

STIEBEL ELTRON

How to write a brief for a renewable heating system

A guide for architects, property owners and installers by John Felgate chairman of the Domestic Heat Pump Association and Head of Technical at STIEBEL ELTRON UK Ltd





Electricity is the future. With the development of green technologies, we advocate innovative, environmentally responsible and futureproof building services – so that you can enjoy sustainable wellbeing. As a family business, we act for the future – yours and ours.

About STIEBEL ELTRON: Comfort through technology since 1924

A sense of comfort and wellbeing opens the door to life's really happy moments. But has our sense of wellbeing changed? Yes, we believe it has. Wellbeing is best brought about today with intelligent and efficient technology – and of course a commitment to sustainability. STIEBEL ELTRON turned this vision into reality sooner than others and has long been an adherent of innovative, environmentally responsible and futureproof building services. With reliable solutions for domestic hot water, heating, ventilation and cooling based on renewable energy, we are one of the leading providers on the market.

Green technologies are the future

As a company, we looked towards the future from an early stage and are committed to green technologies instead of oil and gas. Renewable energy gives us a cleaner lifestyle based on electricity. As a family business founded in 1924, we have had a clear focus right from the outset. Our vision is based on always thinking ahead in order to offer you tomorrow's solutions today.

Strong partnership for a shared goal

From the design and manufacture of appliances through to their maintenance, we systematically apply our expertise, innovative skill and experience. Closeness to our trade partners is also particularly important to us. Our service goes far beyond efficient appliances for supplying environmentally responsible hot water, heat and clean air. We also provide information, consulting and assistance, in order to ensure that people can enjoy a true sense of wellbeing in their homes – both now and in the future.



Watch video 



About the author: John Felgate

With a degree in product design and manufacturing, John spent the early part of his career in Australia and Malaysia working in design consultancy designing, for brands such as Whirlpool. Returning to the UK, he took a role with Dyson Ltd, where he became the head of the team that supported current products and later moved into project management for the research and development team. He moved to Applied Energy Ltd as the Brand Manager for the Creda heating and hot water range and later for Xpelair commercial ventilation. In 2008 he moved to STIEBEL ELTRON UK as the Head of Technical, to set up the UK operation for this large German manufacturer of heating and hot water products.

Industry positions

Chairman of the Domestic Heat Pump Association Technical Committee
Chairman of the Electric Space and Water Heating group at BEAMA

Awards

Winner of the "Contribution to Energy Efficiency Award" in the Natwest Energy Efficiency and Renewables Awards 2013

Awarded the Richard St. Clair Award from BEAMA for his role in developing the world of heat pumps, electric heating and hot water in 2022



Introduction

This book is designed to help you write a good brief for your renewable heating project. It sets out the key questions that need to be asked to ensure that the choice of design and product will meet the needs of the end user. A good written brief is always a help to protect the interests of all parties in a project because it provides a clear reference of what is expected from the project and a benchmark against which success can be measured.

It isn't necessary to know all about the various technologies on offer to write this brief. If you are an end consumer or architect you should focus on providing the key objectives and desired outcomes of your project. Your installer can help you fill in the technical gaps. This booklet will help you think through what is driving you and the resources you have on site to be taken into consideration when a proposal for the best option is made. It will also help you with evaluating responses to your brief.

If you are an installer then this document provides a useful checklist and framework to help you work with a customer and take to a manufacturer for detailed discussion of suitable technologies and specific products.

At STIEBEL ELTRON we are always happy to help if you are planning a renewable heating project. We offer a unique free specification service for all our technologies and can help with all other enquiries about integrating our products with other technologies.



Sizing your system

“A lot is at stake: a warm, cosy home, hot water and our environment. And we are happy to channel our entire energy into providing this for you.”

Dr Ulrich Stiebel

How large and powerful your heating system needs to be depends on a number of different factors. The size and age of the property is the place to start with this process (see table below). As increasing standards in building regulations over the years have led to increased heat retention, newer properties have become more energy efficient and tend to require less powerful heating systems to maintain a comfortable winter temperature. To perform this basic calculation you just need to know the floor area of the property and its age to apply the energy requirements per square metre given below.

Minimum Watts per square metre required for heating based on age of building

Built between 2006-today	45
Built between 2002-2005	48
Built between 1995-2001	64
Built between 1979-1994	135
Older than 1979	188

Note: this rule of thumb assumes ceilings of 2.4 metres. For rooms with higher ceilings divide your final figure by 2.4 and then multiply by your actual ceiling height. For fast heat up times you may wish to increase your total Watts per square metre by 15- 30%.

This quick rule of thumb calculation is enough, in many cases, to begin the briefing and quoting process. Before a detailed technical specification is completed and the final selection of technologies made, a full heat loss calculation should be performed on the building using a method that complies with BS EN 12831. This calculation will take into account more factors, such as the material from which the building is made (and how quickly heat passes through that material), the thickness of the walls, how many windows there are (and whether they are double glazed) and so on.

Heat loss calculations are carried out by some installers themselves, whilst others prefer to use specialist consultants. If you want to do it yourself, there are spreadsheets and calculators online. The MCS have an [online calculator](#) which can be accessed for free for example. You can also use our online [Navigator Tool](#) for a quick system design which will size a heat pump based on basic building fabric information.



Space requirements

“Plan which heating technologies you want early in a building project. Very often we see clients who have left this too late and find that they have not allowed enough room.”

John Felgate

If this is a new build project then it is vital to ensure that your architect and builder are briefed to consider the space requirements for renewable technologies at the beginning of the project. To this end, it is worth spending some time familiarising yourself with the impact and requirements of different heating technologies as early as possible in your project. These requirements might influence your overall design. Here are just a few facts that might be relevant as an example:

Considerations for siting renewable heating systems

- › **Pellet-fed boilers** require significant storage space for the fuel. Even the average home may need room for a large dedicated shed with access for deliveries.
- › **Installing a ground source heat pump** may mean digging up land to install a ground loop collector (and you will attain 25W per square metre and up to 35W per linear metre of borehole so you need to calculate if you have enough suitable land for your needs). You'll also need indoor plant space for the heat pump and water tanks.
- › **Air source heat pumps**, have a relatively small outdoor footprint and are easy to install; but tend to produce slightly more noise than ground source machines. Depending on the refrigerant used there may also be restrictions on how close to doors and windows they can be positioned. Both need to be considered when thinking about the positioning of the outdoor unit. Don't forget that you will also need indoor space for controllers and water tanks.
- › **For solar thermal panels** to make significant contribution to hot water production you will need at least 5 square metres of un-shaded south facing roof

Overleaf: a considered positioning of an air source heat pump





What do you need indoors for a ground heat pump? The requirements are the same as for an air source heat pump; but in the case the heat pump or pumps will themselves be sited indoors. Again, at STIEBEL ELTRON our HPeasy concept means we provide packages that make installation as compact, tidy and foolproof as possible. The picture below shows a domestic ground source heat pump with a domestic hot water tank with an integral solar indirect coil for connecting to solar systems.



What do you need indoors for an air source unit? The picture above is an example of a STIEBEL ELTRON domestic hot water cylinder and buffer cylinder, with integral hydraulic components including the heat pump manager and heating circuit connector all in one casing. This makes for a very tidy and compact indoor installation; you may need more room if separate components are connected together manually by your installer. STIEBEL ELTRON'S HPeasy concept means we provide installers with packs for installation that include all the components needed for indoor and outdoor installation pre-plumbed and pre-wired to make installation, neat and fast whilst reducing margins for error.





New build

If you are building a new property then you will be driven largely by the building standards and regulations that you are required, or choose, to meet. Planning permission for new build is by law subject to meeting [Part L building regulations for the conservation of heat and power](#).

Local planning authorities may also enforce their own additional requirements, an example being Merton in London, where the "Merton rule" requires new developments of ten homes or more to generate at least 10% of their energy needs from on-site renewable energy equipment. Some authorities also require compliance to the [Home Quality Mark](#) which is a more holistic approach to sustainability, it includes such considerations as whether you use local materials and whether there is storage or parking for bikes.

Essentially, part L of building regulations will require your home or property to meet a standard of energy efficiency laid down by the government. To achieve this standard, you need to follow a process. An accredited assessor must enter the details of your building into industry standard software, the output of which is a TER (target emissions rate - this is the target for the carbon emissions of your building) which you must hit. This may be by such measures as improving your glazing or insulation or using renewable heating systems. Because renewable heating systems use less carbon, they help you hit your score and offset less efficient features of your

design. Once you hit the target you get a SAP (standard assessment procedure) certificate, which says that your design meets Part L, allowing you to progress your planning application (provided there are no extra requirements).

For commercial buildings the process is similar but a different assessment standard is usually applied - this is the SBEM / BREAM Standard (building research energy assessment model) for commercial buildings.

Your first challenge is to find out which regulations you will be subject to. The best place to start is your local planning authority. If simply meeting the minimum standards required is your aim, then the first part of your brief is to state this - and what percentage you need from your renewable system to hit your TER.

You may however choose to meet a more stringent standard than that required by your local planning authorities, to future proof your home against rising costs or because you wish to be as green as possible. Well recognised standards for greener homes include the Code for Sustainable Homes and the Passive Haus Standard (the gold standard for green homes) If this is what you wish to achieve then read on into the next section regarding retrofit homes, where we cover these project drivers in more detail.

Drivers and objectives

“The type of project you are undertaking and your view on things like how green you need it to be are drivers you can be in control of. Planning controls and budget limits will exert pressures that you will have to accept and accommodate. Current government plans, for example, mean new homes will not have the option of a gas boiler from 2025 onwards - more sustainable options will be required.”

Mark McManus Managing Director, STIEBEL ELTRON UK LTD

Renovation projects

“Yes renewables can work even with older, less well-insulated properties. They can still be greener than burning fossil fuels and can still provide significant savings on bills when done right.”

John Felgate

It would be unrealistic to require existing properties to meet the energy efficiency standards of new buildings every time they made a change (although debate about how this might be at least partially enforced rumbles on).

Without the stick of building regulations to meet, the government uses the carrot of incentive schemes to encourage owners of older properties to decrease their carbon footprint (whilst rising fuel costs provide another incentive to cut costs). Thus return on investment both by saving on fuel bills, and an income from incentive schemes, becomes a key driver for many owners of older homes considering new technology. Many of us decide to make greener choices out of a growing sense of responsibility for our environment – and deciding which of these two motivations is primary in your project will be the key to getting the technology choice right.



Funding and return on investment



The key to gaining the best savings is to look at where your energy use is greatest and apply efficient renewable systems there. This is usually - but not always - heating (swimming pools for example can sometimes require more energy than the home they serve). We look at determining where your energy usage is greatest in more detail later on.

Funding

The government is providing grants to encourage property owners to install low carbon heating systems such as heat pumps, through the Boiler Upgrade Scheme (BUS). These grants can help property owners overcome the upfront cost of low carbon heating technologies.

The scheme is open to domestic and small non-domestic properties in England and Wales. It runs from 2022 to 2025.

What you'll get

- › £5,000 off the cost and installation of an air source heat pump
- › £5,000 off the cost and installation of a biomass boiler
- › £6,000 off the cost and installation of a ground source heat pump
- › You can get one grant per property.

You may be eligible if you:

- › live in England or Wales
- › own your property (whether this is a

home or a small non-domestic property)
 › Private landlords and second-home
 The scheme applies to domestic and small non-domestic properties with:

- › an installation capacity up to 45kWth (this covers most homes)
- › a current energy performance certificate (EPC), with no outstanding recommendations for loft or cavity wall insulation

Grants are not available for:

- › social housing
- › new build properties (apart from certain self-builds)
- › properties that have already had government funding or support

Making the most of your site for ROI

The resource and restrictions you have on site will also contribute to the opportunities available to maximise return on investment and lower the carbon footprint of the project.

For example:

- › If you have lots of land you may be able install a highly efficient ground source heat pump with a ground loop as opposed to a generally less efficient air source heat pump
- › If you can place the collector loop for your ground source heat pump in water, because you have a well, river, lake or access to the coast on site, you will have the option an even more efficient system.
- › Lots of land may also give you the opportunity to have a large solar array for electricity generation, which can pay not only in terms of saving electricity, but win you payments for surplus electricity fed back into the grid. To install solar panels on a roof top you will require an expanse of roof that is un-shaded and south facing.
- › Having a weak domestic single phase electric supply may limit your options for heat pump products – having a commercial three phase supply will widen them.

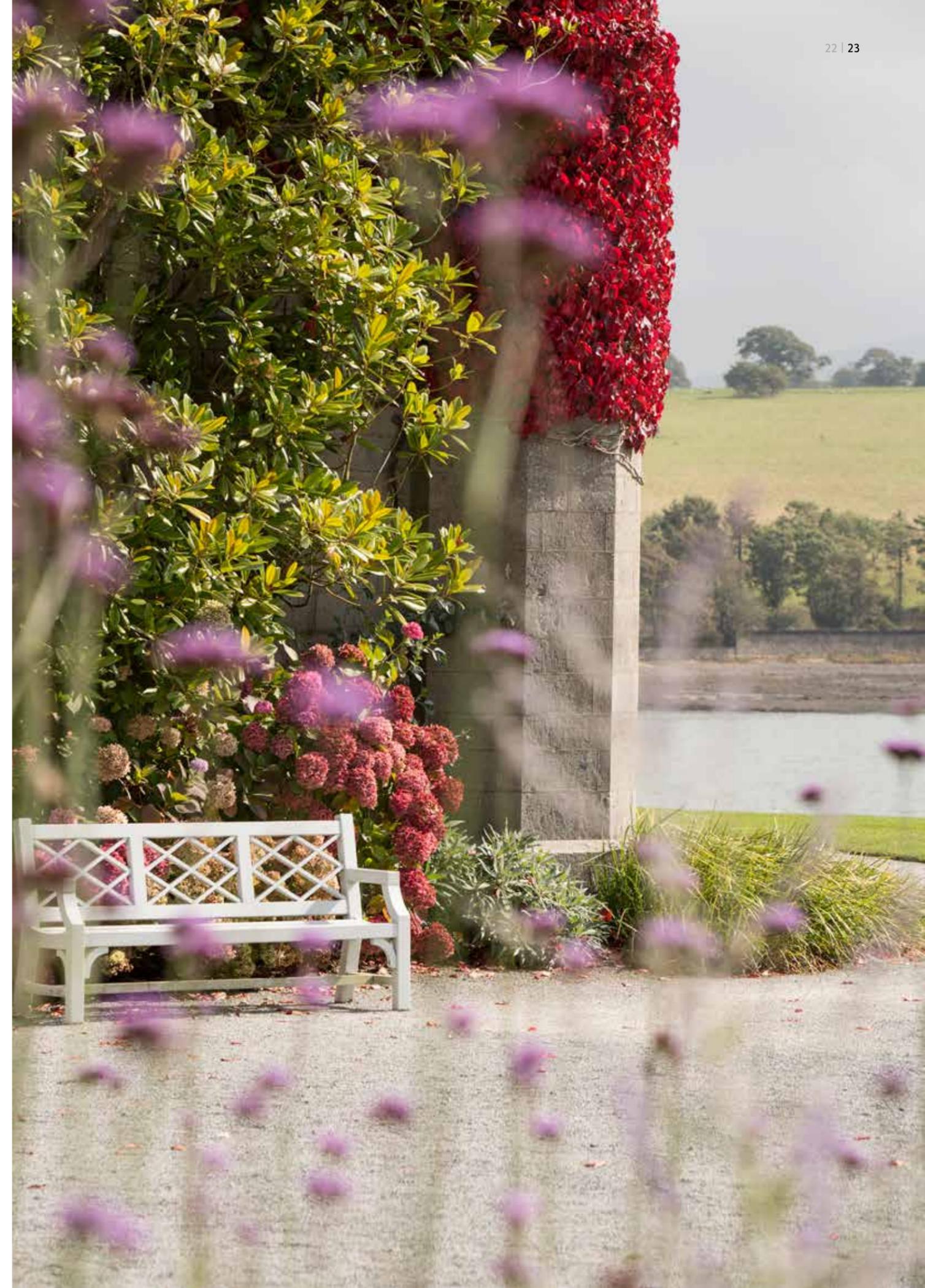
If there are planning restrictions on your property, because it is listed or in a conservation area, these are important to highlight at the early stages of a project too.

In an existing property, the technology being displaced also has a bearing, as for example heat pumps typically give a great ROI if you have a suitable property currently being heated by oil or LPG. If you have mains gas, the cost savings will be less compelling.

Modern heat pumps can be connected to solar PV (either directly or via a battery) to provide the power for your heat pump. In this way your heat pump can make the most of the free energy being harvested from your roof. For example when the sun is shining your heat pump could target a higher temperature in the DHW tank to give greater mixed volume of water (which means you could have more baths from the same tank of hot water).

Other opportunities may arise if you have a process with recoverable heat on site. An example might be a bakery with large ovens; waste heat might be recoverable to supply space heating or DHW to nearby offices. STIEBEL ELTRON have even supplied solutions to projects recovering heat from waste water pipes and silage silos (though there is a balancing act with the latter not to rob too much heat and stop the natural and desired decomposition of the grass!).

In the checklist at the end of this document you will find a full list of points to consider and detail in your brief.





Lowering your carbon footprint

“We are using fossil fuels a million times faster than they are created. By moving to sustainable forms of heat you are future-proofing your home and making a contribution to the wellbeing of the planet.”

John Felgate

Believe it or not if you really want to be green, you may not be led to the same choice of technology as you would if your sole objective is to achieve a ROI. If a ROI is your key objective you would probably never build a house to the Passive Haus standard. Although you may have a more valuable asset at the end than if you had not, it is debatable whether the increase in value of the property would make up for the extra costs involved in the build).

The key consideration here is to look at the environmental resources you have on site and where your energy use is greatest. The latter point is what we'll look at next.

Where is energy use greatest?

Properties use energy in five key ways:

- › **Domestic Hot Water**
- › **Electrical Appliances**
- › **Space Heating**
- › **Pool Heating**
- › **Process Heating** (e.g. bakeries heating large gas ovens, a chocolate factory melting chocolate).

You might already be painfully aware of the particular activity in your home or business that uses the most energy; it is, however, always worth taking stock. You may discover, for example, that your hot water requirements are a very low percentage of your total energy costs. In this case solar thermal panels will give you very little benefit in terms of savings on your bills.

We spoke above about how to estimate the right size of heater for your property. How much you use that heater depends on a number of factors including your lifestyle and the level of insulation in your property. In a retrofit situation the best way to work out where the energy use is greatest is to look at your bills from previous years. To understand how much of a domestic fuel bill is being used for hot water vs space heating you can use the following rules of thumb:

Find out how much fuel you have bought in kWh by dividing the unit cost by the volume of fuel bought (or ask your energy supplier for this figure).

For domestic hot water allow a usage of 850 kWh of this total per person in the household

per year.

For offices allow 90 kWh per year.

Obviously if you are the owner of a leisure centre with showers, a hairdressing business, or another business with more unusual hot water use patterns, then this simple rule won't work for you – you will need some consultation to establish the breakdown of your usage. If you call or email us at STIEBEL ELTRON we can help you with this.

Here's a simple example for a home with 3 inhabitants:

My oil bill is £1000 a year.

I buy oil at 6.5 pence per kWh

I have consumed 15,584 kWh (which is 1000 divided by 6.5 pence or 0.65)

There are 3 people living in the property so 2550 kWh is hot water usage (which is 3 x 850) The balance, which is 12,835 kWh is therefore for space heating

In this example it is clear that space heating uses far more energy than hot water, and this is where we should focus first on applying a renewable technology.

Your electricity bill will already be in kWh (sometimes referred to as units of electricity). Thus once you have worked out your heating and hot water usage in kWh it should be simple to compare the figures to see where energy usage is greatest.



When is the seasonal energy use greatest?

For most heating applications this is obviously going to be the colder months of the year. However, some seasonal businesses, such as caravan parks, have peaks of demand for hot water in the summer. You might also want to heat your swimming pool mostly in the summer. As heat demand is generally greatest in winter the performance of some inverter driven heat pumps, for example, is optimised for cold weather so would not be ideal for such a project. Solar thermal panels obviously supply more hot water in summer than in winter, and on/off type air source heat pumps can be more efficient in warmer conditions too. Be sure that you specify in your project when your peak usage occurs, and check with a manufacturer that specific products will work well in the prevailing conditions.

Disclaimer

(1) Introduction

This disclaimer governs the use of this ebook. By using this ebook, you accept this disclaimer in full.

(2) Credit

This disclaimer was created using an SEQ Legal template.

(3) No advice

The ebook contains information about renewable heating systems. The information is not advice, and should not be treated as such. You must not rely on the information in the ebook as an alternative to advice from an appropriately qualified professional. If you have any specific questions about any matter relating to your heating system you should consult an appropriately qualified professional.

(4) No representations or warranties

Without prejudice to the generality of the foregoing paragraph, we do not represent, warrant, undertake or guarantee:

- › that the information in the ebook is correct, accurate, complete or non-misleading;
- › that the use of the guidance in the ebook will lead to any particular outcome or result;
- › To the maximum extent permitted by applicable law and subject to section 6 below, we exclude all representations, warranties, undertakings and guarantees relating to the ebook.

(5) Limitations and exclusions of liability

The limitations and exclusions of liability set out in this section and elsewhere in this disclaimer: are subject to section 6 below; and govern all liabilities arising under the disclaimer or in relation to the ebook, including liabilities arising in contract, in tort (including negligence) and for breach of statutory duty. We will not be liable to you in

respect of any losses arising out of any event or events beyond our reasonable control.

We will not be liable to you in respect of any business losses, including without limitation loss of or damage to profits, income, revenue, use, production, anticipated savings, business, contracts, commercial opportunities or goodwill. We will not be liable to you in respect of any loss or corruption of any data, database or software. We will not be liable to you in respect of any special, indirect or consequential loss or damage.

(6) Exceptions

Nothing in this disclaimer shall: limit or exclude our liability for death or personal injury resulting from negligence; limit or exclude our liability for fraud or fraudulent misrepresentation; limit any of our liabilities in any way that is not permitted under applicable law; or exclude any of our liabilities that may not be excluded under applicable law.

(7) Severability

If a section of this disclaimer is determined by any court or other competent authority to be unlawful and/or unenforceable, the other sections of this disclaimer continue in effect. If any unlawful and/or unenforceable section would be lawful or enforceable if part of it were deleted, that part will be deemed to be deleted, and the rest of the section will continue in effect.

(8) Law and jurisdiction

This disclaimer will be governed by and construed in accordance with English law, and any disputes relating to this disclaimer will be subject to the exclusive jurisdiction of the courts of England and Wales.

(9) Our details

In this disclaimer, „we“ means (and „us“ and „our“ refer to) Stiebel Eltron UK Ltd, a company registered under registration number 06428547



Controls

One final consideration is whether you want or need more advanced controls for your system.

STIEBEL ELTRON, have a range of heat pumps with an internet service gateway that allows remote tracking of performance, system control, and can automatically contact your service engineer if it detects a fault, all via an app

Zone controls are another consideration – do you need to heat parts of a property at different times or to different temperatures? Such solutions as STIEBEL ELTRON's EAYTRON system offer zone control with underfloor systems and radiators - providing the best of both worlds in terms of efficiency and flexible zone control.

If your project is for a group of buildings or multi-occupancy buildings - perhaps a set of farm cottages or a social housing project - district heating systems allow individual billing

Template for a renewable heating/hot water system brief

Outline of project

Project is:

e.g. domestic/commercial, new build/retrofit etc.

Project is for

e.g. heating system/pool heating/hot water supply/electricity generation etc.

System being replaced is:

e.g. gas boiler

Budget

(you may choose to share this or not with your potential contractors in the first instance, but you should have an idea of this for your own purposes at this point)

Project Objectives

Standards

Part L/Part O
Passiv Haus
Other:

TER is...

We require.....points from a heating/electrical system or% of building requirements to be supplied by renewable energy

Payback time required?

Costs/savings targets

MCS approval required?



Site resources and restrictions

- › Single phase electrical supply: yes/no
- › Three phase electrical supply: yes/no
- › South facing roof space (unshaded): yes/no and size if applicable
- › Land and plant room available: (detail how much) e.g. 3 acre field, large garden with outhouses, basement in house etc
- › Water resources: yes/no – if yes what type: well, river, stream, pond, sea. Do you already have permission from the environment agency to extract water?
- › Planning restrictions: listed building/conservation area etc.
- › Recoverable process heat: yes/no (if yes, provide detail)
- › When is energy use greatest? (e.g. daytime/night time or summer/winter etc.)
- › What emitters are currently in use? Do any of these units need to be kept?
- › What is the current energy use pattern/heating pattern? Does the client understand and accept any need to change this?
- › Is there a target recovery time for hot water tanks or response time for heating to reach target temperatures from setback

Case studies

Applications of intelligent green building services

Our efficient, electrically powered products are suitable for:

- › Family houses and apartment buildings
- › Residential complexes
- › Multi storey apartment buildings

They ensure hot water, heat, fresh air and pleasant coolness in summer. Since our solutions are based on renewables, the heating energy is generated carbon neutrally.

Family home replaces oil boiler to improve comfort

Before installing their heat pumps this 557 square metre home in Sotby, had very high oil bills and was difficult to keep sufficiently warm and comfortable. The owners, Mr and Mrs Swaby, are delighted with their new system. They can now leave internal doors open without cold drafts and have found themselves turning radiators down.



Family home Lincolnshire replaces oil with heat pump

Saving and estimated £400 a year on bills. Client Nigel and Gina said, "clean, green energy is what motivated us to purchase a heat pump. The low sound levels and evident quality is what led us to choose the STIEBEL ELTRON WPL 25. We are extremely impressed with the quality of the equipment and the service offered.... The quality of the heat pump has exceeded our expectations"



Plas Newydd historic house in the town of Llangollen,

The UK's first Marine Source Heat Pump at Plas Newydd House in Anglesey for the National Trust in 2014. Still in operation, the system has saved huge amounts of carbon and reduced bills significantly.

Our company has stood for new, innovative thinking from the day it was founded. With our advanced solutions, we improve people's living comfort and ensure security of investment while also promoting the energy transition. This is our commitment. Because the future has only just begun. And STIEBEL ELTRON is part of it.

Our product range in the UK comprises heat pumps, electric heating and hot water products and ventilation.





We invest in training and supporting our installer partners. We know that you want our quality products to be matched by the quality of the installation on your project. We work very hard to provide our trade partners with all the information and training that they need. Our new training centre and showroom represents an investment of over £350,000.



STIEBEL ELTRON UK has been operating as a wholly owned subsidiary of the parent company since 2008. Based in Bromborough on the Wirral, it has grown year on year to become one of the leading building services manufacturers in the country.



Discover more

Find out more online

stiebel-eltron.co.uk

Send us an email

info@stiebel-eltron.co.uk

Call us

0151 346 2300

