



Efficient Comfortable Homes = Economical Healthy Living



Sustainable Heating, Cooling and Energy Solutions

Our population and our use of the finite resources of planet Earth are growing exponentially, along with our technical ability to change the environment for good or ill.

Stephen Hawking



Design | Supply | Installation | Maintenance

Integrated Heating, Cooling and Ventilation systems based on Heat Pumps and other Renewable Technologies

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“Uxbridge College is an outstanding college.”
Ofsted 2008



Recommended equipment that forms part of Be Green’s Climate Control System



So who are Be Green?...

Be Green are specialist renewable technology designers, installers and maintainers. We offer an exclusive whole house approach to heating and cooling new and existing homes using the latest energy efficient materials, equipment and installation methods. We are a friendly and enthusiastic bunch with a diverse and talented team of experienced professionals throughout the business. We have come together from all aspects of the renewable and building industry and between us now have over 100 years of knowledge and particle experience in this new immersing renewables market.

We've been a fully accredited MCS installer for over five years. What this means is the company is subject to an independent annual audit by Napit, they look into the company's day to day working practice, installing quality, and ensures we meet all the criteria as set out for all new renewable installations. For your development this gives the peace of mind that our design, supply chain, installation and maintenance of all renewable heating and cooling technologies comply with today's stringent regulations.

This brochure will hopefully give you an introduction and insight to our unique heating and cooling techniques that we have developed over many years and 100's of installations. Each home is designed to provide the most energy efficient home achievable, also keeping a close eye on creating the healthiest possible living space possible (see our Healthy Homes Brochure for details on creating a in home healthy living environment).

What can we bring to your development?

- To start an experience renewable consultant will talk through your development to establish the best options available that will meet your planning requirements, expectations and of course your budget.
- If successful an appropriate scheme is agreed and an order placed, our in-house design team takes over. They will attend meetings to come up with a complete design package that works within your development.
- At the same time you will be introduced to one of our site managers that will run your development and coordinates between the consultant, design team and developer.
- After designs are agreed our installation engineers swing into action. Different teams, each experienced in their particular field, complete the various aspects of the heating and cooling system.
- When the home is complete after sales is less hassle and simpler for you and your customer, we take full responsibility the whole system, one contact one number, whatever the issue.

What we offer as part of our comprehensive package

- Ground or Air source heat pumps from various manufactures.
- Under-floor heating and cooling designed around your heating and cooling method.
- Mechanical Ventilation and Heat Recovery uniquely specified for high efficiencies and cooling.
- Background controlled comfort cooling for whole house or individual rooms.
- Solar PV and or Solar thermal panels adding to the home's efficiencies.

With ever increasing bills and homes in the UK responsible of over quarter of the country's total CO² emissions, it's essential we all what we can to reduce every homes energy consumption with increased energy efficiencies, indeed today's and future planning regulations reflects this.

To encourage us to achieve this, the Government has made a commitment with the introduction of the RHI (Renewable Heat Incentive) and FIT grants (Feed in Tariff) that will generate an income direct to the home owner over 7 to 20 years for having renewable technologies installed in their homes.

Each part of the Be-Green system requires little, if any maintenance, and is controlled via a simple thermostat in each room. The system can also be controlled remotely through an internet connection or an app

What is a Be-Green System?

Getting a Be Green System installed means the heating, hot water and cooling system has been engineered and designed to be as environmentally friendly as possible, increasingly so with the product integration.

If you think about it, installation each product as a single item is unwise if they can by design be integrated to as one by work together. All the various equipment we supply is designed to work as a whole rather than individually. This approach will help ensure further reductions to the homes running costs and with the integration of some products create a higher level of in home comfort. Integration in general adds no or very little cost to the installation as it is more often than not a design issue. A reduction in the homes energy costs will without doubt further reduce the building's overall carbon footprint.



No two buildings are the same, and the same can be said for manufacturers of renewable products; they may sound the same like a Ground or and Air source Heat Pump, but in our experience different manufacturers products do work in a fundamentally differently ways. We will only offer the best product that suits for your development, in short there is no one product or manufacturer that fits all requirements. With this in mind and with the in house experience Be Green have on the products available, we will recommend the product that best suits each development. Everything is installed to the highest standards, working with only quality manufacturers that lead the world in sustainable energy technologies. Examples of some recent award winning manufacturers we work and partner with are:

And we are partners with:



Each of these and other manufacturers we recommend are committed to carbon reduction and designing products that help reduce a buildings energy consumption as well as products that integrate with other technologies. All of which help us at Be Green to design a complete heating and cooling system that will offer the lowest possible running costs and reduction of the buildings carbon footprint.

As the public become ever more aware of the environmental issues we face and the possibilities that renewables technologies can offer to combat this, our complete heating and cooling system will undoubting add value to any property. Helping making it more saleable and marketable with benefits like, improved health of everyone living in the home, low carbon emissions and energy consumption and low energy bills, as well as the glowing and satisfying feeling you get by knowing you're doing your bit for the environment.

The standard Be Green System comprises of three separate components that individually are commonly installed throughout new homes in Europe and in some new homes being built today in the UK. All of these systems are tried and tested technologies in their own right. Over many installation Be Green have been perfecting various way of getting the best out of each of these technologies that form part of our complete system, ensuring they talk to one another so that the greatest energy efficiencies and savings can be achieved.

By working closely as partners with the leading manufactures has enabled us to secure long term guarantees on all the products we install. This in turn gives us the ability and confidence to offer our customers in conjunction with a maintenance contract, the peace of mind of a full 7 year guarantee on the whole Be Green installation.



The standard Be-Green System consists of:

- Ground /Air Source Heat Pump that provides the heating and hot water.
- Mechanical Ventilation Heat Recovery (MVHR) that ensures constant clean fresh air in the home and gives whole house and comfort cooling in summer.
- Underfloor Heating System that gives the best and most efficient form of heat distribution throughout the home.
- Bespoke Control System, controlling MVHR, heating, comfort cooling and air conditioning.

Further energy saving options

Below are some additional options that we would recommend are added to our standard Be-Green System; these options will offer additional indoor comfort which will bring enormous health benefits, plus they also help achieve our greatest energy efficiencies that help reduce still further the home's running costs and overall carbon footprint.

Be-Green recommended additional renewable options consist of:

- Ground to Air pipe that either pre-heats or cools incoming air.
- Hydrogen fuel cell that create low cost electricity and hot water
- Electrostatic air filters that micro-clean incoming air.
- Passive Air Conditioning to any room, installed with ground source heat pumps.
- Solar thermal panels that give free hot water and can add to the efficiencies of the heating system.
- Energy storage system that stores the heat gained from the Solar panels or heat pump.
- Hot Water Recovery that reclaims the heat from hot water that goes down the drain.
- Rain Water Collection to flush toilets, feed the washing machine and water the garden.
- Grey Water Collection from showers and baths - this is used to flush toilets.
- Solar PV Panel and mini Wind Turbines; these create the electricity to help run the system.
- Swimming pool heating and indoor pool air ventilation and heating.
- Humidity Control System that keeps the home at a constant 50% humidity.
- Remote Maintenance and diagnostics.

The products we offer can be purchased individually; each will help achieve the upper limit of energy efficiencies, reduce the homes running cost and reduction of its carbon footprint as well as enhance the home's living environment that can bring enormous health benefits.

The first half of this brochure describes the products that make up the Be-Green System, with the second part showing the optional extras that complete a fully integrated Be-Green house.

Changing energy efficiencies of new homes

The aim of this brochure is to introduce a variety of technologies and solutions that will provide a home with various heating, hot water and cooling solutions.

Energy efficient new buildings along with increasing insulation levels in existing homes is now the high on everyone's priority list.

Homes built before the eighties had virtually no insulation qualities, and even homes built through the nineties to early part of this century had comparatively little. Only in relatively recent years have we realised the value of a well insulated energy efficient home as energy prices rise and as we move towards the energy efficient and carbon neutral homes of the future.



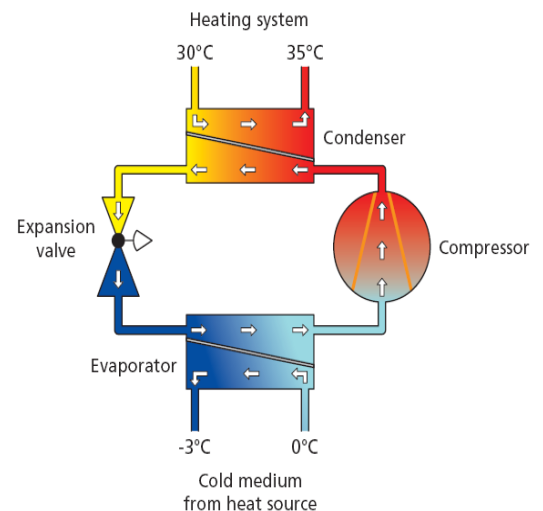
Why the integration of a Ground Source Heat pump with Mechanical Ventilation Heat Recovery and Under-floor heating are the perfect match.

A Ground Source Heat Pump will comfortably provide a home with all its heating and hot water requirements, it can achieve large savings against a conventional condensing gas/oil boiler (over 50% in the right conditions), and with the new RHI grant scheme the overall system could cost nothing to run.

But a Heat Pump is only as good as the house it's installed into; new properties should be built with the best insulation and highest air tightness possible. The tighter and more insulated the house is the better the Heat Pump and Heat Recovery System will work. So it's the house that's the most important factor when building homes with energy efficient renewable products in mind.

The heat pumps we recommend are from some of the leading heat pump manufacturers in Europe and are designed to achieve the highest energy efficiencies, or achieve the best COP (Co-efficient of performance) and SPF (Seasonal Performance Factors).

All Ground Source Heat Pumps (Air Source are different) are measured for their efficiencies or COP in the same way, for example: with the temperature of the ground fluid coming into the heat pump at 0°, and with the heat output at 35° (see diagram). Under these conditions the average COP from the ground source heat pump is roughly 4.3. This means that for every 1Kw of electricity used the heat pump gives out 4.3Kw of heat, or is 430% efficient, but be aware as with all heat pumps, the COP will fluctuate. In straightforward terms the higher the heat output and/or the lower the temperature from the ground the worse the COP will be, or the poorer the efficiencies become. This is why it is imperative we work closely with the developer and ensure the home is built with all parties understanding what is required from the building to achieve the highest efficiencies possible.



Most heat pumps work using floating condensing, this means the Heat Pump via an external sensor, only supplies the house with the right amount of heat needed to keep the home warm. In the spring and autumn for example, the heat pump may only need to supply (via the under-floor heating) the house with 30° of heat to maintain the desired internal temperature. Although radiators can be used under-floor heating is by far the best method of heat distribution as it requires far lower temperatures to heat the home. It's also more efficient because it heats the concrete floor (or the fabric/thermal mass of the building) and does not directly heat the air, as above, the lower temperatures needed to heat the home the better the COP of the Heat Pump will be.

Taking the above into account, the temperature of the fluid returning to the Heat Pump also makes a massive difference (see picture). For example, for every 1° of heat that can be added to the temperature of the fluid coming back into the heat pump from the ground collector adds approximately 2 to 3% to its efficiencies. So in the autumn (after summer) the expected temperature of the ground would be around 10 to 12°, adding roughly 15 to 20% to the overall efficiencies of the heat pump. Add this to the low flow temperatures of 30° and the COP of the heat pump could be as high as 5.0, or be 500% efficient.

So when designing a heating system with a heat pump, **the real secret to high energy efficiencies is to heat the home using the lowest temperatures possible**, whilst achieving the best conductivity with the ground!

There are a number of things that can be done in the construction of the property that will help improve the overall efficiencies of a Heat Pump. Developers need to build a well insulated tight house as a must but also if possible with a large thermal mass. The house should have no extract vents in bathrooms and kitchens except for the cooker hood, there should be no trickle vents in the windows so as little air as possible can either enter or escape; this then lends itself to the introduction of a Mechanical Ventilation Heat Recovery (MVHR) system which will complement the home and the heat pump installation.

With a MVHR installed it allows the house and the occupants to breathe with controlled fresh filtered clean air entering the living areas and bedrooms whilst removing the stale warm smelly air from the wet areas like toilets, bathrooms and kitchens. This works 24 hours a day with the air movement increasing and decreasing depending on the homes occupancy and time of day. In winter as the cold air enters the home it's pre-warmed by transferring heat through a simple heat exchanger from air being extracted, during this process the two air flows do not mix together. This raises the temperature of the incoming air by 14 to 16° when its -1 outside, installing an MVHR reduces the properties heat losses enabling the temperature of the under-floor heating to be lower and so adding to the overall efficiencies of the Heat Pump and the whole house.

Highly insulated air tight homes with MVHR installed that all add to reducing the homes heat demands/heat losses which in turn can significantly reduced the cost of installing and running of the Heat Pump, this will also help improve the SAP (Standard Assessment Procedure) calculations for the property.

To further improve the efficiencies of the MVHR we recommend a ground pipe is installed (see Ground energy Pipes page 14), this pipe is buried approximately 1.5 meters deep in the ground and supplies the air to the MVHR unit. This helps because the ground has a constant temperature all year around so when the air travels through the pipe it is either be pre-heated in winter or pre-cooled in summer. This is one of very few products that are truly renewable with zero running costs; the system will further reduce the homes heat demand and UFH flow temperature, again helping to reduce the overall efficiencies of the house.

The consequence of reducing the properties overall heat demand is lower temperatures are required to keep the home warm, so improving the heat pumps COP and SPF. This could possibly reduce the size of the Heat Pump and ground collector required, reducing the installation costs. There is a running cost associated with the MVHR, but this is easily offset against the savings made with the smaller and more efficient heat pump.

This brings us nicely onto the cooling of the house, using air entering the homes living areas via the MVHR (see MVHR page 12) and the use the coolant that's stored in the Heat Pumps ground collector after heating the house all winter (see Heat Pump page 10), the house can now quietly and effortlessly have background Comfort Cooling throughout the summer by cooling (see comfort cooling page 18) the air entering the home with virtually no running costs.

Our system heats or cools the home 24 hours a day in winter and summer and is never switched off. It is designed to adapt to the occupants live style and ever changing weather conditions to achieve the properties highest efficiencies and best possible living conditions, all adding to Be Green's whole house approach which apart from being energy efficient is to achieve the greatest possible comfort levels for the homes occupants.

In Summary, an automated, sustainable and efficient property with a heating and cooling system that never allows the home get too hot or too cold. With controlled constant supply of clean, fresh, filtered air that is heated or cooled all helping achieve a complete environmentally friendly Climate Control system. All of which helps fashion the healthiest possible living space by creating a home with a wonderful clean and fresh ambiance that can have huge health benefits (see MVHR page 12) and makes the whole home feel a relaxing and comfortable place to be in and live in.



Ground Source Heat Pump (GSHP)

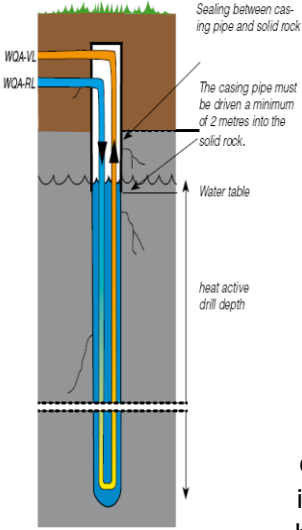


A Heat Pump generates heat through a refrigeration circuit; we all have and are comfortable with this technology in our homes today, as it's the inconspicuous fridge. The difference being a fridge is designed to create cold, and the by-product of cooling is heat, a fridge dumps or disperses its heat through a matrix of pipes at the back of the unit. So to ease any concerns you may have about this technology, a Heat Pump is just a big fridge, a little larger perhaps but it works in exactly the same way except in reverse, it's designed to create heat, and the by-product of creating heat is cold. This cold is dumped or dispersed into the ground, water or air, hence a Ground or an Air Source Heat Pump.



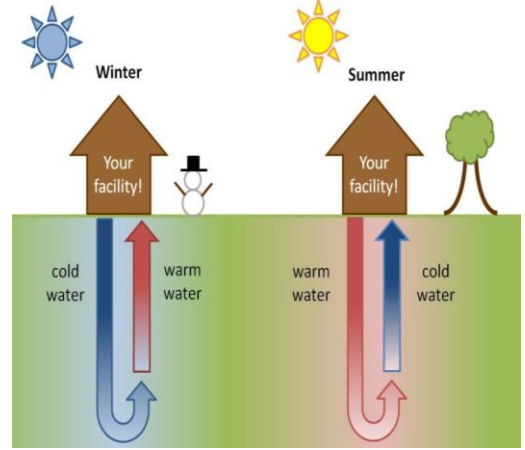
For Ground Source Heat Pumps this cold by-product is transferred into a mixture of water and antifreeze. The fluid is then moved around a series of sealed pipes buried in the ground, either through ground loops or boreholes (see pictures). As the fluid travels through these pipes, the natural warmth from the ground re-heats this fluid, the warmed fluid then returns back to the heat pump and the cycle starts over. So for 6 months of the year during the winter months, the ground around the pipes becomes chilled as the heat pump heats the house and hot water. This cool ground takes all the summer months to recover but stays cool (around 4 to 10°) all year; this is where we get the FREE cooling from when cooling the house in the summer (see Comfort Cooling), this coolant storage works best with boreholes.

Borehole for ground probe



It cannot be stressed enough how important it is to correctly size and install these ground pipes and boreholes for the Heat Pumps. Its importance is because of the different types of ground conditions we have in the UK and the various conductivity levels of each substance.

Designing the correct length of pipe or depth of borehole for each development is different and needs a complete ground survey to ensure the system is designed correctly. If the pipes are slightly over-sized it will only cost a little more to install. If they are undersized it could cost a whole lot more as the ground could freeze, resulting in a heat pump failure. This is where the cooling of a house helps with the recovery of the ground because, as the house is being cooled then the heat from the house is being put back into the ground.



With boreholes it's not just about the drilling of the hole; the way the borehole is grouted and the type of grout used is as important to ensure the maximum conductivity from the ground is achieved.

In addition using only experienced drillers, for complex installations we also call on a geologist whom oversees some complex projects, ensuring the ground pipes have been designed correctly. There are new design standards through MCS that are approved in the UK for these ground pipes and boreholes for us or anyone to design to, we also have the advice from experts plus our considerable experience installing Heat Pumps.

As well as the home and hot water the same heat pump can comfortably heat other things like swimming pools or spas at a fraction of the conventional running cost.

Finally maintenance and reliability, as heat pumps are basically use the same technology as your fridge, they rarely go wrong need little looking after and have a 20 to 25 year life expectancy.



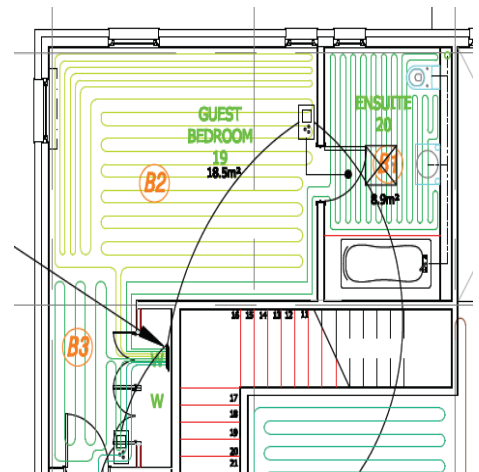
Under-floor Heating



There is nothing quite like getting up in the morning to a warm house with the added comfort and feeling of the warmth from a warm floor that's set at the perfect temperature for the outside conditions. Whether it's cold, wet or windy outside, an under-floor heating system always gives that wonderful feeling of luxury and comfort.

Under-floor heating is an invisible heat for the home, with no ugly obtrusive radiators. It is by far the best way of heating the house, especially when connected to a Heat Pump. This is because the underfloor heating requires far lower temperatures to heat the home than the usual radiators.

A heat pump is perfect partner for under-floor heating offering an extremely efficient way of getting gentle low temperature heat into the floor to maintain the optimal living temperature and conditions. Using only quality under-floor Pex pipe manufactured by Rehau, the makeup of this product enables a design that can work to increase a heat pumps efficiencies. When designed and installed correctly the UFH forms an interacial part of the very fabric of the building by being part of the concrete screed. By gently heating the floors concrete screed it creates a large thermal heat store using the floors concrete mass (or the buildings thermal mass). As the Heat Pump heats the home 24 hours a day in the winter, this thermal mass gets warm and stays warm; it then only needs low-temperatures to keep the home warm, this is one of the ways we reduce the home's running costs and increase the overall efficiency of our heating system.

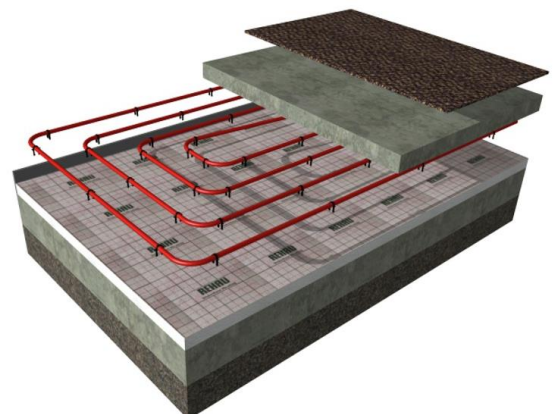


Heat Pumps are intelligent unlike many basic gas boilers, they only create enough for the homes heating needs, for example, as the weather gets colder outside to compensate for this the warmer the under-floor heating will get inside, and it does the opposite as the weather gets warmer. This helps achieve the maximum efficiencies from the heat pump by heating the house using the lowest temperatures possible. Heating the water that travels through the under-floor heating pipe, only up to the temperatures needed to heat the home can increase the efficiencies of the Heat Pump by 10%.

Using this method not only makes the heat pump more efficient but also gives added comfort to the home as the house will never get too hot or too cold.

As a ground source heat pump uses lower temperatures than a conventional gas boiler, the use of high quality insulation is an absolute must. The Insulation material Be-Green recommends is Rigid Polyurethane. Polyurethane has a far higher thermal resistance than expanded polystyrene.

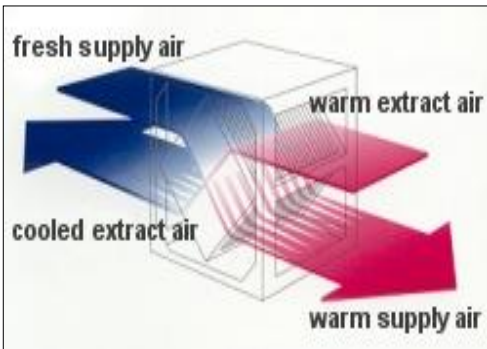
A 'Tacker' under floor heating system is best for direct contact with the screeded concrete floors (Ground & Basement) as the pipe forms part of the screed itself. Insulation thickness of 65mm would get a new building through current building regulations but, the thicker the insulation the greater the efficiencies will be.



Mechanical Ventilation and Heat Recovery (MVHR)

We all like the fresh air feeling of living in a house with all the windows open, but in winter that might get a little cold. With a Mechanical Ventilation with Heat Recovery is installed, it gives that same fresh air feeling, feeling as though all the windows were open all day but with the added bonus that the home stays warm and uses less energy.

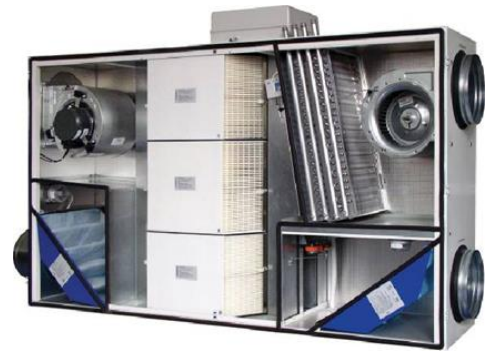
Having installed many Heat Recovery and Ventilation systems Be-Green has developed and can designed a unique system that can work at over 95% efficiency when heating and can offer comfort cooling in summer.



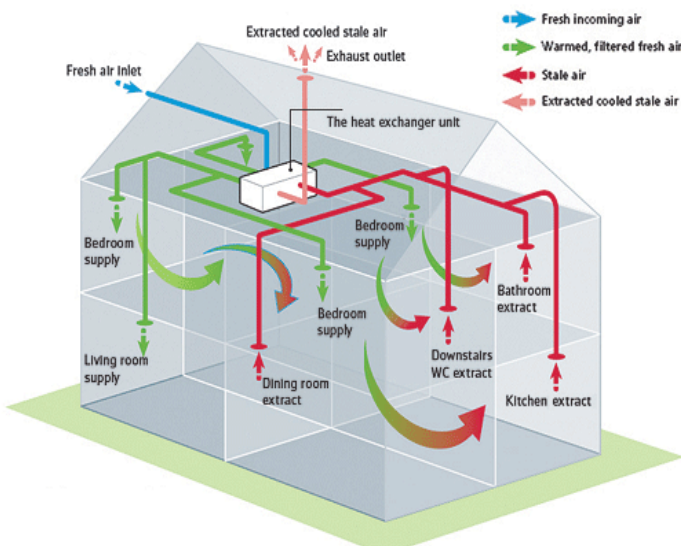
The system runs continually, sucking out stale warm air from humid smelly areas like kitchens, bathrooms and toilets, at the same time it bringing in fresh filtered air in from outside into bedrooms and living areas. The warm air that's being taken out is used to heat up the clean fresh air coming in as they pass one another (see diagram). This simple process eliminates the need for trickle vents in windows creating a tighter more efficient house. The incoming air temperature can also be significantly increase by integrating the MVHR with PV panels, the Easy roof booster (see page 24).

Be-Green's designs and specifications are usually much enhanced than building regulations stipulate. Our designs aim to achieve half an air change in the house every hour in winter with the system running at 50% capacity. This helps reduce the running cost and noise levels and gives a higher level of heat exchange, it also then enables the ventilation rate to be increased in summer for comfort cooling purposes.

Certain Ventilation filters can remove over 99.99% of pollutants and pollen and can remove over 80% of household dust and can control high humidity levels. The result is a cleaner, fresher home that gives enormous health benefits to everyone and can reduce the heating demand on the house by 10 to 15%.



The ventilation ducts that supply the fresh air to the living areas is how the house is cooled though our passive Comfort Cooling system (see Comfort cooling & Heat Pump). In the summer the cooling automatically comes on when the home temperature rises above a set level (see Be-Green controls).



When it comes on the ventilation rate is increased and the cooling coil comes on, the coolant for the cooling coil comes from the cold ground around the heat pumps boreholes, the cost of comfort cooling the whole house for 24 hours is less than 10 pence a day. As it is a passive cooling system in can also be installed into code 4 and 5 developments without with no affect to the energy rating or the performance of the house.

With the Heat pump and under floor heating controlling the heat in the house, and the ventilation system controlling the air movement and background cooling, we can ensure the home never gets too hot or too cold creating in effect an in-house climate control system.

By integrating systems we can get close to achieving the perfect in-house living environment that can have enormous health benefits for everyone in the property, some of these including the following.



- Can noticeably help improve sleep patterns
- Makes you less lethargic and gives you more energy
- Can increase concentration levels
- Reduces dehydration levels
- Helps with allergies such as hay fever
- Will help aid recovery when unwell
- Help occupant be less susceptible to illness
- Makes the home feel a clean and fresher place to live

Ducting, insulation and installation

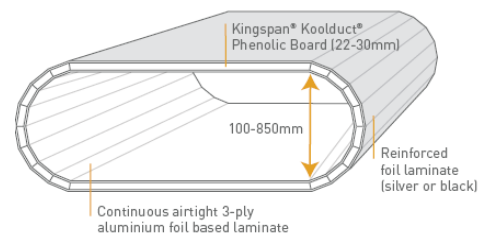
When installing ventilation ducting of any kind it's imperative that it's designed and installed correctly in ridged ductwork, certainly not flexible, this particularly applies when cooling a home through the MVHR. It must also be well insulated to avoid condensation and planned for increased air movement in summer for cooling.

A well designed and installed ducting installation reduces energy demand and adds to the overall efficiencies of the whole system. At Be Green we use the Spiralite ductwork system, fabricated using rigid phenolic insulation panels. This unique all-in-one insulation, jacketing and weatherproofing system is suitable both internal and external enabling a one step application to pipe work and ducting.

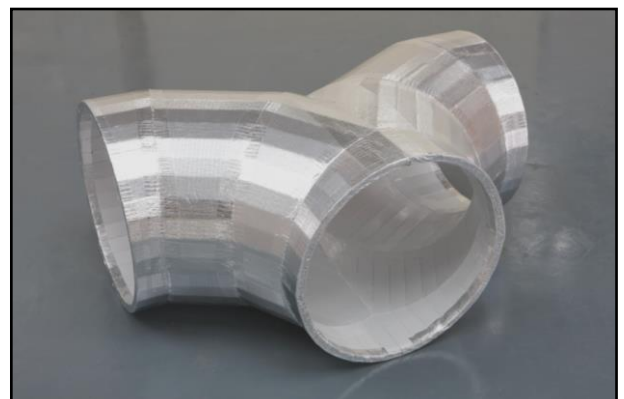
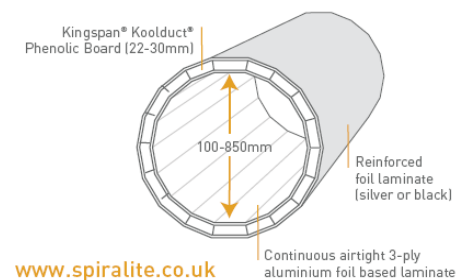
This new and innovative product will revolutionise the way insulation is manufactured, installed and weatherproofed for pipe work and ductwork installations for Consulting, Mechanical Engineering and Insulation Contracting industries. It is up to 86% lighter than traditional steel ductwork with insulation, significantly more energy efficient, fully sustainable and quicker to install. It also has significant cost benefits over traditional steel ducting, both on installation and whole-of-life, and once in operation the Spiralite[®] system produces energy savings of up to 40%.

Spiralite[®] is fabricated in the UK from phenolic panels which are cut and formed into flat oval or circular shapes. These shapes give the product exceptional rigidity, a feature which is enhanced by the continuous vapour proof laminate which seals the inside of the duct to give a strong and extremely air tight duct system. Spiralite[®] is a complete ductwork system; bends, shoes, tees and indeed any shape that can be made in metal can be made in Spiralite pre-insulated ducting all adding to the overall efficiencies of the system.

- Adding insulation values to all ducting.
- Reducing sound and noise transmission.
- Seals minor air leaks.
- Eliminates any potential condensation.
- Makes ducting less susceptible to damage
- Increases air flow.
- Reduces running costs of the Heat Recovery System.



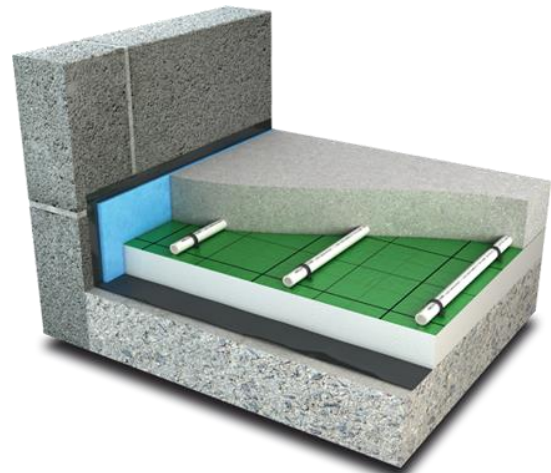
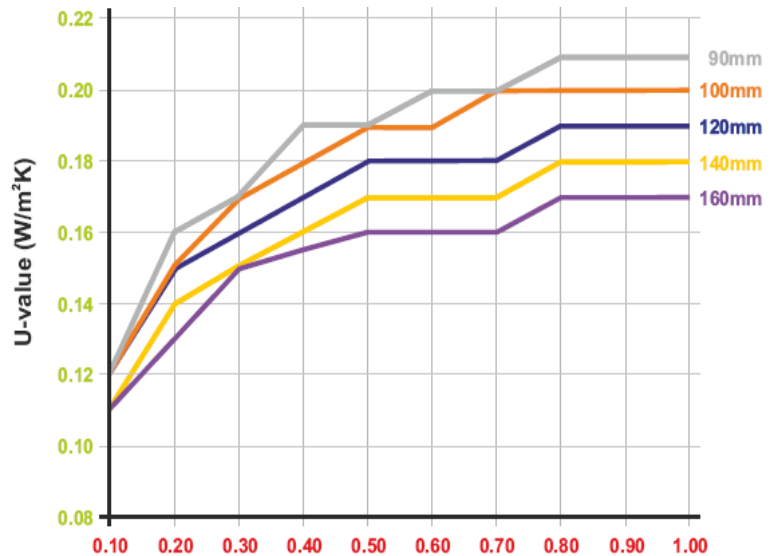
Circular Ducting



Insulation & Screed board

Insulation does matter, the more insulation installed means, the size and cost of renewable products required to heat and cool the building can be significantly reduced.

- More insulation creates a lower heat demand in the property.
- More insulation allows for lower temperatures to heat the home.
- Lower heat demand and heat temperatures means a smaller more efficient heat pump.
- Smaller Heat Pump reduces the installation and running cost of the Heat Pump.
- Smaller Heat Pump reduces cost as less ground pipes or bore holes are needed.
- Reduces the overall running cost of the house.



Insulation panels have been developed specifically for use with concrete screeded floors and for liquid flow screeds. Comprising a rigid polyurethane material it has a High Density Polyethylene Woven Film bonded to its upper surface. This protects the insulation from the screed and allows the under floor heating pipe work to be fixed to the panel using specially designed “U” shaped plastic staples.

Other options like a ‘Foiled Pre-Grooved’ under floor heating system is best proposed for the wooden joisted floors. The ‘Foiled Pre-Grooved’ Insulation comprises a rigid polyurethane material with routed grooves of a specified diameter and pattern positioned in the upper surface. The upper surface has an aluminum foil bonded to it, following into the grooves, which acts as a radiant surface improving heat transfer and reducing system start up times. The system can be laid between joists or is laid on top of an existing floor, we recommend the use of a ‘Screed replacement board’ on top of a ‘Foiled Pre Grooved’ UFH system to a standard chipboard.



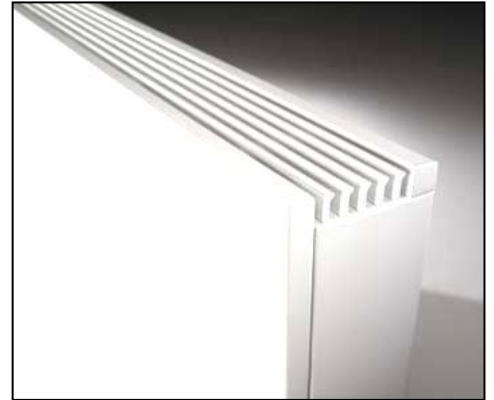
With any underfloor heating on joisted floors we would recommend the fitting of Knauf Brio dry screed boards. The same in appearance and in fitting as a Chip board has a greater thermal mass than standard chip board, This makes them incredibly efficient when used with low temperature under-floor heating systems associated with heat pumps.

Radiators

Sometimes it's not always necessary, practical or possible to fit under-floor heating, this is when radiators are required which will work fine provided they are correctly designed and use low temperature water.



For such applications we recommend a low energy radiator designed to work with low temperatures. They come in a variety of sizes and colours and are controlled from the Be-Green control system (so no ugly thermostat stuck on the side), they are also designed so that the sides do not get hot to the touch making them an all-round safer product.



Towel Rails

Towel Rails that now come in all shapes and sizes are an expected part of the comfort offered into a new properties bathrooms, but they are also a bit of a hangover from times passed.

When towel rails first appeared with the advent of central heating systems, they were inherently installed to heat the bathroom as well as dry and warm the towel. Now with advent of underfloor heating providing the primary role in heating the bathroom the towel rail has now become, to a certain extent, an item not required to heat the bathroom but with a specific task of drying and warming of the towel only.

However our perception is these towel rails need to be as hot as the radiators and towel rails of the past. As much as these high temperatures can be achieved this is not the best idea when trying to create a home that is energy efficient (see ground source heat Pumps).

When considering the whole house approach serious consideration needs to be taken as to how towel rails are heated and at what temperature these need to be. Our and your customer's expectations are always a difficult and poignant thing to manage. So in order to try and manage this as best we can, below are the options available when deciding how and at what temperature your towel rails should be.

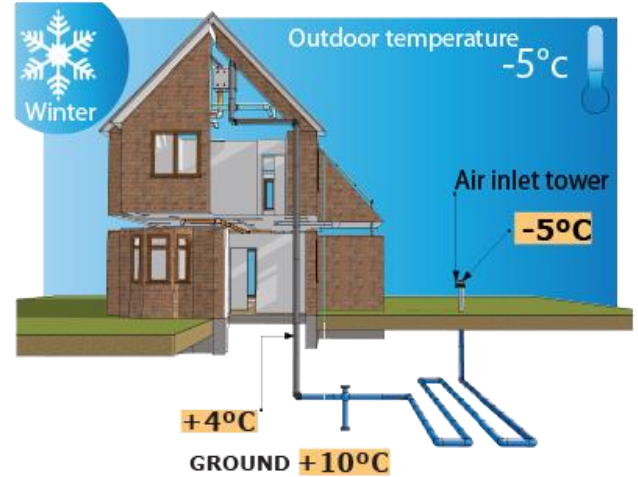
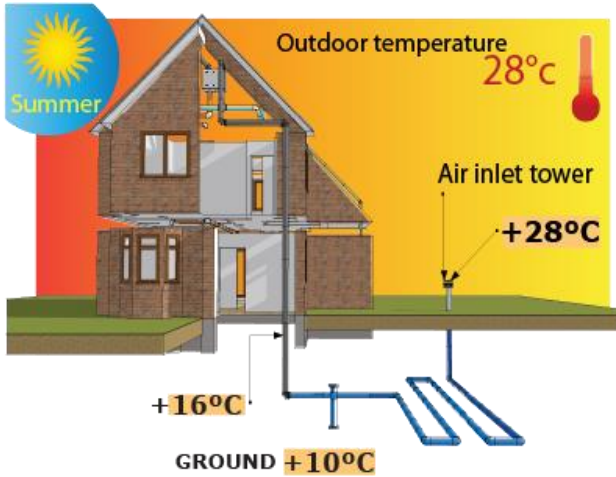
- Heat the towel rail direct from the hot water tank via a separate towel rail heating circuit, this will give the high temperatures all year around, a timed pump will be used so they only get hot at certain times of day but taking heat from the hot water tank means the Heat Pump will have to replenish the heat more frequently.
- Heat the towel rails from the heat pumps buffer tank again on a timed pump, this will provide heat to the towel rails at the same temperature as being sent to the UFH. As with the UFH that attached to a Heat Pump the colder it gets outside the warmer the towel rails will get. Main problem with this is in summer when there is no heat required then the towel rails will not get warm, unless dual towel rails are fitted.
- Fit towel rails that can use potable water and connect them to the hot water circuit supplying the hot taps and showers, this way the towel rails will only get hot/warm when the bathroom is in used, it also restricts the type of towel rail that can be installed.
- Fit electric towel rails only and have no connection to the heat pump or heating system.



Ground Energy Pipes, Heating and Cooling for FREE...



Ground temperature varies little throughout the year; this constant temperature can be used to either pre-heat or pre-cool the incoming air entering the building before it gets to the Mechanical Ventilation Heat Recovery System.



Installing this simple system will change the temperature of the air entering the house as it travels through pipes that are buried 1.5 meters deep in the ground, making the most use of the abundance of free energy available. Experience has shown that ground pipes make it possible to raise the temperature of the air by 10°C in winter and reduce it by as much as 14°C in summer.



This free energy that pre heats the incoming air in winter can reduce the homes energy demand by approximately 5 to 10% saving on the heating demand, this will add to the homes overall efficiencies, what's really good about this system is, the colder it gets outside the better it works.

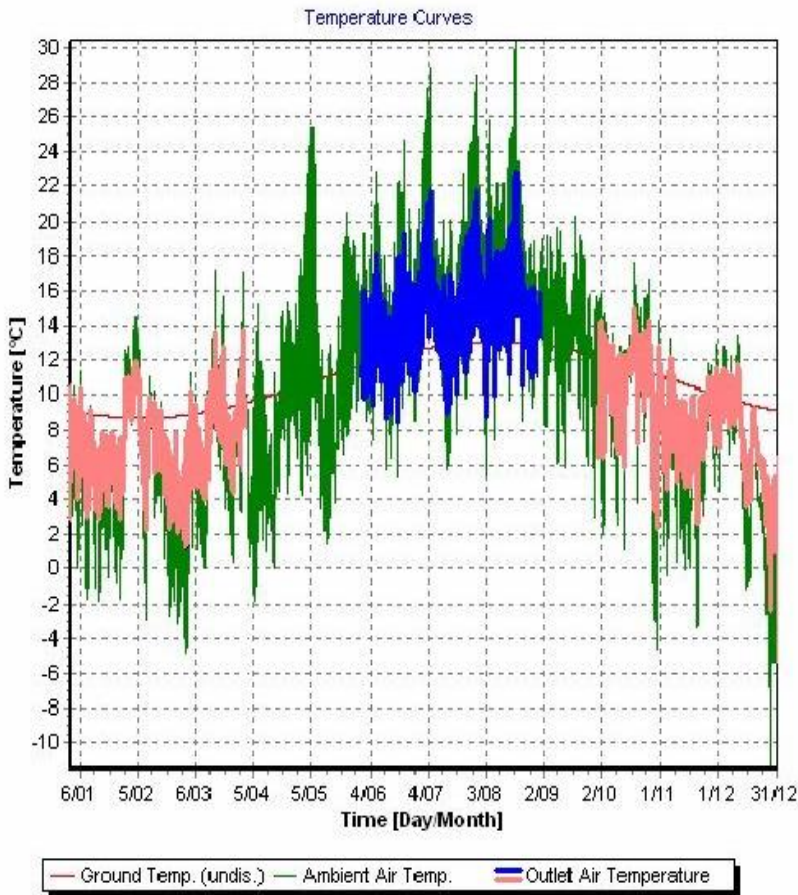
The same can be said for the summer, the hotter it gets the better it works at cooling the air, this product is truly a renewable with zero running costs.

When the incoming already cooled incoming air is coupled with our passive comfort cooling system (see comfort cooling), along with our automated method of increasing the air flow, the temperature of the incoming air will be significantly decreased, Comfort Cooling to the whole building with virtually zero running costs.



Ground to Air (Heat Exchanger) Energy Pipe

Because the pipes will generate condensation during use, the inner surface is lined with silver particles to inhibit microbial growth; Rehau are an enormous global company with an enviable reputation that they are keen to protect and extend



Performance

The effect of the Ground-to-Air Heat Exchanger on incoming air temperatures can be seen in the accompanying Temperature Curve graphs.

The curving red line is the ground temperature; 9°C in winter, rising to 13°C in summer.

Comfort Cooling

The blue area shows the amount of incoming air that is cooled in summer; on the hottest days when the outside temperature of 30°C the system delivered 16°C to the ventilation system. That's a reduction in temperature of 14° at no cost, a great start to the Comfort Cooling system. With the further Comfort Cooling from the Ground source heat pump temperature entering the house could be as low as 12°C, for virtually no costs.



Heating

In the winter months, the pink area shows the air passing through the ground heat exchanger is being warmed by the heat from the ground on its way to the ventilation system intake. The coldest day this is showing an outside temperature of -5°C but by the time air reaches the ventilation system it has been warmed to around +4°C; that's enough energy to reduce heating bills at that temperature by 10 – 15%.

Passive heating and cooling from Rehau Awadukt Thermo pipe – a truly renewable energy source.

This product was recognised by TV's Grand Designs as one of simplest and finest green energy saving products available.



Be-Green Whole house Comfort Cooling



The Be-Green Background Comfort Cooling System gently cools the whole house by cooling the air entering the property through the MVHR (see page 11). The air is cooled by passing the cold fluid that is stored in the ground through a cooling coil; the cold ground has been created by running the Ground Source Heat Pump (see Ground Source Heat Pump, Page 10). The coolant is created as a by-product for providing heating and hot water to the house over the winter and stored in the ground ready to be extracted to cool the property.

To extract the FREE coolant available in the ground, all that's required is a pump that circulates the cold fluid from the pipes in the ground to the cooling coil connected to the inlet duct of the MVHR.

Now the whole house can have a Background Climate Controlled Comfort Cooling System, so as the weather gets warmer in the summer, the air flowing around the house will increase and be cooled automatically, maintaining a comfortable background cooling temperature throughout. Comfort Cooling may struggle during the day to overcome solar gain, but at night, when it's most needed, it removes that sticky mugginess and creates the perfect conditions for everyone to enjoy a good night's sleep.



Five steps to whole house passive cooling or to individual room

- Firstly the MVHR switches to summer mode when the outside gets above a set temperature, this is a summer bypass that diverts the outgoing air so that it does not go through the heat exchanger thereby no heat recovery takes place (see page 13).
- Secondly the speed of the MVHR unit increases to remove more of the warm air and supply more of the cool outside air.
- At the same time (if fitted) the air is cooled before it gets to the MVHR as it travels through a pipe buried in the ground (see Ground Energy, page 16) around 1.5 metres deep. This cools the incoming air for free by using the relatively cool ground temperature; it can cool the incoming air by as much as 12 to 14°.
- Thirdly the incoming air is cooled further by adding a cooling coil to the air supply on the MVHR. The coolant comes from the boreholes that are connected to the ground source heat pump (see ground Source Heat Pump, page 10). (This is the perfect example of integrating renewable technologies because, while the heat pump has been heating the home all winter, the by-product cold has been cooling the ground around the boreholes). So by simply circulating the fluid in the boreholes the coolant can be extracted from the chilly ground to cool the whole property, this can reduce the incoming air temperature by a further 5 to 8°.
- Lastly should the room temperature continue to rise, the first thing that can be done is the underfloor heating can be switched to help cool the room with underfloor cooling. What's unique about our under-floor design (when designed when installed) is it can if necessary, heat one room while at the same time be cooling another; again the coolant is coming from the bore holes. Alternatively we can install electronic dampers on the inlet vents to that room, these open when the room gets above a set temperature to bring more cooled air to that room, the MVHR can also be set with a constant pressure sensor so when these dampers open the air flow can increase.

On a hot summer's day, further cooling may be required due to solar heat gain - especially on the south side of the property. There are a number of more options we can offer to further increase the property's cooling on a room by room basis, from increasing the air flow to that room to the Ground Energy Pipes and the Be-Green Environmentally Friendly Air Conditioning System.

The Be-Green Passive Climate Control System/ Air Conditioning

Along with the background Comfort Cooling Be-Green offer a complete environmentally friendly Passive whole house Climate Control system or Air Conditioning system.

No more noisy, expensive to run, high-maintenance ugly air conditioning units sitting outside your house. With our system each room can have its own fan coil and cooling unit, the same as any air conditions system, but as there is no need to run any plant to create the coolant, it cost virtually nothing to keep all rooms cool all the time. This fully automated cooling system forms part of our Climate Control system only coming on when any room gets above a set temperature, so the room will never get too hot, this is controlled by the room thermostat with the temperature set by the home owner.



The system works quietly and efficiently by keeping rooms cool and to a set temperature, never allowing them to get too hot. As rooms never have to come down from a high temperature the cooling requires far less energy than a conventional Air Conditioning system. This method of cooling also adds to the homes comfort levels as we creating an in house Climate Control system rather than a conventional Air Conditioning system.



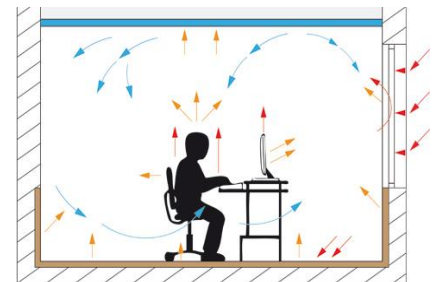
The reason the running cost are so low is the coolant for the fan coil units comes from the chilled ground store around the Heat Pumps boreholes (see Heat Pumps, page 10), this means no plant and equipment is required to generate the coolant. Because of this the system is classed as a passive cooling system as there is no energy required to create the coolant, this means it will not affect the properties SAP or energy calculations or indeed house code for sustainable homes.

On very large domestic homes with swimming pools we can go even further by controlling cooling temperatures. This is done because the pool, indoor or outdoor, needs to be heated on a daily basis. It can then be designed so that the Heat Pump only heats the pool when there is a cooling demand in the house, then as the pool is heated the coolant can be used for the Air Conditioning or our Climate Control system. Heating the pool and cooling the house at the same time with the same equipment is about as environmentally friendly as it gets.

Chilled Ceilings

A Chilled ceiling system offers the opportunity to cool homes, offices and other occupied spaces, silently, efficiently and effectively.

REHAU CoolBoard consists of a double thickness gypsum board with routed grooves to carry 10mm RAUTHERM S Pe-Xa pipe work. The panels are supplied pre-assembled with the pipe, along with an extensive range of fittings to secure the boards to the suspended ceiling hardware.



Pipe tails from the boards are connected into a manifold system to the supply of the chilled water. The chilled water comes from the GSHP boreholes (see Ground Source Heat Pump) the complete system would be installed and supplied using Rehau's high quality Pe-Xa pipework and EVERLOC™ fittings, ensuring no leaks – ever!...

Where high performance cooling is required, special high performance panels are available, with improved thermal conductivity properties. Unlike chilled beams and other ceiling systems, REHAU CoolBoard fits seamlessly with standard Gypsum ceiling panels in any suspended ceiling application. Although you may not be able to see the chilled ceiling panels from the standard panels, you will feel their effect.



Heating and Cooling Control System



This is the real secret behind the Be-Green System, the control and integration of all the different renewable technologies. Ensuring they work together when heating and cooling a property, our system will makes certain of the integration of all these technologies and don't for example, heat and cool a room at the same time.



Intelligent Control
Maximum comfort with low energy consumption

This control system enables us to offer our unique heating and cooling solution which whenever possible, makes the most use of renewable energy in different parts of the house at the same time; below are a few examples of what the complete Be-Green System can do.

Example 1/ In December, when the house requires heating, the controls will firstly try and heat the home using any free heat that's been gained from the solar thermal panels, log fires or any heat that's been stored. When all this heat has been exhausted, only then does Heat Pump kick in, keeping each room in the home at its pre-set temperature. This is completely automated with the indoor temperature controlled via a simple thermostat control in each room.



Example 2/ on a mid summer's day, the house starts to get warm; at a set temperature (set by the customer), the control system asks for cooling, the background comfort cooling gently comes on cooling the property via the MVHR, and it stays on until the rooms are back below the set temperature.

Energy savings compared against central controlled heating systems, without individual room temperature control:

- 30% (individual room control)
- 20% (PI control)
- 10% (weather compensation)
- 10% (setback temp)

= energy reduction up to

55%*

Energy savings compared against simple ON/OFF individual room controlled heating systems:

- 20% (PI control)
- 10% (weather compensation)
- 10% (setback temp)

= energy reduction up to

35%*

Example 3/ Whilst hosting a party on a chilly late September evening, the house may require heating throughout the house but at the same time the dining room may need a little cooling (this will be done via our passive air conditioning), so our system is both heating and cooling the various rooms in the home at the same time with renewable energy.

The complete Be-Green system is a fully automated climate control system that can heat parts of the house and cool others at the same time and all from the renewable energy sources.

It can also offer complete integration with any AV system that is installed into the property, as well as give full remote access to your Mobile phone, tablet or PC so the heating and cooling can be controlled in any room from anywhere.

Our Control system offers a comprehensive climate control system that costs pennies a day to run, emits zero local pollutants and considerably reduces your carbon footprint.



Home and Commercial Swimming Pools

Heat Pumps Ground or Air source, Solar panels and other renewable technologies can all heat swimming pool water effectively and efficiently, and in most cases swimming pool air for indoor pools can also be heated from the same renewable energy source that heats the home.



Heating and keeping swimming pool water with renewables for both indoor and outdoor pools to a constant 27 to 31° is comparatively straightforward thing to do but does need consideration at the design stage. The pool water should be covered when not in use, if its not covered then the energy required to keep the water warm effectively doubles, this can be done but will needs consideration at the design stage.

Heating swimming pool air however is a much more challenging thing to achieve when using renewable technologies as the temperatures necessary are much higher and immediate, something renewables are not very good at. The indoor pool air needs to be warmer than the pool water but it only when the pool is in use, at other times the room temperature can come down to a more comfortable 23 to 25° so the room does not feel too hot or stuffy, the pool room must also have high levels of ventilation to avoid condensation.

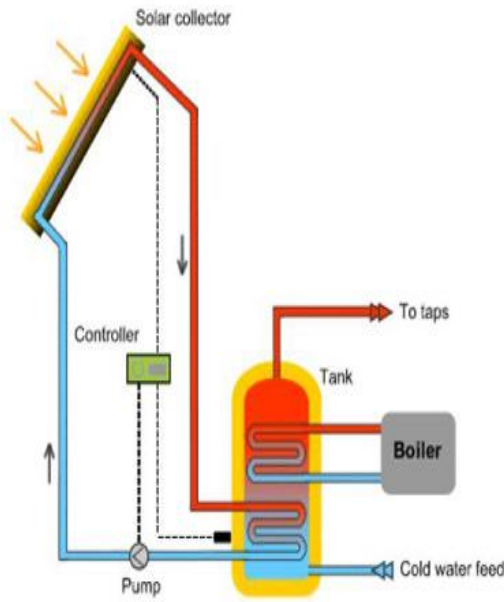
When designing for an indoor pool as part of a whole house solution there are a number of techniques than can be adopted to keep the pool room warm without the use of high temperatures, thereby achieving high efficiencies (see Heat Pumps). There are also a number of methods that can be incorporated into the system to give instant high temperature heat when required to heat the pool air when the pool is in use, this must be incorporated at the design stage give to achieve pool room heating effectively and efficiently.

When building a pool of any kind pool insulation should always be incorporated into the design of the system to keep running cost down and efficiencies high.

Heating swimming pools as part of a whole house solution is the perfect partnership if the property is having any form of cooling incorporated into it. This is because when a Ground source Heat Pump is heating the pool the byproduct of heating is coolant (see Heat Pumps, page 10). This coolant along with boreholes can be controlled and connected to an air conditioning system, in affect giving free cooling to the house (see comfort and passive cooling, page 16-17) cooling of the house very efficient indeed.



Solar Thermal Panels

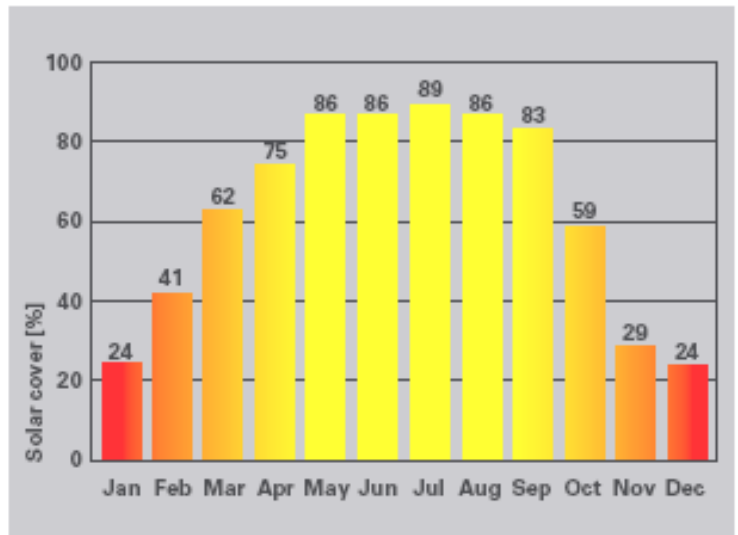


The solar panels heat the hot water then charge the Be-Green energy storage cells (see energy storage); so the whole house can then be heated from the solar panels. We estimate with the right amount of panels all the home's heating and hot water requirements can be supplied with the solar panel for over 8 months of the year, and will help with other months of the year.

The solar panels heating the house and hot water significantly further reduce the running cost and overall carbon footprint made when heating a house.

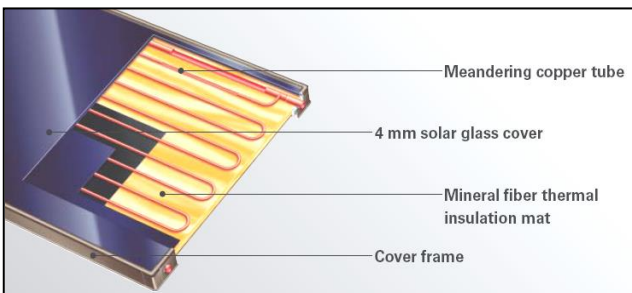
Solar Thermal panels can provide a large amount of the energy needed for heating domestic hot water as the chart below shows. To get the optimum energy out of a solar panel it is essential it is designed and sized correctly, big enough to heat the water without creating over heating in summer but, not so small it won't work at all.

At Be-Green we can design our solar thermal panels to heat more than just the hot water, our solar system can be designed to heat the house itself and anything else that requires heat when available from the solar panels; things like a swimming pool, swimming pool air or spas.

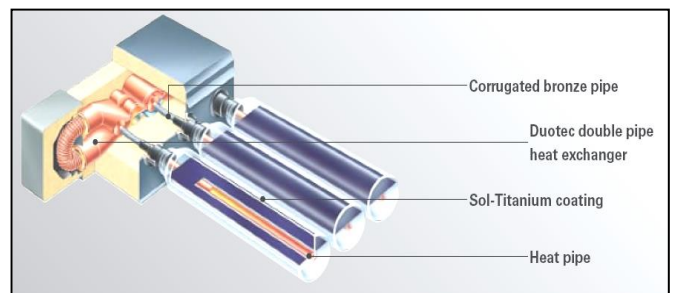


Solar cover for DHW heating in a detached home

Flat Plat Solar Panel



Evacuated tube Solar Panel



Biomass Boilers



Why use BIOMASS?

Biomass is a renewable, low carbon fuel that is already widely, and often economically available throughout the UK. Its production and use also brings additional environmental and social benefits. Correctly managed, biomass is a sustainable fuel that can deliver a significant reduction in net carbon emissions when compared with fossil fuels.



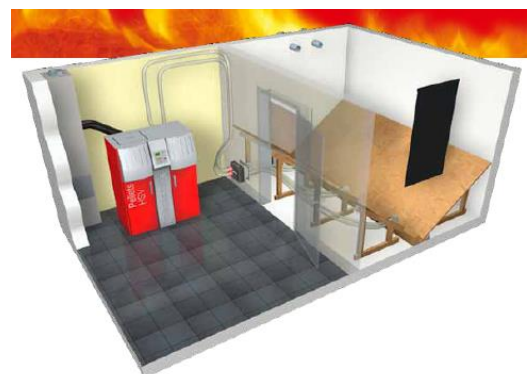
Biomass is all plant and animal matter on the Earth's surface. Biomass is anything that is alive. It is also anything that was alive a short time ago. In the context of biomass for energy this is often used to mean plant based material, but biomass can equally apply to both animal and vegetable derived material.

The carbon used to construct biomass is absorbed from the atmosphere as carbon dioxide (CO₂) by plant life, using energy from the sun. Plants may subsequently be eaten by animals and thus converted into animal biomass. However the primary absorption is performed by plants. If plant material is not eaten it is generally either broken down by micro-organisms or burned: If broken down it releases the carbon back to the atmosphere, mainly as either carbon dioxide (CO₂) or methane. If burned the carbon is returned to the atmosphere as CO₂. These processes have happened for as long as there have been plants on Earth and is part of what is known as the carbon cycle.

If it is managed on a sustainable basis, biomass is harvested as part of a constantly replenished crop. This is either during woodland or arboricultural management or coppicing or as part of a continuous programme of replanting with the new growth taking up CO₂ from the atmosphere at the same time as it is released by combustion of the previous harvest.

5 Good reasons to use biomass as a sustainable fuel:

- Biomass is a sustainable fuel that can offer a significant reduction in fuel bills as well that it qualifies for and annual payment for RHI for up to 20 years, not to mention the reductions in net carbon emissions compared with fossil fuels.
- Biomass can be sourced locally, from within the UK, on an indefinite basis, contributing to security of supply.
- UK sourced biomass can offer local business opportunities and support the rural economy.
- Established local networks of production and usage, allows financial and environmental costs of transport to be minimised. There is no region in the UK that cannot be a producer of biomass, although some have greater productivities than others.
- Woodlands, forestry and agriculture are generally perceived to be an environmentally and socially attractive amenity by the UK population, providing opportunities for recreation and leisure activities.



Be-Green Energy Storage Cells



The Be-Green energy storage cells store heat in a petroleum gel, a method so efficient that it only loses one degree of heat every 18 hours. The system has a life expectancy of over 100 years and does not require any mechanics or electrics, the cells only have flow and return pipes and can be installed and hidden anywhere in the house, garage, ceiling or floor.

By using the energy storage system we can store the heat from the solar panel and the heat pump needs only to run at night when electricity is cheap. The heat will only be released when the heat pump asks for it to heat the house or hot water.

These energy storage Tanks are a revolutionary new technology, developed in Germany, which, when coupled with solar thermal heating panels, can reduce oil or gas consumption by as much as 70%. They can be used in both domestic and commercial applications, with equal success.

The energy storage cells are certified to the highest German quality standards. They are guaranteed for 10 years, but have an expected life of over 100 years as there are no moving parts, include no corrosive materials and need no maintenance.

Hot Water Heat Recovery System

The hot water heat recovery system can recover over 50% of the waste heat from shower and sink water as it travels down the drain pipe, it will also reduce the energy consumption of heating hot water by the same amount.

This is done by replacing part of the plastic waste pipe with a copper pipe of the same size. This pipe is in effect a pipe in pipe, it transfers the heat from the waste hot shower water (the inner pipe) to the incoming domestic cold water (the outer pipe). This heat transfer happens with no moving parts or any mechanics of any kind and is virtually maintenance free; the hot water heats the incoming cold water supplying the shower, so in turn less hot water is used, a real renewable with zero running cost.

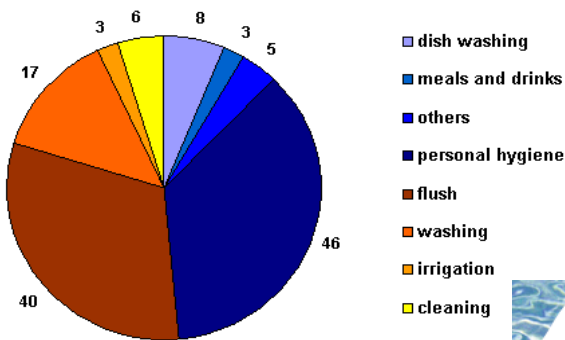
1. Cap nut for access
2. Check Valve assembly
3. Shower water in
4. Shower water out
5. Domestic water in
6. Domestic water out
7. Cap insert for cleaning

Hot water recovery also helps gain points with homes build to The Code for Sustainable Homes codes 4, 5 and 6.



Grey Water Collection

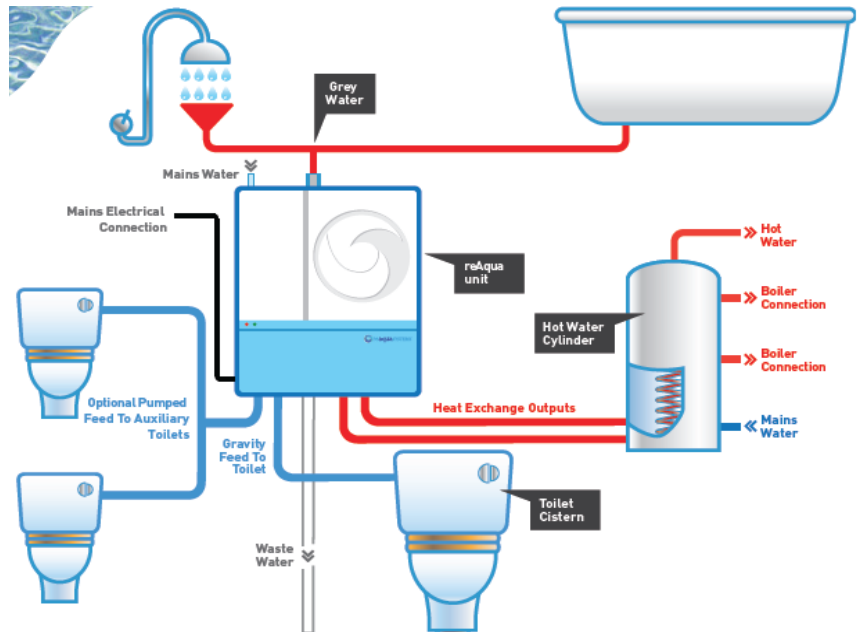
Where we use our water



The standard daily water usage per adult in the UK is 150 litres. Of that up to 70 litres is used to wash, shower and bathe; this water then goes straight to waste, that's where Grey Water can be collected in a tank and re-used to flush toilets, and water the garden. If everyone had this not only would they save water and money but there would be no need for hosepipe bans.

And you'll be saving money on three counts:

- If your water is metered, you'll have cut your usage charge by almost half, see above.
- Most water authorities make a separate charge on your water bill for discharging Grey Water into the sewers; if you aren't, you're entitled to a reduction in your water bill.
- The grey water system can also take the heat from the waste water and re-use it, saving on hot water bills.



Green Rainwater tank

Rainwater harvesting is not a new concept. Only recently have the benefits been recognised now that mains water supplied from the tap has become a much more precious (and restricted) commodity – and that flooding has become more prevalent.

The system works by taking the rain water from your roof gutters; we filter out leaves and debris from the water and store it in an underground tank.

As with Grey Water, Rainwater is then pumped into the house to be used for non-potable applications such as toilet flushing and filling washing machines and gardens; outside, use it to water the garden and wash cars, Simple.



Power Generation

Most renewable technologies need power to work, so to add some form of power generation such as Solar PV panels, a wind turbine or even a Hydrogen fuel Cell to provide the house with its own self-generated electricity that can offset any energy used, this is a requirement for zero Carbon homes. All renewable equipment that generates power will be eligible for the FIT's and will generate an income for 10 to 20 years (See FIT's page 5).



Solar PhotoVoltaic (PV) panels

Probably the most common of renewable technologies taking energy direct for the sunlight and using the power in the property as it's generated. When the Solar array generates more energy that is being used in the property it then exports this onto the Grid.

A 4kW solar array (approximately 16 panels) is great form of power generation creating approximately 3600kWh or around £500 worth of electricity each year. This is subject to where in the county there located are and the direction and orientation of the panels. Only problem with PV panels is they generate power when its least needed, in summer.

With the long awaited energy storage (Batteries) on the horizon generating the homes energy makes more sense than ever, charging during the day and using the energy at night.

As part of a Be Green holistic design, the PV Panels can also be used to pre-heat the incoming air to the house via the MVHR, so the PV panels not only create power but can also help heat the property.

- 
EASY ROOF EVOLUTION
 Integrated system for the residential sector
- 
EASY ROOF SOLUTIONS WITH VELUX®
 Integrate a roof window within in your project
- 
EASY ROOF INDUSTRIAL
 Fully integrated mounting system (garage, garden shed)
- 
EASY ROOF Boost'R
 Hot air heating
- 
EASY ROOF Therm'O Solar
 Domestic Hot Water production
- 
IRFTS UMBRA SOLAR
 Sun protection
- 
IRFTS SHADOW SOLAR home / garden
 Solar shadow

Hydrogen Fuel Cell Electrical Generation



BlueGen® the world's most efficient mini power station in your home

BlueGen is the world's most efficient small scale power generator; it converts natural gas into Hydrogen and can provide enough energy to run three average sized semidetached homes.

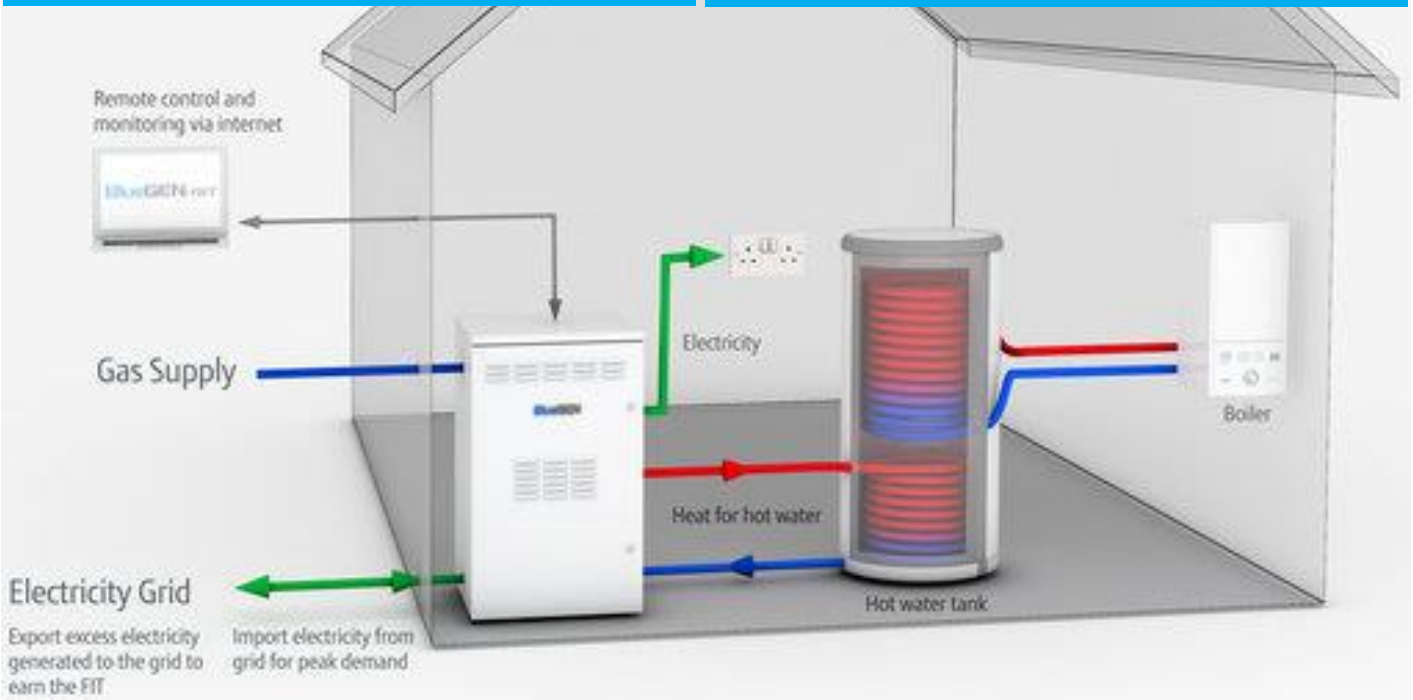
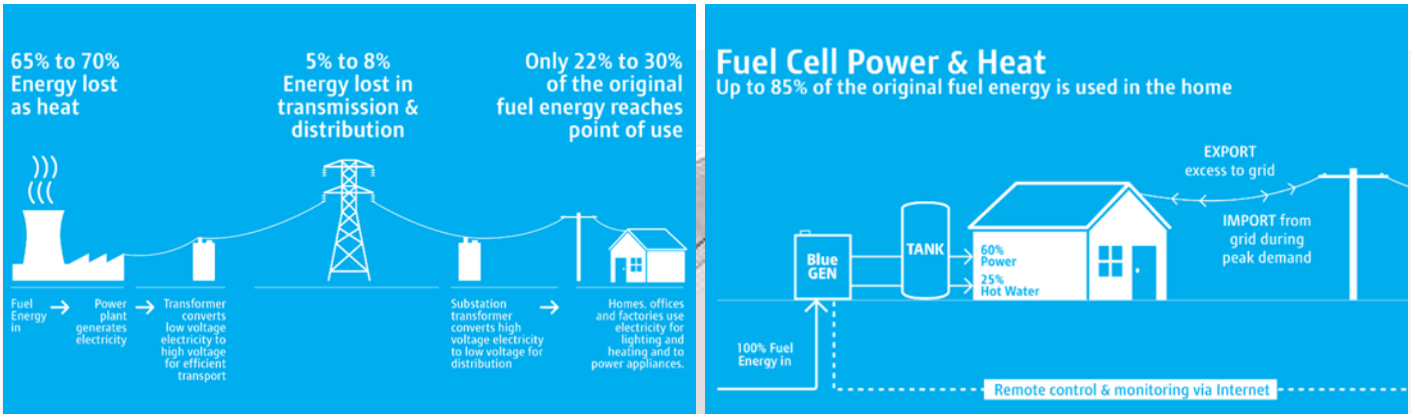
Working at over 60% efficiency it generates a constant 1.5kW which is over 13,000 kilowatt-hours (or £1,700) a year of low-emission electricity a year using the homes natural gas supply. As well as that the BlueGen will deliver a home with all its hot water requirements making the BlueGen over 85% efficient (see below pictures).

The unit is only slightly bigger than a washing machine and is virtually silent as it combines the latest solid state technologies.

If designed as part of a new build then the waste heat from BlueGen's outer casing can also be recovered and put back into the house making the unit an incredible, 95% efficient and over.



As well as saving of the cost of electricity and hot water the BlueGen qualifies for the Feed in Tariff scheme (see page 5) and will generate an annual income of over £2,000 a year for the next 10 years.



Air Source Heat Pumps



These external Air Source Heat Pumps use the ambient temperature of the outside air to run the Heat Pump, so no ground pipes or drilling is required.

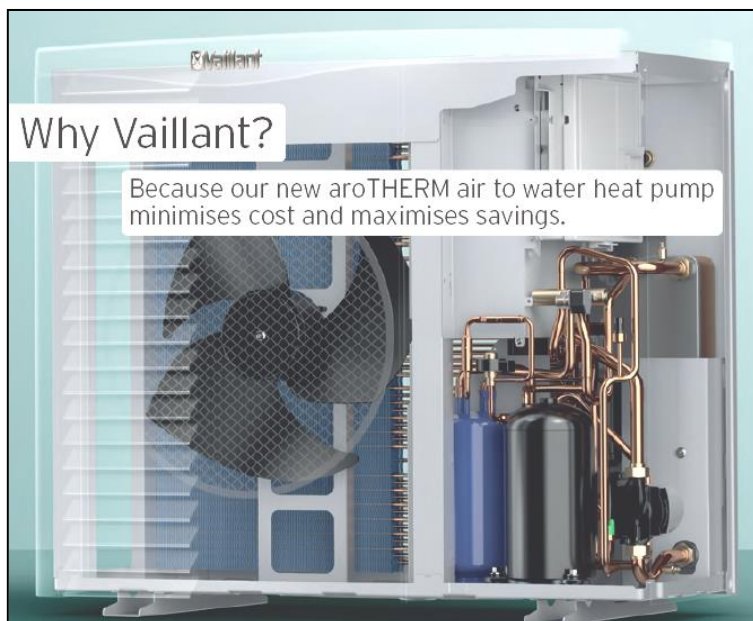
They will provide all the heating and hot water into any house and are an easy option to fit to an existing property. They need to be sized bigger than ground source heat pumps to make up for the performance reduction in colder weather. They also require a back-up heating of some sort for the coldest days of the year, we would expect this type of Heat Pump to save around 20% to 30% of the running costs (in a well insulated property)

Each heat pump installation is designed to provide 100% of a house's annual heating requirements.

External Air Heat Pumps are a very good approach to heating outdoor swimming pools that are heated in the summer and can save over 60% of the running cost against a conventional gas boiler.

For larger properties, we have Air Source Heat Pumps that can be housed inside or outside and can heat a house of any size and provide all its heating and hot water.

There are a number of other techniques we have developed to help make the Air Source heat pump more efficient by integrating other technologies already mentioned.



Use of Natural Sunlight

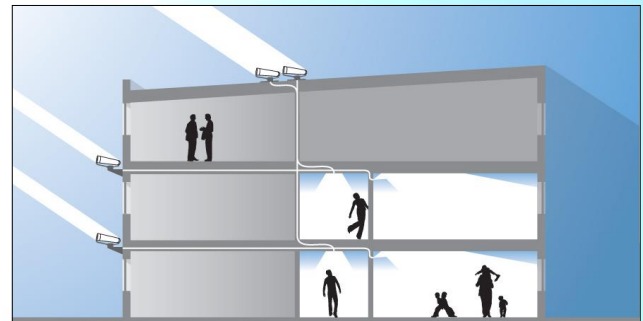
PARANS

Solar Light Receiver

The Solar receiver points directly at the sun, constantly tracking its position over the day to collect the best sunlight possible. Specially designed optical lenses capture and concentrate the optimal amount of sunlight, transferring it through a fibre optic cable for immediate transport of natural light into the building.

The system distributes the precious sunlight to indoor spaces that would otherwise be impossible to reach or are poorly lit, so it's perfect for basements and spaces with no direct natural light like hallways and walkways in large domestic properties.

The intelligent system makes the installation simple; the steps are similar to the installing of a satellite dish. On site the outside unit is fastened to the roof or wall and set to face due South, the cables are ducted to the inside luminaires. As it comes pre-programmed from the factory once powered its ready to go.



Health, Wellness and an Alert Mind and Body

Natural sunlight plays a crucial role in our home and work environment. Clinical research has proven that natural solar lighting can only improve an individual's cognitive functions as well as just making us feel so much better. Cognitive studies conducted in school environments showed the students working in classrooms exposed to natural sunlight progress 20% faster in math tests and 26% faster in reading tests, as compared to students working in rooms with poor or no access to natural sunlight.



Natural sunlight contains the full visible spectrum of light allowing us to see the world in all its colours. The flicker-free light provides the highest quality light available and gives us an experience that no artificial light possibly recreate. Over the day as the collector follows the sun it translates the beautiful dynamics of the sunlight into any part of the property.

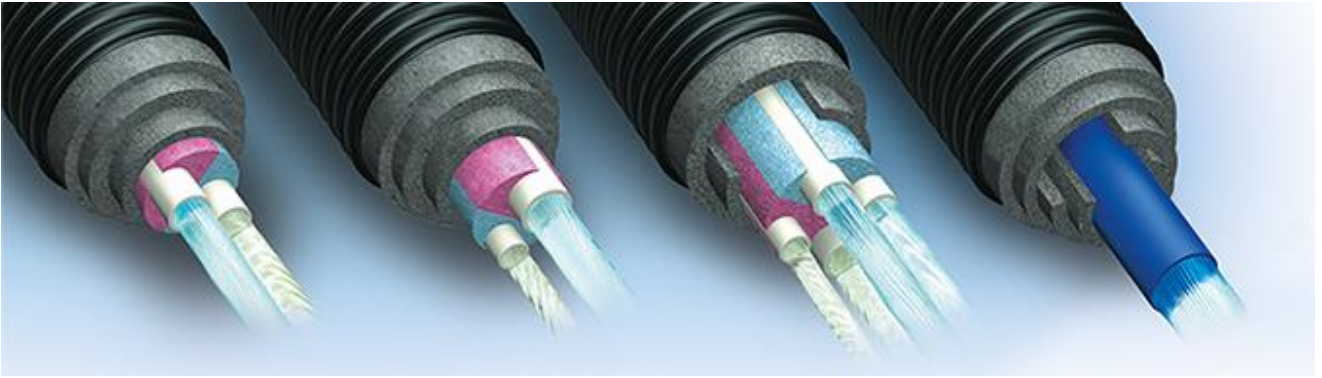
The reason why sunlight is so good

for us is that it gives the full spectrum of light which contains all colours. However natural light also contains IR and UV radiation which is not visible to the human eye. The Parans Solar Lighting system filters out all the non-visible radiation, reducing the need for cooling our indoor environments by only bringing in the best of the sun.

The fibre optic cable that transports the captured sunlight is thin, flexible and has optimized light transmission. That means that natural sunlight can reach deep inside any building and to areas where sunlight would normally be impossible to reach.



Pre-insulated Ground piping systems



Modern pre-insulated pipe for local heat distribution needs to meet the strictest requirements with regard to safety, reliability, robustness, and efficiency. Pre insulated pipe systems is for heating as well as cooling networks. These can be used for various applications, including secondary district heating networks, residential house connections. The network installation can be handled quickly and efficiently even in the most difficult conditions on site.

REHAU HEATING & PLUMBING SOLUTIONS

Be Green are REHAU partner and use their products and services, meaning we all benefit from the substantial resources and experience at their disposal. Applications knowledge, quality products and customer support are just some of them. Recognised for both quality and high performance, the REHAU EVERLOC™ Heating and Plumbing System is the ideal solution for hot and cold water, central heating and underfloor heating systems.

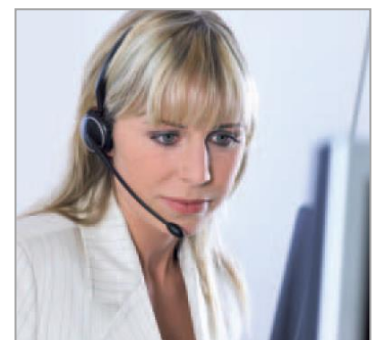


This system combines the advantages of high technology polymer materials with the benefits of an integrated range of pipe and fittings. The result is outstanding products which will perform long into the future, with major benefits for the specifier, installer and you the client. The most significant reason of use of Rehau products is the guaranteed leak free connections that their products can offer, enhancing further Be Green's policy for the use of only quality product in its whole house approach.

Maintenance and Remote diagnostics

Be-Green offer full maintenance service designed to keep systems running at full efficiency. Owners are able to choose various levels of service, which gives complete peace of mind with full parts and labor cover. The service includes an annual visit, when all critical system settings are checked and recorded and the air-handling filters are changed.

We also offer a remote maintenance service on both our heat pumps and heat recovery systems. With our control system connected into the property's computer network, we are able to remotely access the system, diagnose problems and make corrective adjustments. This usually results in a faster resolution to problems, often avoiding the need to send an engineer to site.



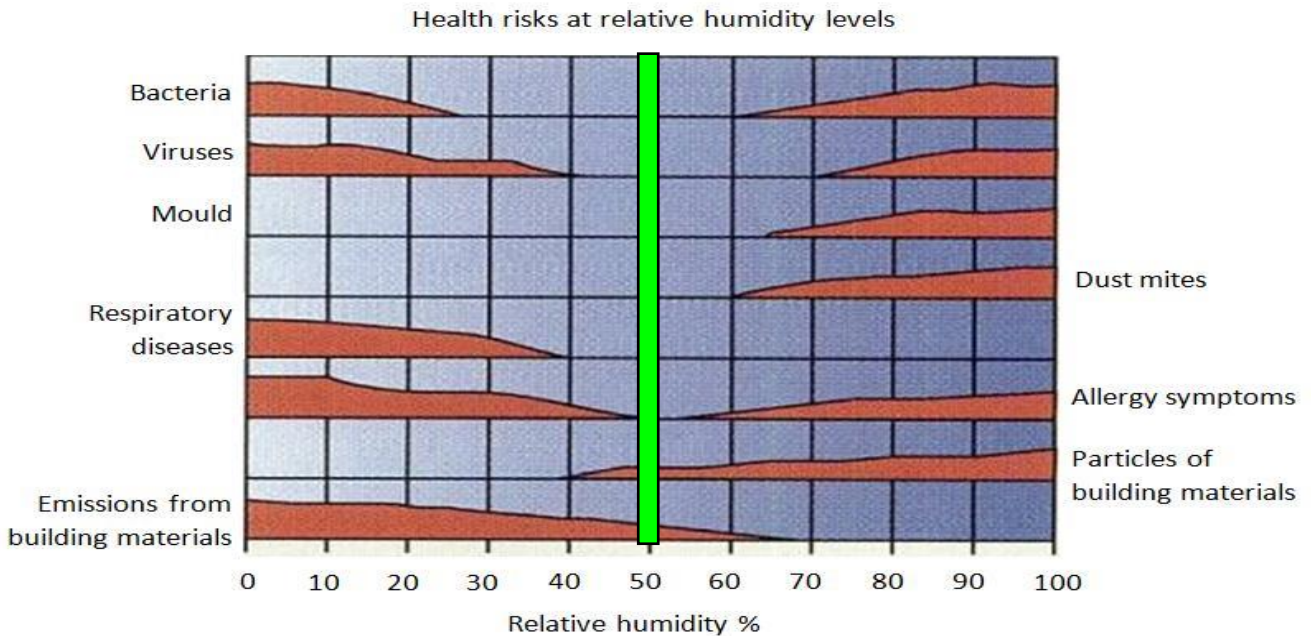
Humidity Control creating a Healthy Living Environment

The average family spends over 80% of its time in the home, but the quality of the in home environment is generally ignored. In old homes it was not important because the houses naturally let air in and out, but today's new buildings are built to a higher standard and are now more airtight than ever before, improving homes' efficiencies, but generally making the home an unhealthier place to live. Because of this, the controlling of the heat and air movement in the home has become more important than ever; also, by maintaining the correct humidity level, the health of the occupants will benefit - but this is normally completely overlooked in new domestic developments.

Living in the correct humidity is proven to improve people's health; it will make the home feel a cleaner and fresher place to live, improve sleep patterns and concentration levels, and makes the occupants less susceptible to colds and viruses. With humidity controlled to correct levels, the temperature in the property can be turned down, improving further the Heat Pump efficiencies.



High humidity is not a problem because of the air movement created by the Mechanical Ventilation Heat Recovery System; the problem is low humidity - in the winter a home's humidity can drop quite significantly to below 40%. A Heat Recovery Ventilation system will help ensure we achieve the optimum level of air movement in the home and will keep the humidity from getting too high, (over 60%). What it cannot do is ensure the humidity does not get too low; to do this moisture needs to be added the incoming air to raise the humidity level.



As well as the above, low humidity (below 40%) dries out furniture, increases dust, and dries out skin and can cause eye irritation. With dry skin, the house will feel cold, so the heating is turned up; as temperatures go up, humidity levels can drop further, starting a circle of heating versus humidity. Extra heat also reduces the efficiency of the heat pump and the cost of heating the house increases.

Be-Green have developed our unique humidity controller which adds moisture to the incoming air (when needed) by introducing steam to the inlet duct of the heat recovery system; this will control the average humidity to the perfect setting of 50% (see green part of above chart).

Benefits of Living in a Home with a Be-Green System Installed

- 1) Climate controlled heating and cooling throughout the house.
- 2) RHI payments for 7 years for installing renewable technologies.
- 3) Gentle unnoticeable increasing and decreasing of home heating - 24 hours a day.
- 4) Constant hot water - 24 hours a day.
- 5) Automatic temperature control; as the weather gets warmer, sensors turn the heating system down, and as it gets colder the heating is turned up, maintaining a constant temperature of your choice.
- 6) Environmentally friendly, emitting zero local greenhouse gases.
- 7) Emits zero pollutants as no flue is required, so the system does not need to be situated against an outside wall – it can be installed anywhere in the home.
- 8) The Heat Pump is up to two or three times more efficient than a conventional gas or oil boiler.
- 9) Can assist when applying for new planning application through the new Part L & F building regulations and the Code for Sustainable Homes, improving the efficiencies and SAP (Standard Assessment Procedure) rating.
- 10) Safer as flames are not used for heating – it does not emit poisonous gases, or use any inflammable substances.
- 11) Add Solar panel and our unique energy storage cells, and the home and hot water can be heated for free for up to 8 to 9 months a year using only solar; this would considerably add to reducing the running cost during the winter months.
- 12) The Ventilation system is oversized running in winter at approximately 50%; this reduces the power consumption and noise levels, but significantly increases the heat recovery and the ability to boost the air flow.
- 13) Air is continually circulating throughout the house, with our design this is at a much higher rate than dictated by building regulations, our design will offer half an air change every hour, stale air then becomes a thing of the past.
- 14) Outside air enters the house and is filtered to removing pollen and pollutants; it is then circulated via air ducts so the home can breathe. Bringing in fresh, clean, filtered air gives everyone enormous health benefits, especially those that suffer from hay fever or asthma.
- 15) Normally stale warm air is removed from kitchens and bathrooms by extraction fans removing and wasting the warm air that has cost so much to heat. The MVHR system extracts the heat from the air leaving and uses it to warm the fresh air entering.
- 16) On extremely cold nights, there are a number of methods where additional heat can be added to the air entering the home.
- 17) In the summer, the air movement is increased, extracting the hot smelly air and vents it outside. But in summer the air being removed does not heat the air entering as a bypass (which has automatically come on) prevents air entering from being heated by the air leaving; by removing warm air from the house, the first level of comfort cooling is obtained.
- 18) On hot, humid nights, further cooling can be added automatically by a number of methods, ground pipes or a comfort cooling coil that's connected to the heat pump boreholes giving a much more comfortable temperature for sleeping.

- 19) With the constant movement of air throughout the home, dust is significantly reduced by up to 80%
- 20) With lower levels of dust and zero condensation, dust mite cannot breed, ensuring a mite-free home.
- 21) With controlled heat and air movement Humidity can be controlled and kept at around 50% this gives the healthiest and most comfortable possible living environment.
- 22) With continual circulation of air, condensation on mirrors and windows in bathrooms in bathrooms clear up very quickly.
- 23) The air venting system has a boost which can be switched on via a button or automatically via a number of sensors such as PIR, smoke, CO², and so on, increasing the flow of air entering and leaving rooms, it's also great for those spring-clean days or party nights.
- 24) A water collection system collects and filters rainwater, which can be used to flush toilets, water the garden, clean the car, and supply the washing machine. This can save you up to 50% of the water bill on metered supplies.
- 25) Apart from an annual check on antifreeze water pressures and the refrigerant circuit, all systems are virtually maintenance free apart from annual air filter changes.
- 26) In addition to the house, the system can be sized to heat a swimming pool, pool air, or even a spa bath.
- 27) Add a cool room into the house design; like an old style larder or a gym or maybe a wine cellar and it can be cooled to a set temperature with virtually zero running costs.
- 28) Added security as windows can stay closed, even in the middle of summer, and as a consequence an added bonus is, the house will be quieter at night.
- 29) All local planning authorities have targets to reach in regard to building green sustainable housing; installing Be-Green Systems into your new development will certainly help to win over your local planning office.
- 30) A help desk with one number to support your development and the new house buyer. Owners also have the option of computer-linked remote monitoring and adjustment, which often gives a very fast resolution to any problems that, might arise.
- 31) The Government encourages sustainable developments, offering RHI (Renewable Heat Incentive) and FIT grants (Feed in Tariff) to offset the running cost of renewable green homes.
- 32) Surveys carried out by the WWF (World Wildlife Fund) and MORI have shown new house buyers are prepared to pay more for green sustainable homes, and any additional development costs can be added to the sale price of the new house.

Should any of the above be of interest, and you would like to arrange for a demonstration or just discuss a future development, please do not hesitate to contact us.

Renewable Heat Incentive (RHI) Domestic

The Renewable Heat Incentive (RHI) is a scheme that has been introduced by the government to promote the use of renewable heating technologies. The scheme will work in a similar way to the Feed-in Tariff (FiT's) (see next page) that was also introduced by the Government to promote the use of Microgeneration products.

The new RHI payments scheme was formally launched in the spring of 2014.

Most types of renewable products that are eligible with the RHI but the grant is only available if the product is MSC (Microgeneration Certification Scheme) approved and the installer is also an MSC approved installer, so beware.

Ground Source Heat Pumps (also known as geothermal heat pumps), uses a series of pipes buried or drilled into the ground to extract thermal energy stored below the earth's surface. This energy is converted to provide a property with all its hot water, heating and cooling requirements for a large or small domestic property.

Air Source Heat Pumps take energy from the temperature of the outside air and use this to provide a property with all its heating and hot water requirements.

Solar Thermal are generally installed on the south facing roof of the property and draws energy direct from the sun which is then turned into heat to provide hot water for the home.

Biomass Boilers come in various sizes and burn different biomass fuels such as logs, wood pellets and wood chippings; these will heat a home and provide all its hot water.

When does the scheme start?

The first phase started on July 1st 2011, but was only available for commercial installations. The second phase of the scheme is to support homeowners/domestic installations came into force in spring of 2014.

The benefits

The main benefit of the RHI is the owner will receive a quarterly tax free payment that rises annually in line with RPI for installing renewable technology in their property. The amount of tariff is calculated on the annual heat output given by the chosen technology. The level of payment varies depending on the type of technology used, the size of the system required, and by the insulation quality of the property, the better the insulation of the property the bigger the RHI repayments will be.

RHI payments are to be paid direct to the owner of the installation and will be made quarterly over a 7 to 20 year period, again dependant of the size and type of technology used, payments will start from the date of registration or on the date of the scheme implementation. We have found in most cases the RHI payments will pay for the supply and installation most renewable technologies with a 4 to 6 year period.

Any installations that have taken place after the 15th July 2009 are still eligible for RHI, but no payments will be awarded until after the registration of the appliance has taken place.

Below are the domestic RHI rates, these payments are for a 7 year period, tax free and rise with inflation.

	Air Source HP	Ground Source HP	Biomass	Solar Thermal
Tariff (p/kWh of renewable heat)	7.42 pence	19.1 pence	8.93 pence	19.51 pence
	£1,100.00	£3,384.00	£2,928.00	£384.00

Above examples are the annual income for 7 years for a 4 bedroom well insulated house, cost excludes any additional reductions made in house energy bills that will vary between 20 to 50% dependant on house type.

Feed In Tariffs (FIT)

The Feed in Tariffs (FIT) is a scheme that has been introduced by the government to promote the use of renewable technologies that generate power. The scheme works by paying for every Kw of power (electricity) produced, the scheme that was also introduced by the Government to promote the use of microgeneration products.

The types of products that are eligible with the FIT are:

Solar PV Panels (also known as Photovoltaic), these use the sun to create power; on average a 1Kw array will generate 800 to 900Kwh a year dependant on location in the country, orientation and angle of solar panels.

Wind Turbines use the wind to create power, wind speeds vary throughout the country along with the location and height of the wind turbine, and all these factors affect the turbines efficiencies.

Hydro power uses flowing water to create power; they are installed into rivers where there is a sufficient flow and head of water.

Combined Heat and Power (CHP) this is a gas boiler that heat properties but also produce power at the same time by using the waste heat and gases that are realised through the flue when the boiler is running.

Hydrogen Fuel Cell, this is a new technology that turns natural gas into electricity but not through combustion, the power is created as the gas travels through the fuel cells. There is also a by-product of heat, this would provide all the hot water requirements for an average 3 or 4 bedroom house.

The facts

If an average household, for example a three or four bedroom house, installed solar 3Kw of PV panels that generate electricity, the Feed-In Tariffs would provide the following benefits:

- The FIT for the electricity generated would pay the homeowner approximately £464 a year tax-free and rising in line with the annual rate of RPI and for a 20 year period.
- Remaining electricity costs would be reduced from £175 to £200, and rising as energy cost increase.
- Therefore the total benefit would be £639 per year and rising year on year for 20 years.
- Based on an average use of 4,500kWh of electricity per year and the installation of 3kW of solar PV panels.

The benefit

The Feed in Tariffs save on energy bills and help you make money from generating your own energy.

The Generation Tariff You earn a fixed income for every kilowatt hour of electricity you generate whether you use yourself in your property or export it to the grid.

The Export Tariff you earn an additional fixed income for every kilowatt hour of electricity you sell back to the grid, this figure has been calculated within the above figures.

You still buy from your electricity supplier: When you can't generate enough electricity for your needs (if the wind doesn't blow and the sun doesn't shine) you still buy electricity from your utility company at the normal rates but it'll be much less electricity than you currently buy.

Quotes to give food for thought?...

"I don't think we are going to become extinct. We're very clever and extremely resourceful - and we will find ways of preserving ourselves, of that I'm sure. But whether our lives will be as rich as they are now is another question".

David Attenborough

'We do not inherit the earth from our ancestors, we borrow it from our children'.

Native American Proverb

"You cannot escape responsibility of tomorrow, by evading it today".

Abraham Lincoln

"It is not the strongest of the species that survives, nor the most intelligent, but the one most responsive to change".

Charles Darwin

"We are in danger of destroying ourselves by our greed and stupidity. We cannot remain looking inwards at ourselves on a small and increasingly polluted and overcrowded planet".

Stephen Hawking

'What a strange creature man is that he fouls his own nest'

Richard M Nixon

'We shall require a substantial new manner of thinking if mankind is to survive'.

Albert Einstein

"If I had asked my customers what they want, they would have said a faster horse"

Henry Ford

Confucius says Man who buys on price alone for products untested, with no case studies or guarantees, will have a long time for regret. The bitterness of poor quality remains long after the sweetness of low price is forgotten.

