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Procurement Framework for suppliers of energy efficiency services and low carbon technologies

Access Foundation

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Step 1: Awareness/Understanding

What is energy efficiency?

Energy efficiency is one of the easiest and most cost-effective ways to tackle the climate emergency. It refers to the use of less energy to perform the same task or produce the same result. By reducing the energy use, we reduce the amount of fossil fuels burned to generate energy.

What is low-carbon energy generation?

To reach net zero we'll need to phase out oil and gas energy systems to reduce our dependency on fossil fuels, replacing them with renewable, low carbon technologies. Low-carbon technologies are systems that help to reduce carbon dioxide emissions from energy generation.

Why do non-domestic buildings need energy efficiency improvements and low-carbon technologies?

In an effort to reduce carbon emissions and contribute to the fight against climate change, we need to find sustainable, low-carbon ways to provide energy to our commercial buildings and improve their energy performance.

Energy efficiency upgrades such as installing roof or wall insulation or low-carbon technologies like heat pumps or solar PVs can help your organisation reduce energy usage and, therefore, carbon emissions. They can also help reduce energy bills, and attract new customers by demonstrating your innovative and responsible approach, ultimately helping your organisation maintain a competitive advantage locally and globally.

How can you benefit from energy efficiency improvements and low-carbon technologies in your building?

By making energy efficiency improvements and installing low-carbon technologies, you can:

- Have a more comfortable work environment.
- Reduce your utility bills.
- Increase profitability.
- Reduce exposure to future energy price rises.
- Reduce your organisation's carbon footprint.
- Maintain or improve property value (if you are the building owner).

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Step 2: Discover/Research

How can you start retrofitting?

Understand your energy usage

You can start by reviewing your energy bills and meter readings to understand your building's overall energy performance and identify any spikes in energy use. This can be compared with previous years to build a picture of seasonal energy use and annual energy costs.

You can also:

- Ask your energy supplier to have a smart meter or an advanced meter installed. Large businesses will have meters that measure the consumption every half hour and, in many cases, charge differently for use at different times or at different levels. Many small businesses do not have this as standard and will need to ask for a smart meter or an advanced meter to benefit from the insight that half-hourly readings can give.
- Smart meters measure how much gas and electricity you're using and can send those readings via a remote connection to your energy supplier. They come with a display screen to help you visualise your energy usage and support you to reduce your energy consumption.
    - What are the benefits of smart meters?
        - Smart meters mean an end to inaccurate bills. As your energy supplier will have an accurate reading of your energy use, you will only ever have to pay for your precise usage rather than working with estimates.
        - They also support you with reducing your energy consumption. When you can see and understand how you're using energy, it helps you manage that. That means lower bills for you and a lower carbon footprint too.

- Consider having sub-meters installed. Sub-meters are separately installed meters that measure the individual consumption of a specific part of your building or an energy load i.e. lighting, lifts, plugs etc.
    - What are the benefits of sub-meters?
        - Sub-meters give a more detailed picture of your energy consumption, allowing you to better understand where energy efficiency opportunities exist.
        - They also support you in reducing your energy consumption, carbon emissions and energy costs.
        - They can separate out your energy consumption from any other organisations if you are sharing a single supply for a building or estate.

Review your energy contract

Before signing an energy contract, contact your energy supplier to understand what tariffs they provide and compare what they offer with other providers. Consider using a specialist energy broker to negotiate a better long-term rate.

It is important to note that energy suppliers must only work with third party intermediaries, such as energy brokers, who are registered with a qualifying alternative dispute resolution (ADR) scheme. According to the independent regulator, Ofgem, there are currently two providers of an ADR scheme for microbusiness – the Ombudsman Services and the Utilities Intermediaries Association.

While businesses pay the standard VAT rate (20%) on their energy there are exceptions. For instance, charities pay 5% VAT on fuel and power if they are for residential accommodation, charitable non-business activities, and small-scale use (up to 1,000 kilowatt hours of electricity a month or a delivery of 2,300 litres of gas oil). Additionally, if less than 60% of the fuel and power is for something that qualifies, 5% VAT applies to the qualifying part and the standard rate on the rest.

Assess building performance

In England and Wales, privately rented non-domestic buildings must legally have an Energy Performance Certificate (EPC) rating of 'E' when:

- they are being sold;
- they are being let to new tenants;
- an existing tenancy is renewed;
- the heating, cooling or ventilation systems are retrofitted.

EPCs can help you understand the energy performance of your building, as well as identify areas for improvement. EPCs provide a rating from 'A' to 'G', with level A being the most efficient. Ratings are calculated based on construction materials, heating systems, insulation, and other factors. EPCs can only be done by certified commercial assessors and are valid for 10 years once issued. It costs around £150 to get an EPC for small buildings, with greater costs for larger and/ or complex buildings.

Understand the practical limitations

- Building owner Vs renter. If you are a renter, it is likely that you are unable to carry out larger energy efficiency improvements and low-carbon technology installations, without the full support and engagement of your landlord. However, many energy upgrades will increase the value of a property, so don't be afraid to ask you landlord if they're interested.
- Listed and historical buildings. Retrofitting or installing low carbon technologies on listed buildings or buildings in conservation areas can be challenging and costly due to the specific skills and materials required, as well as additional permissions required, and sometimes will not be permitted at all. It is important to ensure that listed buildings are treated appropriately with the right retrofit measures or technologies selected based on the construction and use of the building, to ensure that the most cost and energy efficient approaches are implemented.

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Some useful definitions

- Kilowatts (kW) are a unit of power. Power is the rate at which energy is generated or used.
    - Some technologies i.e. PV arrays are usually described in terms of their peak output in kilowatts or kWp. This is the amount of electricity they will produce continuously in optimum conditions.
- Kilowatt Hours (kWh) are a unit of energy. Energy is a measure of how much power is used by something over a period of time.
    - Energy consumption expressed in terms of kWh doesn't often mean much unless you also know the length of the period that the kWh were measured over.

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Solar PVs

How do solar panels work? Solar electricity panels, also known as photovoltaics (PV), capture the sun's energy and convert it into electricity that you can use in your building.

By installing solar panels, you can generate your own renewable electricity.

How do solar panels work?

A solar PV panel consists of many cells made from layers of semi-conducting material, most commonly silicon. When light shines on this material, a flow of electricity is created.
The cells don't need direct sunlight to work and can even work on cloudy days. However, the stronger the sunshine, the more electricity generated.
Solar PV systems are made up of several panels, with each panel typically generating around 400W of power in strong sunlight in the form of direct current (DC) electricity. Because the electricity used for appliances is alternating current (AC), an inverter is installed along with the system to convert DC electricity to AC. This electricity can be used throughout the building or exported to the grid.

A small 3.5kWp solar PV system, such as you might see on the roof of a house, will take up around 20m2 of roof space, which is the same as about two car parking spaces. It would typically be made up from around 15 panels and would generate around 2,500kWh per year, depending on location and system design.

Are solar panels right for your building?

Solar panels can be designed to fit the space you have, accommodating chimneys and unusual roof shapes. A south-facing pitched roof is ideal for generating the most electricity from the sun, but panels facing east or west can also work well. Panels can also be mounted on frames on a flat roof, but north-facing pitched roofs aren't recommended. Consider whether your roof is shaded by any nearby buildings, trees or chimneys, as this will reduce the performance of your system. Limiting the impact of shading will be a key concern for your installer. Sometimes shading is unavoidable and, in this case, your installer may suggest a number of solutions to maximise output from your given space.

PV cells are most effective in bright sunlight but they can still produce some power in the UK on cloudy days. A PV system may be sized to produce as much electricity over the years as is used on site, but often the size is determined by the roof space available, the maximum you are allowed to export to the local network, and the budget available. New-build sites are ideal for PV installations because the cost of fitting them during construction is less than the cost of fitting them at a later stage. However, retrofitting panels to existing buildings can also be a cost-effective option. The building must first be surveyed to ensure that it is able to take the additional weight, and there will often be additional costs such as scaffolding which may not be required in a newbuild project.

Do I need permission to install solar PV?

Planning permission is not usually required for small-scale PV installations (less than 50 kWp). However, there are exceptions (for example, on listed buildings, buildings in conservation areas or national parks). Larger systems up to one megawatt may also be considered permitted development but additional criteria apply. You should always contact your local planning authority for advice before proceeding.

When you connect a PV system to the electrical circuit in a building you are effectively connecting it to the wider electricity network. The local Distribution Network Operator (DNO) will need to be informed of the installation and, in many cases, will need to decide whether the installation can go ahead without any upgrades to the network infrastructure. Domestic scale installations can usually proceed without asking for consent but the DNO should be informed once the system is up and running. If the installation is larger then you will need consent from the DNO before you go ahead. The size at which you need consent will depend on the nature of the existing supply (single phase or three phase) and the details of the solar installation. Your installer will be able to advise on the best approach, liaise with the DNO on your behalf, and may suggest possible mitigation strategies if the DNO does not consent to the initial proposal.
You should also check with your insurance provider to make sure your policy covers your solar PV system or to make any adjustments needed. It's good to get confirmation of this in writing.
Benefits of solar electricity for your building

1. Cut your electricity bills.

Many of us are looking for ways to save on energy bills, and solar panels can help achieve this by using the sun's free energy. Once you've covered the upfront cost of installing solar panels, you can enjoy cheaper bills for years to come.

2. Cut your carbon footprint.

Solar panels are a great way to cut your organisation's carbon footprint and improve your building's energy efficiency rating.

3. Little maintenance

Solar PV systems need little maintenance – a wash once in a while, debris removal if needed and electrical checks of the panels and the inverter.

4. Get payments for the extra energy you generate.

It's likely there will be times when the electricity you generate is more than you can use, so the surplus will be exported to the grid. You can be paid for the electricity you send to the grid through a Smart Export Guarantee (SEG) tariff. To qualify, the work must be suitably certified – for installations up to 50kW this is normally done by providing a copy of your Microgeneration Certification Scheme (MCS) certificate. You will have one of these provided the installation is carried out by an MCS-certified installer (See here (link to section 7) for more information on MCS certification and a list of certified installers in your area).

Many suppliers offer more than one option for buying your surplus generation, and some of the tariffs they offer may be SEGs while others are not. Some tariffs offer a flat rate throughout the day while others will pay you different rates at different times of day. Usually the times and rates are fixed and you get similar multiple rates for the electricity you import. At least one company offers a tariff that has a different rate for export, and for import, every half hour of every day, based on the wholesale price for electricity at that time.
The best tariff for you will depend on how much electricity you use and generate, when you use or generate it, and whether you have any energy storage (link) or large electrical loads that can be operated at different times to suit the tariff structure.

5. Solar panels can improve the EPC of your building.

EPCs tell you how energy efficient your building is and give it a rating from A (very efficient) to G (inefficient). EPCs also inform the person using the building how costly it is likely to be to heat /power, and what carbon dioxide emissions there will be. They also state the potential energy efficiency rating if improvements are made, and highlights cost effective ways to achieve this. The more energy efficient a property is, the less it will cost to heat and light. Also, energy efficient properties have lower carbon emissions, so it's good for your budget and for the planet! Installing solar PV can improve your property's EPC rating and once you've paid for installation, your energy costs and carbon emissions will be significantly reduced.

Indicative costs and savings

Installation costs

The cost of a solar PV installation can vary significantly depending on the mounting requirements, access issues, and any electrical upgrade requirements, as well as the size of the system.

A typical small-scale UK installation of 3.5kWp, mounted on a pitched roof, will cost around £7,000. This cost includes:

- The inverter, generation meter, panel-mounting system and wiring.
- The cost of labour for supplying, installing, connecting and registering the system.
- Scaffolding, which is needed for most pitched roof mounted systems.

Larger systems are usually less expensive per installed kilowatt.

Ground mounted or flat roof mounted systems will typically cost more as the cost of the mounting system is likely to outweigh any savings through needing scaffolding.

Costs can vary also between installers and products, so we recommend getting quotes from at least three different installers.
Financial savings

The typical energy bill savings of a solar PV system differ depending on the size of the system you need or can accommodate, how much electricity you need daily, when you use it and what you pay for your electricity.

With the recent increase in the cost of electricity, the payback period for solar PVs has become considerably shorter, which can make installing solar PV a smart long-term financial investment. Payback periods can be less than 10 years in many cases. The PV panels should typically last around 40 years. Inverters will not last that long but many will come with a 10 year guarantee.

How long does it take to install solar panels?

Installation can take from one up to several weeks, depending on a number of different factors such as the size of your system, as smaller installations take less time to complete than larger ones, and the type of your roof and its complexity, as installations on flat roofs tend to be quicker than those on pitched roofs.

Disruption during the installation

For the most part, solar PVs can be installed on your building with minimal disruption and your organisation can continue its activities throughout the duration of the installation. Some or all of the electrical supply will need to be disconnected for a short time but this can often be arranged to avoid conflicting with your work practices. You may need to allocate some areas of your building for the storage of solar equipment and other tools and machinery, and ensure there is space for installer vehicle parking and scaffolding, if required.

Can I do this by myself?

Solar panels are not a technology that you can install by yourself. You will need to talk to an installer who will assess your needs and evaluate your building before proposing which system could be right for you. Click here to learn more about this. (link to installers section)

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Energy storage

An energy storage system allows you to capture heat or electricity when it is readily available, such as from a renewable energy system, storing it for you to use later. The most common energy storage systems include electric batteries, hot water cylinders and electric storage heaters.

In this guide, we will only talk about battery storage systems.

What are the benefits of battery storage?

Electrical batteries can help you make the most of your renewable generation system. For example, electricity generated during the day by solar PV panels could be stored in an electric battery to be used when your panels are no longer generating electricity.

A battery can also be used to store electricity bought from the grid at cheaper times of the day, so you can use it at peaks times when electricity may be more expensive. This can save you money if you are on a variable electricity supply tariff.

Some tariffs also pay you different rates for electricity you export at different times of day, so you can use a battery to wait until the best time to export your surplus generation.
Is battery storage suitable for my building?

If you have, or plan to have, a renewable generation system supplying your premises then you need to consider how much electricity will be generated when, how much you are likely to use when, and how the two match up. If you have a solar installation that generates during the day and you only occupy the building during the day then you may be able to use most of your generated electricity immediately, rather than exporting it, and there may be little benefit in adding battery storage. However, if your electricity demand peaks at times of the day when generation is likely to be low then you are far more likely to see a financial reward from fitting a battery. It is very difficult to predict generation, use and the value of storage with complete accuracy, but a rough assessment of the likely match between time of generation and time of use can help you decide whether storage is worth investigating further. Your installer will make an assessment of possible savings, and the tariff structure and control strategies that will help to realise those savings, so that you can make an informed choice before investing.

It is possible to install a battery in a building that does not have any renewable generation but does have a variable tariff. The battery can be charged when import prices are low and then used to run equipment when prices are high, and also to export electricity if there is surplus available and a variable export tariff. These systems are currently uncommon as it is often difficult to generate enough financial savings to pay for the battery within its lifetime.

Battery characteristics

There are two different battery technologies that can be used for small scale and short term storage of electricity within a building's energy system:

- Lead-acid batteries. These have been used in a range of electricity-storage applications for more than 30 years. The technology is similar to that used in a petrol or diesel vehicle's starter battery, but designed specifically for longer term energy storage. These 'deep cycle' lead acid batteries are optimised to store and release the maximum amount of energy at a modest rate, as opposed to starter batteries that can provide very short bursts at a high power. This technology offers low energy density (the amount of electricity that can be stored in a given size and weight of battery) and limited lifetime (700 to 1000 cycles) compared with more advanced technologies. Lead-acid batteries, due to their low cost, are widely used in many larger energy storage applications and especially in applications not connected to the grid where there are no limits on space. However, you need to replace the batteries several times during the lifetime of a battery storage system.
- Lithium-ion batteries. This technology is increasingly becoming more popular and is currently used in many modern, compact small-scale or domestic electricity storage systems because they are lighter and need less space. Lithium-ion batteries are more expensive than lead-acid batteries but due to their longer lifetime (more than 4000 cycles) they do not need to be replaced as often.

Whatever the technology, batteries are characterised primarily by their storage capacity, quoted in kilowatt hours or kWh. This is the total amount of electricity that can be stored in the battery, but the amount you can put in and take out repeatedly will usually be less than 80% of this theoretical figure.

The second parameter is the charge or discharge power, quoted in kilowatts. This is the maximum rate at which you should charge or discharge the battery.
The third important parameter is the battery lifetime, quoted either in number of charge/discharge cycles or just in years. Lead-acid battery storage units have a lifetime of around five years on average, depending on how the system is used, while lithium-ion systems generally have a lifetime of 10 years or more. Most electricity battery storage manufacturers also offer a five-year warranty for lead-acid products and a 10-year warranty for lithium-ion products.
Electricity battery storage systems usually require little ongoing maintenance although you should speak to an installer about what is required. The main maintenance cost is therefore the cost of replacing the batteries at the end of their lifetime.

In most cases, the electricity battery storage systems currently available in the market offer some sort of 'smart' operation to make the most of the system, such as charging the batteries with low-rate electricity from the grid, or free access to online applications or dashboards so you can monitor the operation of the battery storage system and keep track of your energy savings.

What battery size do I need?

Your battery size depends on a number of factors, including budget and space available, but also the amount of timing of your likely generation and likely electricity use, as well as the electricity tariff structure for both importing and exporting.

There are a number of electricity battery systems currently on the market and more are likely to appear in the future. The capacity of typical small (domestic-sized) electricity batteries ranges from 1kWh to 8kWh, enough energy to boil your kettle from 10 to 70 times. Larger "off-the-shelf" units are available for non-domestic use, or you could buy a 'stackable' system where you can add multiple smaller batteries, or you can get a bespoke system design.

In terms of how much electrical power can be put out, some products present power outputs of a few hundred watts while others have power outputs of 3kW or more. Speak to an installer about what you would like the battery to power so they can assess what will be suitable for you. It is also important to understand that most battery storage systems will not provide power during a power cut.

Indicative costs and savings

Installation costs

The cost will vary depending on the size and type of battery as well as the practicalities of the installation. As an indication we would suggest a 5 kWh lithium ion battery will cost around £6,000, rising to around £8,000 for 10 kWh batteries. Larger systems will be more bespoke and so it is not possible to give indicative costs.

Will installing a battery save me money?

You are likely to save money from installing a battery alongside a renewable generation system as you will be able to use more of the generated energy to operate your appliances rather than exporting it to the grid. As you usually pay more to import electricity than you can earn from exporting it, this will reduce your bills. You may be able to increase this saving by choosing a variable tariff and changing when you charge and discharge the battery to take advantage of the varying prices offered.

The amount of the saving will depend on the amount of electricity you generate, when you generate it, the amount you use, when you use it, whether you adjust when you use it, and the tariff structures available to you. It is impossible to generalise about the scale of savings available - you will need your installer to provide guidance on this, and we recommend you speak to several installers to ensure you get a representative response.

When considering the financial payback of investing in batteries you need to consider installation costs and potential savings, but also the lifetime of the equipment. Batteries typically come with a 5 or 10 year warranty, but you can expect the storage capacity to decline during this period. The warranty will set a lower limit for storage capacity remaining at the end of the term. Remember that the inverter will have a limited lifetime too, and a warranty to cover this.

Carbon savings

Installing a battery will not directly reduce your carbon dioxide emissions as it will not reduce the total amount of electricity you. In fact, as some energy is lost in charging and discharging the battery, your total consumption is likely to increase slightly. However, fitting a battery does have significant indirect benefits by enabling the installation of additional renewable generation systems without putting extra strain on the network. There is currently no appropriate and accepted methodology for quantifying this benefit and so it cannot be used when calculating your carbon footprint, but it is a very real benefit nonetheless.

10.2.How long does it take to install commercial battery storage?

The installation time can vary depending on the complexity of the installation and the size of the battery. Typically, for smaller systems, it takes just one day.

Disruption during the installation

No major disruptions are expected during the installation of battery storage systems, apart from disconnection of the electricity supply for a short period.

10.3.Can I do this by myself?

Energy storage systems are not a technology that you can install by yourself. You will need to talk to an installer who will assess your needs and evaluate your building before proposing which system could be right for you. Click here to learn more about this. (link to installers section)

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Solar thermal

Solar water heating systems, or solar thermal systems, use energy from the sun to warm water for storage in a hot water cylinder or thermal store. Because the amount of available solar energy varies throughout the year, a solar water heating system won't provide 100% of the hot water required throughout the year. A separate system, usually your existing boiler or other water heating system, is used to make up the difference.

How do solar hot water heating systems work?

Solar water heating systems use panels or tubes, called solar collectors, to gather solar energy. The solar collectors convert the energy in sunlight into heat, which is transferred to liquid made up of water and glycol. This liquid is pumped round a circuit, which passes through the hot water
cylinder.

There are three types of solar water heating collectors:

1. Evacuated tubes – a bank of glass tubes mounted on the roof tiles.
2. Flat plate collectors – fixed on the roof tiles or integrated into the roof.
3. Low temperature collectors such as solar matting – often fitted directly on the ground to provide heat for swimming pools.

What are the benefits of solar water heating?

Reduced energy bills. Sunlight is free, so your hot water costs will be reduced.

Lower carbon footprint. Solar water heating can reduce your carbon dioxide emissions by reducing the need to burn fossil fuels.
Is solar water heating right for your building?

To tell if solar water heating is right for you, there are a few key questions to consider:

Do you have a sunny place to put solar panels?

Solar hot water collectors are typically placed on south facing roofs, or somewhere between east to west (but not north facing).

Panels can be mounted on a frame on the ground or on a flat roof, though this will increase the cost. Solar water heating collectors can benefit from being mounted at a steeper angle than solar PV panels because they often over-produce in summer so can be optimised for winter performance without sacrificing annual output. This means they can be attached to walls rather than roofs, though usually on a frame to tilt them upwards slightly.

The amount of space you need depends on the amount of hot water you use. For a domestic scale system you might need around five square metres that receive direct sunlight for the main part of the day.

Do you have space for a larger hot water cylinder?

Energy is transferred from the sun to the water-glycol fluid used to heat water stored in a hot water cylinder. Inside the hot water cylinder, a base coil is connected to the solar collectors. Typically for small installations, one cylinder is used, with either an immersion heater or another coil connected to your boiler, near the top of the cylinder. This top immersion heater or coil will heat the water to a higher temperature when needed. If a dedicated solar hot water cylinder is not already installed, then you will usually need to replace the existing cylinder.
Instead of a single hot water cylinder with two coils, some installations use a dedicated cylinder with a solar heating coil in addition to the existing cylinder.
Is your current boiler compatible with solar water heating?

Conventional boilers and hot water cylinder systems are often compatible with solar water heating. However, if you have a combi boiler, this will mean a solar hot water cylinder must be added to the system, so you'll need to consider where this might be located in your building.

Will you need planning permission?

Most small-scale solar water heating systems do not require planning permission. However, exceptions apply, and you should check with your local planning office.

If your building is a listed building, or in a conservation area or national park, you may have more restrictions.
How to make the most of solar water heating

There are a few things you need to consider to get the most out of your solar water heating system.

It's important to make sure that your back-up heating system is set up to come on at the right time. Before you installed the solar panels, your boiler or immersion heater was probably set to give you a full tank of hot water in the morning. If you leave it like this, your system will always start the day with a hot tank and there'll be no water for the solar panels to heat during the day. Your installer should advise you on how to set your hot water controls to get the most out of your new system, whatever time of day you use hot water.

Indicative costs and savings

Installation costs

The cost of installing a typical domestic-scale solar water heating system is around £6,000. Costs will depend on the type of solar water heating collectors you will choose, as well as the size of the system. While larger systems are more expensive the cost is unlikely to increase proportionately – a system that is twice the size may not cost twice as much. Retrofitting can be more expensive due to the additional complexity of installation. However, many solar thermal systems can be integrated into existing gas-boiler systems.

Savings

Solar hot water heating systems make more financial sense in commercial buildings when there is sufficiently high demand for hot water, such as in catering or swimming pools. Generally, solar hot water is more economical in larger systems. Payback periods can be long but the lifetime of the equipment can be even longer.
It is often worth considering whether a solar PV system would be more effective than a solar water heating system, even if the solar electricity were used primarily to heat the water. The relative financial performance of the two technologies will have to be considered on a site by site basis and you should ask multiple installers for advice if you are unsure.

How long does it take to install commercial solar thermal systems?

For smaller systems, the installation can take only a few days. Bigger and more complicated installations can take longer than that.

Disruption during the installation

During installation there is likely to be a period when you do not have hot water, and a (usually) much shorter time when the water supply is disconnected completely.

Can I do this by myself?

Energy storage systems are not a technology that you can install by yourself. You will need to talk to an installer who will assess your needs and evaluate your building before proposing which system could be right for you. Click here to learn more about this. (link to installers section)

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Conventional heating

In this section, we will talk about condensing boilers, electric heating and how to improve your central heating systems.

Gas boilers

Many buildings are heated by one or more gas boilers, often distributing heat throughout the building via a system of radiators much like a domestic central heating system. Some may use other distribution systems such as warm air distribution, usually as part of a ventilation system (which may also include cooling), or underfloor heating.

Smaller buildings may have a single package boiler, essentially a domestic boiler, where the burner, heat exchanger, flue and other elements are all supplied as a single unit or package. Larger buildings may have a bank of multiple package boilers, or they may have one or more commercial boilers, where the boiler itself, the burner, the flue, and the condensing economiser are all supplied as separate elements and fitted together on site.

The condensing economiser is a unit fitted between the boiler and the flue and is used to recover additional heat from the combustion gases before they are released, making the boiler more efficient. Modern package boilers will have this functionality built in and will be described as condensing boilers.

If you have a non-condensing boiler set-up then you can save energy and money by adding a condensing economiser or replacing your non-condensing package boiler with a condensing model.

Hot water supply

If you have a gas boiler for heating then this will often also be providing hot water for taps, showers etc. Generally, the hot water will come from a separate hot water cylinder that is heated by a coil heat exchanger fed from the boiler. If you have a package boiler then this could sometimes be a combination boiler, or combi, in which case the hot water will come straight from the boiler as and when required, with no need for a hot water cylinder.

If you do have a hot water cylinder, then it is important that this is well insulated to avoid wasting energy as the water cools down. Insulation jackets can be applied to existing hot water tanks but often the best performance will be achieved by fitting a new pre-insulated tank. If a tank already has some insulation, then you could still save more by adding further insulation. We recommend at least 80mm of fibreglass insulation jacket or 50mm of pre-sprayed polyurethane foam.

Oil and LPG boilers

Oil and LPG boilers operate in the same way as gas boilers, with a similar set of options. The main differences are that the fuel needs to be stored on site, with deliveries arranged when necessary, and the fuel is typically more expensive than gas. Oil is also a significantly higher carbon fuel than mains gas and so leads to a higher carbon footprint than an equivalent gas heating system.

Oil and LPG boilers are generally only found in buildings where there is no nearby mains gas supply. If there is gas nearby then it may be possible to save some money and reduce emissions by switching from oil/LPG to mains gas, but the cost of boiler replacement can be significant so it is worth considering whether investing in a low carbon heating option would be a better long-term investment.

If you decide to stick with oil or LPG heating then the upgrade options are the same as for mains gas, but the payback will often be better as the value of the fuel saved is higher.

Electric boilers

These are not common in the UK due to the big price difference between electricity and other heating fuels. Where they do exist, the hot water produced by the boiler is usually stored in an accumulator tank – a large hot water cylinder used for space heating rather than for hot water supply. This means the boiler can be operated with a variable electricity tariff, heating the accumulator during cheaper off-peak times of day. This will help to keep operating costs down but is unlikely to make this an attractive option for space heating.

Direct electric heating

There are a number of technologies that use electricity to heat a room directly, either by heating the air in the room or by radiating energy into the room, or a mixture of both. These include:

Convection heaters – typically wall-mounted or free standing, an electric heater heats air within the unit which then rises out of slots in the top of the unit and circulates around the room.
Fan heaters – as per convection heaters, but with a fan to blow the hot air more forcibly and in a specific direction.
Radiant heaters – either wall mounted or free-standing panels that are heated electrically and so give off radiant energy that warms anything in its direct line of "sight". The radiation given off ~~may be entirely~~ in the infra-red spectrum or it may include some visible light i.e. the heater will glow.
Storage heaters – wall mounted units filled with heavy bricks that are heated electrically during off-peak periods using a cheap electricity tariff. When heating is required, flaps are opened that allow heat to escape much like a convection heater. Modern high heat retention storage heaters are much better at storing heat until it is required, making them more effective and cheaper to run than older storage heaters.

Heating, ventilation and air conditioning (HVAC)

Many office buildings have a single HVAC system which provides all the ventilation, space heating and cooling needs. Air is distributed throughout the building usually in large metal ducting suspended from the ceiling or concealed within it. The air is heated centrally, often by a commercial gas boiler, but other technologies are also common. If cooling is included then there will be a chiller unit, which is a heat pump extracting heat from the ventilation air and expelling that heat to the outside air. Most heat pumps are reversible which means the same unit could be

used to provide heating in the winter as well as cooling in the summer (link to Heat Pumps section).

Improvements to heating systems

Given the range of possible heating technologies, it is difficult to generalise about potential energy improvements. Most technologies will have more efficient and less efficient models, but it is important to consider all the technical options, including switching to a different fuel, when considering whether to invest in new equipment.

It is also important to consider changes to your heating control strategy to ensure you only heat the spaces you need to heat, to the level you need to the heat them, and at the times you need to heat them. This can range from providing clear instructions to staff about how to use the heating where they work, to investing in new heating controls or even a Building Energy Management System to optimise use of whatever heating system you have.

Indicative costs and savings

Costs for installing new systems vary with size and complexity, as well as with technology. A replacement package gas boiler, where no additional pipework or modifications are required, will cost around £3,500. Larger commercial boilers will cost more, depending on size, complexity and whether all the elements of the system need to be replaced.

Controls for a heating system start at around £350 for a programmer unit for a single heating zone.

Modern high heat retention storage heaters cost around £900 per heater, and fixed standard electric heaters around £400 per heater, including installation.

You will need to get multiple quotes for any heating system upgrade you are considering to get a bespoke cost for your situation.

You should also ask your installers to estimate likely running costs for any systems they are proposing. While every installer has an incentive to make their proposed solution appear attractive, comparing one supplier's estimate with another can help to guide you on which options are likely to save you the most in running costs.

How long does it take to install a commercial boiler?

A new commercial boiler can take a few days to be installed. This will depend on the size of the system, how big your building is, the number of radiators and how many installers will handle the job.

Disruption during the installation

If you are thinking of having a new system installed, then the summer months are usually the best time to have it installed because it's when you rely on your boiler the least.

During the fitting of pipework and radiations, the whole property will need to be accessed and you will have no access to heating or hot water.

Can I do this by myself?

Conventional heating technologies are not systems that you can install by yourself. You will need to talk to an installer who will assess your needs and evaluate your building before proposing which system could be right for you. Click here to learn more about this. (link to installers section)

energy saving trust

Lighting

Most buildings require artificial lighting to some extent, and it's crucial to ensure that the lighting provided is of good quality and tailored to the specific tasks and occupancy of the building.

When assessing the lighting needs of your building, first consider who is using the space and what activities are being carried out within it. Our requirement for lighting varies depending on the tasks being performed. For instance, if your space accommodates customers or visitors, it's likely you'll want to create a well-lit, inviting atmosphere. Whereas walking down a corridor is a relatively simple visual task and doesn't require as much light. In an office environment, the amount of light needed to view a computer screen differs from that needed to read a printed report.

It's also important to understand the occupancy patterns of the space and when lighting is required. Is the building only occupied during typical office hours? Is a particular room only in use for a few hours each day? Are people constantly entering and leaving the room within a short period? Both the bulbs themselves, and their control, play significant roles in the building's lighting energy use.

Designing an efficient lighting system

Once you know how the building is used, you can then review whether there are any improvements that could be made to reduce your lighting bill. Reviewing your bulb choices can be a useful first step. LEDs are the most common energy efficient bulb on offer.

What is an LED?

Light emitting diodes, or LEDs, are efficient, turn on instantly at full brightness, and are available to fit almost every light fitting in a building. An LED works by producing light from the electricity flowing through the bulb.

Select the right lumen value

With traditional bulbs, we used watts to determine the brightness of a bulb, but watts measure power consumption rather than brightness. Energy-efficient bulbs use fewer watts, so it is best to look at lumen output to determine how bright it's going to be.

This table compares the wattage of traditional bulbs and approximate equivalent lumen values of LEDs.

Traditional bulb	LED bulb
15 watt	140 lumen
25 watt	250 lumen
40 watt	470 lumen
60 watt	800 lumen
75 watt	1,050 lumen

100 watt	1,520 lumen

Select the right colour

Low energy light bulbs imitate traditional light bulbs, so if you prefer a particular colour, there should be a close match with the new energy-efficient lighting.

'Soft white' or 'warm white' bulbs provide a cosy glow that is best for general lighting, while 'cool white' or 'pure white' are ideal for focussing on tasks, or any area that requires clear vision. The colour rendering index (CRI) of a bulb shows you how well a bulb will illuminate a chosen colour. Two bulbs can have the same colour, but the bulb with a higher CRI will show colours more accurately than the other.

The bulb's packaging will indicate the CRI alongside the lumen value. A CRI of 80 or more is appropriate for many tasks.

What are the benefits of upgrading to LED?

If there are any incandescent or halogen bulbs in your building, upgrading them to LED can reduce your electricity consumption and your electricity bill. In addition:

- They last longer than conventional light bulbs reducing replacement costs.
- LEDs produce very little waste heat compared to conventional sources, reducing the need for additional cooling on warm days.

Indicative costs and savings

Potential savings switching traditional or halogen bulbs for LEDs

Switching incandescent bulbs to LEDs	
100 watt incandescent bulb	Save up to £14 per bulb per year (Based on 1,100-lumen bulb running for 562 hours per year.)
75 watt incandescent bulb	Save up to £9 per bulb per year (Based on an 825-lumen bulb running for 503.5 hours per year.)
60 watt incandescent bulb	Save up to £7 per bulb per year (Based on an 660-lumen bulb running for 445 hours per year.)
40 watt incandescent bulb	Save up to £4 per bulb per year (Based on an 440-lumen bulb running for 394 hours per year.)

Switching halogen bulbs to LEDs	
50 watt halogen bulb	Save up to £5 per bulb per year (Based on 750-lumen bulb running for 521 hours per year.)
35 watt halogen bulb	Save up to £4 per bulb per year (Based on an 525-lumen bulb running for 521 hours per year.)

Fluorescent lighting

Many office and work environments are lit by fluorescent tubes. These vary in efficiency, with modern thin tubes (T5s) being the most efficient and the older, thicker tubes being the least efficient. All fluorescent tubes are more efficient than traditional incandescent bulbs, but even the most efficient tubes are not as efficient LEDs. Compact fluorescent bulbs – designed to fit into domestic style fittings – are not quite as efficient as the best straight tubes.

Modern fluorescent tubes are often fitted in mounts with a reflector to direct more light in the desired direction, and this will improve overall system efficiency. Some also have diffusers over the bulbs, which can improve the look and feel but will tend to reduce efficiency, especially if the diffuser isn't kept clean.

Replacing a fluorescent lighting system with an LED lighting arrangement can be relatively expensive as you will often need to change the fittings, not just the tubes. You are more likely to consider this level of upgrade as part of a wider refurbishment, but savings could be considerable, particularly if you are replacing an older fluorescent system, and if you are able to introduce other optimisation, such as avoiding unnecessarily bright lighting or arranging switching so that levels can be adjusted more appropriately.

Controlling lighting

Understanding when and how each area of the building is used will help determine the type of controls needed. For instance, spaces with varying occupancy throughout the day may benefit from occupancy sensors that automatically adjust lighting levels based on movement detection, reducing energy waste during periods of low activity.

You should also consider the flexibility and ease of use of the lighting controls, especially if you need other people to interact with them. Intuitive controls allow occupants to adjust lighting according to their preferences and tasks.

Advanced controls like daylight sensors can optimise energy savings by automatically dimming or switching off artificial lights in response to available natural light, further reducing energy consumption while maintaining comfortable lighting levels.

If advanced lighting controls don't seem appropriate for your building, don't overlook the potential for small, practical improvements to reduce lighting use. Simple solutions tailored to specific challenges can still yield significant savings and promote sustainable practices. For example, lights left on in areas like staff kitchens or break rooms, even when unoccupied, can be a common problem. Staff may have their hands full with hot drinks for themselves and colleagues as they leave the room and forget to return to switch the light off. Simple interventions like installing reminder signs and providing convenient solutions such as a table near the light switch to temporarily hold items, could encourage occupants to switch off lights when leaving the room. By identifying and addressing low-cost, high-impact opportunities for improvement, you can reduce the overall energy use of the lighting system and contribute to a more sustainable building operation.

What else can I do to reduce my lighting bill?

- Use natural daylight as much as possible.
- Always turn lights off when leaving a room. The quickest way to start saving is just remembering to turn lights off when you don't need them.
- Arrange light switches so it is easy to turn them off, for example, place switches for rooms at the door.
- Label light switches that can be turned off by all staff, especially in infrequently occupied areas such as meeting rooms, storerooms and bathrooms, and in rooms with multiple switches in one place.
- Use sensors or timers on external lights, so they are only on when they need to be.
- Consider using transparent shades or fittings, as a dark lampshade can absorb some of the light a bulb emits.
- Ensure that you regularly clean any lamp shades or fittings to increase the impact of the light.
- Make sure furniture is not blocking light sources.
- Consider installing lighting controls such as movement sensors or time clocks to ensure that the right light is provided in the right place and at the right time and that you reduce
- electricity use. According to the Carbon Trust, lighting controls can make huge reductions in energy use, usually between 30% and 50% in a typical office environment.

Can I do this by myself?

Yes! Switching out existing halogen or incandescent bulbs to LEDs is something that you can do by yourself, unless there are difficulties in access or fittings need changing as well.

For bigger jobs though, such as switching from tube lighting to LEDs or installing lighting controls, you will need to talk to an electrician who will assess your needs and evaluate your building before proposing which system could be right for you. Click here to learn more about this. (link to installers section)

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Heat pumps

Heat pumps provide low carbon heat, and cooling, to many types of buildings across the UK. If you're looking to reduce the carbon emissions associated with heating or cooling your building, then a heat pump could be a good option. However, it's important to understand the different types of heat pumps, their applications, financial aspects, and ongoing operational and maintenance requirements. This knowledge can help you to decide when to choose heat pumps as an option for heating and ensures that the systems are installed and operated efficiently.

What is a heat pump?

A heat pump works by taking heat from one location, raising the heat's temperature, and moving the heat to another spot. A fridge works in a similar way. It takes heat from inside the fridge, moves it to the grill at the back of the fridge, and eventually releases that heat into the kitchen or room where the fridge is placed. When used to heat a building, the heat pump gathers heat from the outdoor air or ground, then brings it indoors to warm up the rooms using either a system of circulating water or air.

A heat pump uses electricity to collect heat energy, raise its temperature and pump that heat indoors, but the heat energy it supplies is much more than the electrical energy needed to power the system.

This makes heat pumps a more energy efficient way to heat a building than a traditional gas or oil boiler. It also produces far fewer carbon emissions than other heating systems.

What kind of heat pump should I get?

There is a wide range of heat pump technology available. An experienced heating, ventilation and air conditioning (HVAC) engineer is best able to advise on what is right for your building following a site survey. However, there are some key questions to answer to help you and your HVAC engineer determine whether a heat pump might be suitable, and if so, which kind.

Building information

- What size is the building and how many floors does it have?
- How is the building used? (eg is it occupied all the time, are some areas or zones used more commonly, do they all need to be at the same temperature?)
- How well insulated is the building?

Current heating system

- How is the building currently heated?
- Does the building have any cooling requirement?
- How old is the existing heating and/or cooling system?
- What is the building's typical energy consumption and spend for heating and cooling?

Space available

- Is there space available to install external heat pump units? (the size required can be advised by a HVAC engineer)
- Is there space available internally for a plant room, buffer tanks or distribution system like air ducts or radiators (the space required can be advised by a HVAC engineer)

Types of heat pump

The type of heat pump best for your building can be advised by the HVAC engineer, but we've provided some detail about the most common types below.

Air to water heat pumps

An air-to-water heat pump transfers heat from the outside air to water. This heated water can heat water circulating your building via radiators or underfloor heating. It can also heat water stored in a hot water cylinder for showers and hot water taps.

Air-to-air heat pumps

Air-to-air heat pumps transfer heat from the outside air, warming air that enters your building through a series of fan coil units, or 'blowers', or via ducted air.

Air-to-air heat pumps are sometimes referred to as air conditioning. While many people think of air conditioning as a way of cooling buildings, it can also be used for heating. In non-domestic buildings, heating, cooling and ventilation are all provided by a single HVAC system – the cooling will always be supplied by an air-to-air heat pump, but the same heat pump could also provide heating.

Ground source heat pumps

A ground source heat pump (also known as a ground-to-water heat pump) transfers heat from the ground outside your building to water. This heated water can heat water circulating your building through radiators or underfloor heating. It can also heat water stored in a hot water cylinder, ready to use for hot taps and showers.

Digging trenches for a ground loop

If you have the space, then you can have a ground loop system. The ground will need to be suitable for digging and accessible to machinery from a road entrance. The area will need to avoid trees, as roots will cause problems when digging trenches.

The length of ground loop and trenches depend on the size of your building and the amount of heat you need.

Boreholes

If space is limited, it may be possible to drill vertical boreholes to gather heat. This is usually more expensive than digging trenches and usually needs a specialist ground (thermogeological) survey. The ground is generally warmer the deeper you dig, so these systems can be more efficient than ground loop systems.

Commercial buildings may require more than one borehole. A borehole is drilled only about 20cm wide, but somewhere between 75 and 200 metres deep. The depth of the borehole depends on your heat demand and the underlying geology.

Exhaust air heat pumps

If your building has a mechanical ventilation system then it may be possible to fit a heat pump to the extract air flow. This is an air source heat pump that recovers heat from the extract air before it is blown out of the building. The heat could be used to pre-heat incoming ventilation air (if you have a balanced ventilation system that includes input air as well as exhaust air) or to heat a hot water cylinder.

Indicative costs and savings

Installation costs

The cost of an air source heat pump installation varies depending on:

- the size of heat pump or heat pumps.
- the size of the property.
- whether it's a newbuild or an existing property.
- whether you need to change the heat distribution system inside the property.

Because they require digging, ground source heat pumps are typically more expensive to install than air source heat pumps. In addition to the air source heat pump considerations, the cost of a ground source heat pump installation will also vary depending on the access to the ground and whether you choose trenches or a borehole to lay the ground loop.

Savings

Commercial heat pumps have the potential to be a money-saving solution for businesses and organisations, the extent of the savings depends on the system being replaced and the efficiency achieved by the new system. When compared to traditional electric heating or gas-fired conventional heating systems, heat pumps can provide significant energy and carbon savings. They often outperform standard electric heating systems in terms of cost savings. While they may also offer savings compared to gas-fired heating systems, this varies based on factors such as the purpose of the system (e.g., heating only, or both heating and cooling) and the relative costs of gas versus electricity your organisation pays. So, it's important to carefully consider these factors when evaluating the potential benefits of installing a heat pump for your building.

1How long does it take to install a heat pump?

Air source pumps are quicker and easier to install than ground source, as ground source pumps require a lot more planning and preparation. Depending on your building, the system chosen and the complexity of the installation, the work can take from a few days to a few weeks to be completed.

Disruption during installation

Installing a heat pump may cause some disruption to your organisation, depending on how much work needs to be done.

Typical work in a heat pump installation includes:

- Building a plinth outside for an air source heat pump or pumps to stand on.
- Digging trenches or boreholes to install the heat pipe for ground source heat pumps.
- Adding pipes through the wall to where your existing boiler is.
- Installing or replacing a hot water cylinder.
- Upgrading radiators, or air ducting, where needed.

While your organisation may decide to keep the building closed during the installation, it's often possible to stay open as usual while work takes place.

1Can I do this by myself?

Heat pumps are not a technology that you can install by yourself. You will need to talk to an installer who will assess your needs and evaluate your building before proposing which system could be right for you. Click here to learn more about this. (link to installers section)

Insulation

Topics covered: walls and roof/loft insulation.

If you occupy premises that need to be heated, then improving the insulation levels can help to reduce the heating demand, which in turn will cut your energy bills and emissions. Insulation levels can be improved by adding layers of insulation to existing building elements such as walls, roofs and floors, and by replacing poorly insulated elements such as doors and windows with better insulated alternatives.

Heat loss can also be cut by reducing the amount of unwanted and uncontrolled draughts. Technically speaking this is not insulation, but it often goes hand in hand as part of a building upgrade, and ideally both need to be done to effectively minimise the heating requirement.

Cavity wall insulation

If you occupy a building that is made of brick or concrete blocks, which was built between 1920 and 1980, then there is a good chance that it has cavity walls. This means the external walls were built as two separate walls with a gap or cavity in between. It is often possible to fill this gap with insulation sprayed through holes drilled in the outer wall. The insulation material is usually either mineral wool or polystyrene beads, but polyurethane foam may sometimes be used instead.

Where possible, cavity wall insulation is one of the most cost-effective ways to upgrade the thermal performance of a building.

Internal and external wall insulation

There are many non-domestic buildings that do not have cavity walls, or where the cavity cannot be filled for technical reasons. These may include older brick buildings, where the walls were built as a single solid brick wall with no cavity, as well as newer buildings of various construction types such as steel frame. If there is no cavity to fill then a wall can be insulated on the inside or the outside.

The cost of insulating internally or externally is often much higher than the cost of cavity wall insulation, but the savings can be greater is there is often less of a limit on how much insulation can be applied.

Internal wall insulation

Internal wall insulation may involve fitting rigid insulation boards to the inside surface of the wall, building an additional stud wall filled in with insulation material such as mineral wool fibre, or sometimes by spraying foam insulation directly onto the inside surface of the wall.

Internal insulation:

- Is generally cheaper to install than external wall insulation.
- Will slightly reduce the floor area of any rooms in which it is applied (the thickness of the insulation is typically around 100mm).

- Can be quite disruptive but can be done room by room.
- Requires internal fittings to be removed and reattached and may require modifications to window and door frames.
- Can make it hard to fix heavy items to inside walls – although special fixings are available.
- Cannot be done before fixing any problems with penetrating or rising damp.

External wall insulation

External wall insulation involves fixing a layer of insulation material to the wall, then covering it with a special type of render (plasterwork) or cladding.

The finish can be adapted to fit in with the general look of the building, or with other nearby buildings.
External insulation:

- Can be applied without disruption to your organisation.
- Will not reduce the floor area of your workplace.
- Will renew the appearance of outer walls.
- Will improve weatherproofing and sound resistance.
- Reduces the risk of condensation on internal walls.
- Best installed at the same time as external refurbishment work to reduce the cost.
- May need planning permission – check with your local council.
- Requires good access to the outer walls.
- Not recommended if the outer walls are structurally unsound and cannot be repaired.

Indicative costs and savings

Installation costs

Cavity wall insulation in suitable low-rise buildings typically costs around £30 per square metre. Costs for internal or external wall insulation, or for filling complex cavities, will be higher, sometimes much higher depending on the circumstances and available options.

1.Roof and loft insulation

A significant portion of heat is lost through the roof in an uninsulated building. Insulating your loft, attic or flat roof is an effective way to reduce heat loss and reduce your heating bills.

Insulation options

If you have an accessible loft space that is easy to access and has no damp or condensation problems, it should be easy to insulate. You can lay rolls of insulation, usually mineral wool, between the joists and then another layer at right angles to achieve the desired thickness –

300mm is usually the recommended depth for mineral wool loft insulation. It is important to make sure the loft space is well ventilated to avoid condensation in the now colder loft, and to make sure any water pipes or tanks that sit above the new insulation are well insulated to avoid freezing.

If you have a flat roof, or a pitched roof with a room directly beneath, or a loft that cannot easily be accessed, then you will need professional installers to suggest the best solution. This will usually involve applying a layer of rigid foam board insulation, and often requires the replacement of some of the existing internal or external finishing layers. A detailed moisture risk analysis is usually required so an appropriate vapour control strategy can be applied to minimise the risk of internal condensation.

Indicative costs and savings

Straightforward loft insulation can be one of the cheapest insulation options available, maybe as low as £10 per square metre, plus any costs for increasing ventilation, draught-proofing access hatches etc. All other roof insulation options will be considerably more expensive and will require installers to visit before they can estimate costs for you.

Savings can be significant for a building that is heated regularly throughout the day, but will be very dependent on occupancy, heating system and building geometry.

Windows and doors

The thermal performance of windows and doors cannot be improved by adding a layer of insulation, but you can often make considerable saving by replacing old, single glazed windows and insubstantial external doors with newer, more efficient alternatives. The cost is generally higher than other insulation options, so the expenditure is often not recovered through energy bill savings alone. However, the additional benefits of comfort, improved appearance and reduced maintenance may make the investment worthwhile. If replacement is not allowed due to planning restrictions, or is too costly to justify the expenditure, then secondary glazing may be an alternative. This involves adding an additional layer of glass or polycarbonate to the inside of an existing window, trapping an insulating layer of air without the need to replace the window.

When considering modification or replacement of glazing it is worth remembering that, in an office environment, glare and overheating are often just as significant issues as heat loss. Adding shading, blinds and anti-glare coatings may be of more benefit to the occupants or may be useful additional measures to consider as well as any actions you take to reduce heat loss.

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How to choose the right installer for your organisation

Once you've decided to go ahead with some energy improvements to your building, you'll want to find an installer you can trust to do the job. Your installer should be able to advise you on the most appropriate technology, size and specification of system to suit your organisation and your energy needs.

Here's our advice on what to look for:

1. Find a fully qualified and reputable installer, ideally certified by a relevant industry accreditation body.

See here (link to section 7.2.) for a list of accreditation schemes providing certified installers in your area.

2. Get at least three quotes from three different installers before signing a contract.

Beware of heavy-handed sales techniques, such as pressure to sign on the day, high prices with large discounts for signing on the spot, or bogus monitoring scheme discounts. Don't compare installers on cost alone – the cheapest may not be the most appropriate. See here (link to section 7.1.) for more information on how to review installers' quotes and what to ask the installers when reviewing their quotes.

3. Check out the installer's previous work either by asking them directly or on their website. Also check any available customer reviews and testimonials on Google reviews, on Trustpilot etc.
4. Check the maintenance requirements of your system and any post-installation support the installer is offering.
5. Check what guarantees the installer will provide you for the quality of their work and the products they will install.

Guidance on how to review installers' quotes

We recommend checking your quotes over:

- Project management

Will the installer project manage the whole job, or will you need to arrange and pay for other trades like electricians, scaffolders, plumbers or groundworkers?

- Commissioning

What level of commissioning and handover is included? All certified installers must commission systems once fully installed to make sure they're fit for purpose, so this should be included in the price, but different installers will offer different levels of support during the handover phase.

- Payment terms

What payment options are available? Your deposit shouldn't be more than 25 per cent of the full cost. You should check that this will be protected with insurance.

- Product specification

What are the specifics of the system, including size, estimated electricity generation, efficiency values and maintenance cycles? You will need to do this to ensure the proposed system meets your requirements, but also to allow you to make comparisons between different installers' quotes.

These are some specific questions you may need to ask the installer if the quote does not make it clear:

1. Are you certified with any relevant industry accreditation bodies?
2. How experienced are you in installing the systems of this type in buildings of this type?
3. What performance can I expect from my new system?
4. What maintenance requirements will my new system have?
5. Is this a final and fixed price?
    - It's essential the installer visits your property and carries out an inspection to understand your needs. Some installers may give an indicative quote before a site visit and then an amended and fixed price quote afterwards. Often an installer will quote based on certain assumptions, even after a site visit, and then charge extra for unforeseen complexities. The installer should be able to provide a list of circumstances where an additional charge may be added.
6. What warranties do you offer for your products and the quality of your work?
7. What support/maintenance do you offer after the installation?
8. What does the installation process include and when will the work be completed?
9. Are there any building alterations or other preparatory work that need to be carried out before the installation can go ahead? If so, who is expected to undertake them?
10. Who will do the paperwork for the permits (if required)? Are associated fees included in the price of the system or charged extra?
11. Until when do I have the right to cancel or change my requests?
12. Can my organisation operate as usual during the installations?
13. Are there any financial incentives available to support with the installation cost and, if so, will the installer make the application, or support me in making it?
14. Will you keep me updated on the progress and how?

1Accreditation schemes

Why choose an accredited installer?

Accreditation schemes provide standards of quality for the work of an installer. They are a way for the installers to demonstrate competence and provide assurance and confidence to their

clients for the high standards of their outputs. Accreditation schemes are not a legal requirement, but they are intended to ensure a high standard of installation work. Some funding schemes require that an accredited installer is used.

There are the two main accreditation schemes in England for the technologies covered in this framework. You can search for a certified installer in your local area using the online tools provided on their websites.

Microgeneration Certification Scheme (MCS)

MCS is a standards organisation, a mark of quality. They certify low-carbon products and installations used to produce electricity and heat from renewable sources. In addition, they create and maintain standards that allow for the certification of products, installers and their installations. Using an MCS-certified installer ensures that equipment meets good standards of performance and that installers are technically safe and competent. Certification is available for electrical systems up to 50kW and heating systems up to 45kW, but you could opt to use an MCS registered installer for installations larger than this.

Technologies covered: Solar PV, battery storage, solar thermal, heat pumps.

Locations covered: All of the UK.

You can find an MCS-certified installer here.

TrustMark

TrustMark is the only UK Government-Endorsed Quality Scheme for improvements carried out in and around a property. Since 2005, they have been working to help drive-up standards across the industry and improve the protection offered to customers when having work done. TrustMark help customers find tradespeople who are skilled, trained and competent to carry out the work needed.

Technologies: Solar PV, battery storage, solar thermal, heat pumps, heating controls, lighting, wall and roof insulation.
Locations covered: All of the UK.

You can find a TrustMark-certified installer here.

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Energy efficiency and retrofit advice providers

This section includes a list of energy efficiency and retrofit advice providers in England.

Energy Saving Trust

Energy Saving Trust is an independent organisation working to address the climate emergency. It provides trusted advice on energy efficiency and low carbon solutions for homes and businesses.

Local authorities and location-specific energy advice providers

Councils often provide energy advice online. Likewise, there are a number of projects delivered by several local authorities covering England regions:

- The Business Energy Saving Team in Newcastle, North Tyneside, Northumberland and Gateshead.
- The Pilot Business Energy Advice Service across the West Midlands, including Birmingham, Coventry, Dudley, Sandwell, Solihull, Walsall and Wolverhampton, as well as Worcestershire and the Marches, Warwickshire and Stoke and Staffordshire.

A number of energy advice providers across England offer support to small businesses, sometimes depending on where an organization is based:

- Act on Energy provide free and impartial energy advice to householders and small businesses in Warwickshire, Worcestershire, Birmingham, Coventry & Solihull.
- Centre for Sustainable Energy support people and organisations across the UK to tackle the climate emergency and end the suffering caused by cold homes.
- Low Carbon Hub offer energy saving advice to community buildings and organsiations.
- Marches Energy Agency (MEA) have supported and inspired thousands of householders, communities, businesses and schools to take action on fuel poverty, energy reduction, renewables and climate change. MEA covers Shropshire, Telford & Wrekin, Derby, Derbyshire & the Black Country.
- Nottingham Energy Partnership offer energy advice and commercial services for all business types.
- Peterborough Environment City Trust support businesses to become greener.
- Severn Wye Energy Agency support businesses, charities and community organisations to lower their carbon footprint through innovative installations and energy efficiency.
- YES Energy Solutions have an energy help businesses reduce their carbon footprint by improving the energy efficiency of offices, factories, depots and outlets.
- Zero Carbon Harrogate provide the opportunity to share practical advice and knowledge to support businesses as they work towards their carbon reduction goals.

- 361 Energy provide energy advice to households and businesses in North Devon and Torridge.

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Post-installation support

This section includes guidance on steps charities and social enterprises can take after installing energy measures, including any support they can receive from the contractors or other advice bodies.

Post-installation checklist

Following the completion of works, you should:

- Make sure you fully understand how to use a newly installed system. The installer should also ensure this, as well as handing over any manuals, but the level and detail of handover varies between installers.
- Collect and file invoices and any Microgeneration Certification Scheme (MCS) or TrustMark certificates, building regulations notifications, planning consent notifications etc.
- Keep your commissioning certificate and warranty details in a safe place.
- Get a post-installation Energy Performance Certificate (EPC) – see EPCs for business premises.
- Keep a note of the installer's contact details.
- Know when to expect contact about annual servicing.

EPCs for business premises

- An EPC rates how energy efficient your building is using grades from A to G (with 'A' the most efficient grade) and is required if you wish to sell or rent your property for example.
- If you get any energy saving measures retrofitted in your property that will not be visible, such as wall, floor or loft insulation, it is very important to keep evidence of this work. Take photos before and after installation, keep receipts of materials and builders' invoices and building warrant plans.
    - If an EPC surveyor cannot visually see the measure because it's inaccessible, they will need to see documentary evidence of the work undertaken in order to validate the EPC.
    - If you do not have evidence of retrofit insulation, this insulation cannot be factored into the EPC rating and will be ignored. Instead, the level of insulation will be assumed based on the building's age. This may significantly affect the EPC energy rating and the rating may not be as high as it could be.