Renewable energy in more detail

There is a difference between knowing the basics about the options available and having an in-depth understanding of the practicalities around the installation process. This resource provides more in-depth information to guide you through the installation process for a range of domestic or micro-scale renewable technologies, which may also be eligible as Green Deal measures.

General considerations

Do you need planning permission to install a renewable technology?

Many small-scale renewable technologies can be installed under permitted development rights and will not require a planning application, subject to certain limitations and conditions. However, it is always a good idea to speak to your local council about your plans before work commences, particularly if you live in a listed building or conservation area. It is also advisable to inform your neighbours if the technology is likely to be visible from their property or has the potential to impact on them in any way. For more information on planning requirements, have a look at the PlanLoCaL resource: 'Planning permissions'.

Finding an installer

The first step towards installing your chosen technology is to identify potential installers in your area. Ideally, try to make sure that one company has the responsibility and the liability for the installation as a whole. Where services such as plumbing, installation and the electrics are procured separately, no single contractor can be considered to be responsible for the entire system. Should there be a problem further down the line, this may mean that it is difficult to get it fixed at low cost or under guarantee. Installations funded through the Green Deal must be carried out by an authorised Green Deal installer.

The Microgeneration Certification Scheme (MCS) is a quality assurance scheme supported by the Department for Energy and Climate Change, and it publishes a list of approved microgeneration products and installers on its website: **www.microgenerationcertification.org** Make sure you have a shortlist of at least two or three different companies so that you can compare the services available and their cost before you decide which installer you want to proceed. Wherever possible try to get a breakdown of costs included in quotes so that it's easier to compare like for like e.g. design costs, equipment costs, labour costs etc. If you are intending to take advantage of government incentives such as the feed-in tariff (FIT), Renewable Heat Incentive or the Green Deal you will need to provide evidence that your installer and your technology are both MCS certified.

More information on choosing the right installer can be found in the PlanLoCaL resource: 'Finding the right installer'.

Practical considerations

On the date of the installation, you will need to make sure that there is a space near the site where the installer will be able to park a van, and that they can have unobstructed access to the relevant areas of

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your home. It is also likely that the installer will expect you to be present in the property whilst the work is being carried out.

Once the installation is complete, the installer will need to carry out a series of checks to ensure that the system is operating correctly. This is known as the commissioning process, and the type of checks that need to be carried out will depend on the type of technology being installed. They should then provide you with a full set of documentation with details of the system design, controls, ongoing maintenance requirements and any relevant certification or compliance documentation and guarantees.

DIY options

How a technology is designed, commissioned and installed can have a significant impact on its performance, and therefore it is usually recommended that they are only installed by experienced and qualified professionals. The installation of the majority of the technologies included under this guidance note will also involve working around your gas and electricity supplies, therefore it is important that your installer is suitably qualified to carry out the installation safely. Where appropriate, technology-specific guidance is provided below.

Air Source Heat Pumps

Installation

Prior to the installation of an air source heat pump, your chosen installer will need to visit your site to assess the building, calculate the heat loss of the property and work out the size of system required. The size of the heat pump will largely depend on the size of the property, how well insulated it is and on what heating distribution system is to be used (i.e. radiators, underfloor heating etc.). The installer should make you aware of any permissions, approvals or licenses that you may need, and should be able to provide guidance on obtaining these.

Air source heat pumps do not usually require any form of ground works prior to installation and therefore can be considerably cheaper and less disruptive to install than ground source heat pumps. During the installation process, a heat pump unit containing the evaporator coil, compressor and heat exchanger will be fixed on an external wall, and a twin cylinder unit will be installed inside the property. Your installer will then commission the system to ensure that it is functioning correctly. This process should usually take less than 2 days in total.

Other considerations

An air source heat pump will operate more efficiently in a well-insulated building, so ensure that you have taken any measures necessary to improve the thermal performance of your building before you contact an installer.

It may be possible to retain your existing heat distribution system, but it is important to consider the heat pump system as a whole. As such, it may be necessary to replace the existing distribution system with underfloor heating or radiators that are more appropriately sized in order for the system to run optimally so make sure you budget for this.

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Ensure that your installer provides you with full guidance on how to use the system and its controls, as if used incorrectly the system will not run efficiently.

Biomass Heating

Installation

Your proposed installer will need to visit your site to assess the suitability of a biomass boiler before you commit to installing one in your property. During their visit they will be looking to calculate the heat demand of your building, and to check that the space and operational requirements of the system can be met. For an average sized house using woodchip, you will need to have up to 6 cubic metres of storage space near to where the boiler is to be sited in which to keep the fuel. The storage space required can be smaller if using wood pellets. The storage space will need to be easily accessible for deliveries and should be under cover in order to keep the fuel dry. Your property will also need to have either a lined chimney or a flue, and the installation will need to comply with Building Regulations (your installer should be able to advise you on this). If a new flue is required, you should check with your local planning authority to confirm whether you will need to apply for planning permission, particularly if you live in a listed building or within a conservation area. Your installer should be able to assist you in gaining any relevant permissions appropriate to your local area and installation type.

A standard domestic biomass boiler is normally about the same size as a washing machine and can be installed in 1 – 2 days. Once the equipment is in place, your installer will need to connect the piping and ducting including the flue, and then connect the electrical and control cabling. All piping that requires insulation will then be lagged and clad.

Your installer should then commission the system, and make you aware of the operational procedures and ongoing maintenance requirements specific to your boiler model, as well as any after-sales services and/or maintenance contracts.

Other considerations

Whilst wood pellet burners tend to be cleaner and easier to maintain than other types of biomass boilers, they can be noisy so do check how loud the unit is before you buy. If you live in a Smoke Control Area you will also need to check that the appliance is certified for use in these areas.

Be sure to research potential local fuel suppliers before purchasing a biomass boiler to ensure that you will be able to obtain your fuel supply easily and at a relatively low cost. It is also vitally important that high quality woodfuel is sourced and that it is appropriate to the boiler specification. Burning fuel that is contaminated, has too high a moisture content or is wrongly sized may cause problems with boiler operation.

The Biomass Energy Centre website **www.biomassenergycentre.org.uk** is a good source of information on biomass boilers and the installation process, and the Carbon Trust **www.carbontrust.com** has also produced some useful guides.

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Ground Source Heat Pumps

Installation

Prior to the installation of a ground source heat pump, your chosen installer will need to visit the site to assess the building and available outdoor space, determine the location of any utilities such as gas, water or electricity feeds, calculate the heat loss of the property and work out the size of system required. The size of the heat pump will largely depend on the size of your property, how well insulated it is and the heating distribution system to be used (i.e. radiators, underfloor heating etc.). It will also depend on whether the heat pump is supplying the property's total heat demand or if supplementary heating is required for top-up during times of high demand (this would typically be provided by an electric immersion heater or small gas/oil boiler). The installer should make you aware of any permissions, approvals or licenses that you may need.

The time taken and equipment needed to install the system will be dependent on a number of factors such as the soil conditions, the length and depth of the pipes, the weather conditions and the type of equipment being installed, but it can be as little as 1 to 2 days. Digging or hole-boring equipment will be needed which can be disruptive in terms of access requirements, noise and damage to grass or plants in the vicinity. The amount of time required will also depend on whether or not the heat distribution system within the building is being upgraded or replaced as part of the works.

The ground loop (the network of pipes pumping the heat-absorbing fluid through an underground circuit) can be fitted either horizontally or vertically, depending on the space available and the ground conditions. To ensure a consistent year-round heat source, trenches for horizontal arrays should ideally be dug to a depth of at least two metres and are normally spaced between 1.5 and 2.5 metres apart. For vertical ground loops, boreholes around 70 -150 metres deep and 3 to 8 metres apart will typically be required.

Consideration should be given to the location of the heat pump unit, which should be determined in accordance with the manufacturer's guidelines. The pump unit is approximately the size of a large fridge and should be installed away from noise sensitive areas (such as bedrooms or close to neighbouring properties) or floors that may transmit vibrations. Anti-vibration pads, mats or mounts and flexible hose connections should be installed where appropriate to protect the building structure, and sound attenuation devices should be fitted to internal fans and ducts.

Once the ground array and heat pump are in place your installer will need to commission the system to ensure that it is fit for use and operating correctly. This will involve flushing it through to remove any debris and purge the system of any air bubbles. The installer will then test the pressure within the equipment and will add a small quantity of antifreeze and biocide to the ground array.

Other considerations

The efficiency of a heat pump is represented by its co-efficient of performance (CoP), where a CoP of 4 will provide 4 units of heat for each unit of electricity consumed. However, in practice the high CoPs under standard test conditions quoted within manufacturers' literature are rarely achieved due to differences in external temperatures and the demand for hot water. Be sure to check which source and delivery temperatures the quoted CoPs are based on and whether or not hot water is included when comparing quotes from different manufacturers.

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Combined Heat and Power (CHP)

Installation

The installation of a micro-CHP system is usually a relatively straightforward process as there is little physical difference between a traditional gas boiler and a micro-CHP unit. Units tend to be slightly heavier than traditional boilers so your installer will need to check that one can be suitably located e.g. on a load-bearing wall normally on the ground floor, and with access to gas/electricity feeds. Your installer should visit your property to review your existing heating system prior to the installation of a micro-CHP system, and should also go through your options for installation and the likely costs at this time.

Once you have accepted a quote and arranged a date for installation, your installer should ensure that any carpets and other surfaces are suitably protected before work begins. For wall-mounted units, a wall-plate will typically need to be fixed to the wall, to which the boiler can be attached. The unit can then be connected to the central heating circuit and electrical distribution board.

Micro-Wind Generation

Installation

The effectiveness of micro-wind technology is largely dependent on its location; therefore it is important to determine whether the wind conditions at your site are appropriate before entering into any kind of financial commitment. Your chosen installer should visit your site to carry out a site appraisal so that they can get a better idea of the local wind speeds, determine the category of the surrounding landscape and identify any potentially significant obstructions to wind flows in the area. The installer will then use this information to calculate the potential annual energy output of the site. It is important to be aware that this calculation is only an estimate and actual performance cannot be guaranteed. The most accurate assessment of wind speeds can only be obtained by on-site wind speed monitoring, which is typically carried out for periods of up to a year, although this will involve extra cost.

As part of the site assessment the installer should also calculate the potential for noise disturbance, and consider any other relevant site-specific factors which will partly depend on whether the turbine is to be free-standing or building-mounted. These include ground conditions (for turbine foundations), the location of underground cables/utilities, the type of building construction (if building-mounted) and the potential impact on local ecology.

Following the site appraisal, the installer will make recommendations as to the most appropriate of the possible options. They should also be able to provide you with advice on project finance (including up-to-date information on the feed-in tariff), facilitate discussions with the Distribution Network Operator (DNO) regarding electrical connections, and help you to navigate the planning process. Whilst certain types of micro-wind have been included under permitted development rights since December 2011, it is always a good idea to speak to your local council and to inform your neighbours of your plans. You should check whether these services are included in the basic quote or whether there will be an additional cost.

The installation itself can usually be completed in just one or two days, however as free-standing turbines will most likely require a concrete foundation this will take additional time to harden. Depending on the time of year, this process may take up to a month. In addition to the groundworks required to set the concrete base, the installer will need to route cables through to the inverter, which may be trenched or run as an overhead line. Your export meter will usually be fitted by your Distribution Network Operator.

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DIY options

As with other microgeneration technologies, it is usually advisable to have micro-wind technology installed by a specialist. However, there are DIY options available on the market and some good sources of guidance on the internet if you do want to install it yourself (although it is still a requirement to employ a qualified electrician to commission the electrics and metering). Micro-wind technology suppliers should be able to provide detailed technical advice on the installation process.

Note that in order to qualify for the feed-in tariff both the technology and the installer must be approved under the Microgeneration Certification Scheme (MCS).

Solar Photovoltaics

Installation

The first step towards installing photovoltaic (PV) panels is to arrange for an installer to carry out an initial site visit. This should usually take between 1-2 hours and you will need to be present at the property. The installer will be checking that PV is suitable for your site; this will involve a review of the size, orientation and condition of the proposed location (e.g. the roof of a house, garage or other outbuilding, or a specific area of land) and the risk of this being shaded throughout the year. They will also need to check scaffolding requirements (note that, depending on your installer, scaffolding may need to be erected ahead of the installation itself rather than all in one go), and identify how to connect the solar array to your distribution board.

The installation process is likely to take around 2-3 days in total, which includes the time needed to erect and then take down scaffolding where required (although this is sometimes done some days prior to or after the actual PV installation). If the panels are to be located on the roof, then the installer will need access to your loft space and electricity meter cupboard. You may not need to clear the whole loft space completely, but your installer will probably request that a walkway of approximately 1 metre wide is provided to allow an electrician to install the inverter and to run cables to your electricity meter. To fix the panels onto a roof, panels are mounted on a frame which is attached to the roof rafters via special brackets.

Other considerations

Solar photovoltaic panels require little in the way of ongoing maintenance, but you will need to make sure they are kept relatively clean and that they do not become overshadowed by growth of nearby trees.

Whilst your panels may last for 25 years or more it is likely that you will need to replace the inverter at some point during this period, so do check the likely cost and timescale of this with your installer.

Solar Hot Water

Installation

Your proposed installer will need to visit your site prior to any work being carried out in order to verify that your property is suitable for a solar hot water system and to consider the size, condition and orientation of your roof for the location of panels or of any alternative space on or around the property. They will also need to review your existing hot water system to determine how to integrate the new solar hot water system. A new hot water storage cylinder will typically be required and there may also be a

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need to upgrade your boiler in order to accept a warm water feed from the hot water cylinder. It is likely that some scaffolding will be required before the work can commence, and your installer should make you aware of any potential additional costs at this time.

Depending on the type and size of your system, the installation should take 1 to 2 days to set up. Access to your loft space will be required if the panels are going on your roof. If you are having a new hot water cylinder installed you may also need to clear space within your airing cupboard.

To fix the panels onto a roof, panels are mounted on a frame which is attached to the roof rafters via special brackets. Associated fittings, such as the circulation pump, will need to be installed in the roofspace and linked to the hot water cylinder.

Other considerations

You should aim to get your system serviced every 3 – 5 years. During the lifetime of the system, which is likely to be around 25 years, it is likely that some components will need to be replaced (for example the pump), and you should check with your installer/provider to determine the associated cost implications.