effect** | 3.5kW |
| **Single phase voltage** | 220-240V |
| **CoP (EN 14511)** | 4.5 |

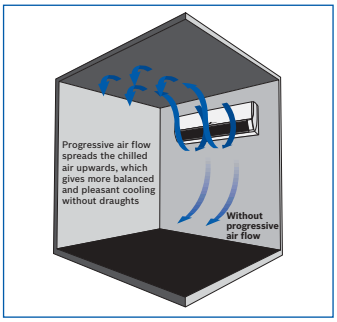
*Output data applies at 7ºC outdoors, wet bulb 20ºC indoor temperature.*

### Coanda airflow system

The Greensource indoor unit can be set to provide progressive airflow in both heating and cooling modes. When in the heating mode the airflow can be directed down the wall and across the floor, from where it rises to provide more evenly distributed heat. In cooling mode, the air can be directed upwards and across the ceiling from where it falls evenly without causing a draught.

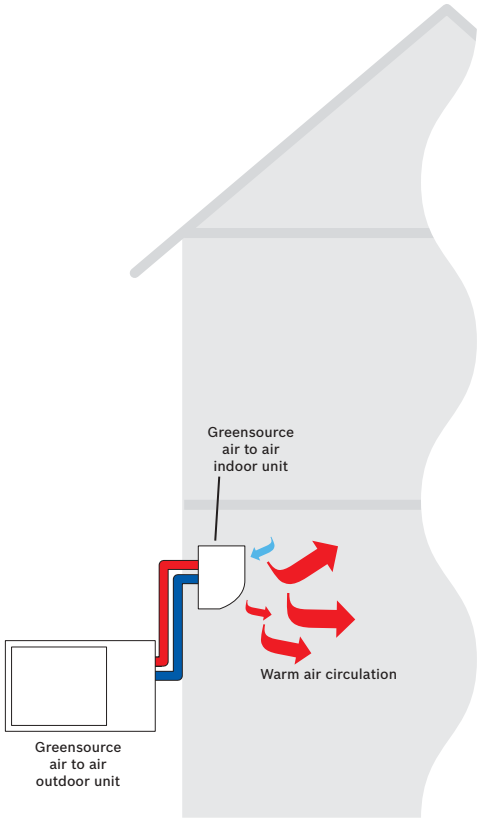



Warm air distribution in heating mode to prevent draughts




Cool air distribution in cooling mode

A typical air to air heat pump system layout




**Please note: these products can only be purchased as a package and will not operate independently**

# Useful numbers

**Consumer Helpline**
**(Pre- & Post-Sales)**
Tel: 08705 266241
Fax: 01905 752741

**Service**
Tel: 08457 256206
Fax: 01905 757536

**Literature**
Tel: 01905 752556
Email: literature@uk.bosch.com
or download instantly from our website

**Renewables Technical Helpline**
Tel: 01905 752780
Email: renewable.energy@uk.bosch.com

## www.worcester-bosch.co.uk

GAS safe REGISTER

The Council for Registered Gas Installers (N. Ireland only)

OFTEC

iphe Industrial Associate

In partnership with energy saving trust™

HHIC HEATING & HOTWATER INDUSTRY COUNCIL

benchmark The mark of quality for domestic heating


Part No. 8 716 115 755 Iss A 07/09

BBT2014

Sustainable Forests

Totally Chlorine Free

WORCESTER
Bosch Group
Worcester, Bosch Group,
Cotswold Way, Warndon,
Worcester, WR4 9SW
Tel: 01905 754624 Fax: 01905 754619