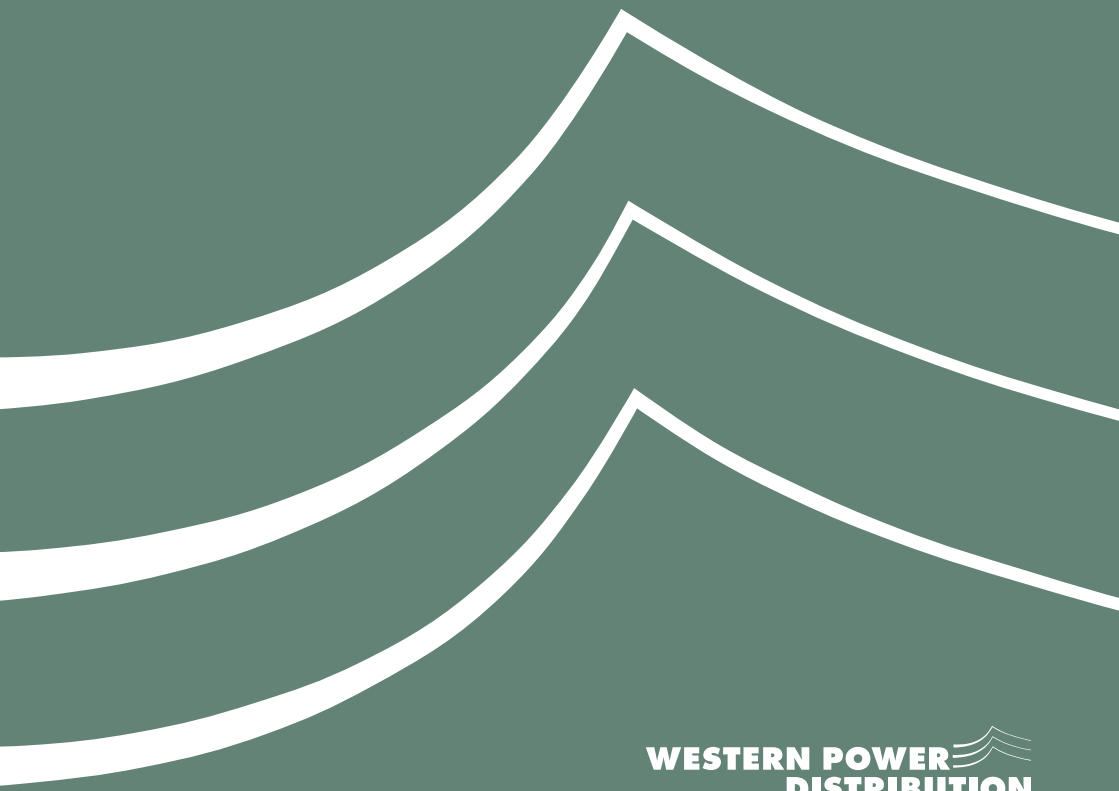
Connecting Microgeneration and other new technology



WESTERN POWER DISTRIBUTION

Serving the Midlands, South West and Wales

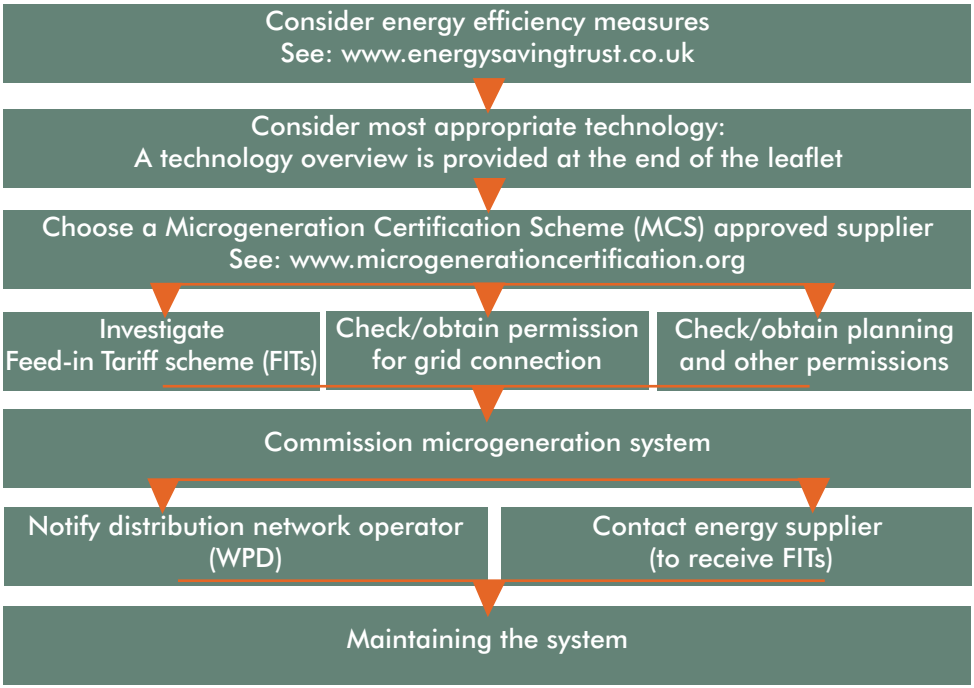
Microgeneration

what to consider and how to connect

Western Power Distribution (WPD) is the electricity distribution network operator (DNO) for the Midlands, South Wales and the South West. It operates and maintains the electricity network in these areas which delivers electricity to over 7.7 million customers. WPD is committed to protecting the environment and recognises the role that small-scale renewable energy can have in helping individuals and organisations to combat climate change. It is looking at how it can incorporate renewable energy across its own offices and depots and it has already installed over 70 kilowatts of solar photovoltaic (PV) technology. WPD is also committed to providing a safe and reliable electricity supply to you and your neighbours and therefore needs to ensure that any new energy generation on the network will not adversely affect its ability to do this.

This leaflet aims to help you understand the process of installing a small-scale renewable energy system with a focus on those technologies which require a connection to the electricity distribution network or local 'grid'.

what to consider when installing a microgeneration system



What is small-scale renewable energy

Renewable energy is energy generated from natural sources like the sun, wind or flowing water and which is replenished at not less than the same rate as it is used. Microgeneration is the term given to electricity and heat generation equipment of the smallest capacity (up to 50 kilowatts for electricity and 45 kilowatts for heat). The main focus of this leaflet is on those technologies that generate electricity, however heat pumps are also included as although a heat generating microgeneration technology they will require a grid connection.

What is the Feed-in Tariff scheme

FITs is a government-designed incentive to increase the uptake of small-scale renewables (defined as under 5 megawatts) by paying a premium price for the electricity they produce. FITs covers PV, small-scale wind, small-scale hydro, anaerobic digestion (AD) and a limited number of domestic-scale micro-combined heat and power (CHP) systems. The scheme pays a fixed premium for every unit of electricity generated (even if you then use this electricity) for a set period of time (25 years for PV, 10 years for CHP, and 20 years for the other technologies). You can also get paid a set rate for any electricity you export to the grid. Any electricity you generate and then use yourself will reduce your need to buy electricity and hence cut your bills.

FITs works alongside the Renewables Obligation, for larger scale renewable electricity generation (over 5 megawatts), which requires all UK electricity suppliers to source an increasing proportion of their electricity from renewable energy sources. The costs of both schemes are funded through everyone's electricity bills.

For further information on FITs including the latest prices see: www.energysavingtrust.org.uk or www.ofgem.gov.uk

Why does WPD need to know if I wish to install and connect microgeneration

WPD is committed to providing a safe and reliable electricity supply. Generators have the potential to affect the electricity network, and the safety of people working on it, when they are connected. So we need to ensure that we know about all connections to our system and check that they have been undertaken in the correct manner.

Some technologies such as heat pumps do not export electricity to the grid but still need an import connection and can need a lot of power at times. Therefore we need to check that the electricity supply to your home is sized to handle the heat pump you wish to install.

How do I connect to the grid (and when should I talk to WPD)

If you are connecting PV, CHP, wind or hydro generation rated up to 3.68kW (16A) per phase at a single premises you do not need to contact WPD prior to commissioning. As a guide this would be up to around 30 square metres of PV (an average 3 bed semi would generally install around 16 square metres).

Your installer will need to follow our guidelines and complete an Installation Commissioning Confirmation Form (which can be found on our website) on your behalf and send it to us within 28 days of commissioning.

You will need to speak to us at an early opportunity prior to commissioning if you are connecting other generation technologies such as small-scale wind as a more complex connection may be required.

For larger generators or multiple units you should also contact us as soon as possible prior to commissioning as costs may be incurred to modify the network to handle the new power generation. For large or complicated schemes it can also take time to devise a new connection so it is important to allow plenty of time for discussion with our connections team.

For further information contact our New Connections team:
Midlands: 0800 096 3080
South Wales: 0845 601 3341
South West: 0845 601 2989

What if I have a three-phase supply

If you are a small business such as a farm (or in exceptional cases a large house) then you may have a three-phase power supply, which means you can commission PV, CHP, wind or hydro generation rated up to 11.04kW assuming it is balanced across all three phases and it is connected at a single premises, without contacting us first. You must, however, notify us of the installation and provide us with a copy of the Commissioning Confirmation Form and circuit diagram within 28 days of commissioning. If you are unsure about the requirements then please contact us.

Do I need to replace my electricity meter

To receive FITs you will need to have additional metering. There are three types of meter required. A total generation meter will measure the total output of your generator and this is the one that your FITs payment will be based on. An output meter will measure the amount being exported to the grid (although for small-scale generators this will be 'deemed' until the roll-out of a new type of meter called a smart meter). Lastly, you will need an input meter, like the one you currently have, to record the amount of electricity you are using from the grid. Your MCS certified installer will be able to provide further information and make the necessary arrangements

Planning and other permissions

PV systems on domestic properties are generally considered 'Permitted Development', as are ground source heat pumps and water source heat pumps. This means that planning permission is not usually required as long as certain criteria are met (such as not protruding more than a maximum height above the plane of the roof). Exceptions to this include listed buildings and highly visible installations in conservation areas or World Heritage sites.

It is always best to check with your local planning authority prior to commissioning your generator as it is possible for authorities to have different criteria in their areas. Larger schemes or other technologies will need planning permission.

Other permissions may also be required. For example hydro schemes, however small, must be licensed by the Environment Agency.

For further information see: www.planningportal.gov.uk

Maintaining your system

What you need to look out for will depend on the technology you install, for example:

Technology	Maintenance Issues
PV	Periodic cleaning of panels if obscured by dirt, leaves, bird droppings, etc. – although on tilted panels, rain has a self-cleaning effect. Inverters (the electronic devices that connect your solar panels to the grid) may need replacing after 10 -15 years.

Small-scale wind	Annual servicing by the installer, regular visual and audible checks for blade erosion and signs of component fatigue.
Small-scale hydro	Largely automatic. User may need to seasonally adjust settings between summer and winter flows. Clearing intake screens of leaves and debris (daily or more frequently in autumn). Greasing of turbine and generator bearings - typically 6-monthly. Replacing drive belts when worn.
AD	Frequent monitoring/adjustment of process required. Supervision of feedstock deliveries. Removal of solid and liquid by-products.
Heat pumps	Very little as few moving parts. Air source needs to be checked for blockages (such as leaves).
CHP	Annual servicing – much like a conventional gas boiler.

Technology overviews

Solar photovoltaics

PV systems use solar cells to generate electricity directly from sunlight. The solar cells are packaged together into panels or modules and are normally roof-mounted. Most systems are grid-connected, where electricity from the PV cells is fed into the mains via an 'inverter' to be used directly in the building or exported to the grid.

Other forms of PV technology are becoming more common in the UK, such as solar tiles, which can be integrated into new buildings or refurbishments alongside conventional roofing tiles or slates.

For best performance in the UK, systems need to be inclined at an angle of 30-40 degrees from horizontal, face due south and be clear of the shade of trees and buildings. Potential shading effects should be considered all year round as the position of the sun varies seasonally.

A typical domestic-scale system may be rated at 2kW and with high efficiency 'monocrystalline' silicon cells would cover an area of around 16 square metres. This size system would typically supply around a third to a half of an average home's annual electricity use. Less efficient types of PV such as 'polycrystalline' or 'amorphous silicon' will need a larger area to produce the same energy output.

Small scale wind

Wind turbines work by converting the energy in the wind into rotational motion, which is then converted into electricity by a generator. Turbines come in a range of sizes from micro scale rooftop-mounted machines up to the very large turbines used in commercial scale wind farms.

It may sounds obvious, but wind turbines need to be sited in windy places to be economically viable, preferably in open or exposed sites with few nearby obstacles such as buildings and trees. The annual average wind speed at the centre of the rotating blades ideally needs to be over 6 metres per second, but wind speeds of 5-6 metres per second are also sometimes considered.

Small scale turbines are most commonly used as single machines supplying electricity to specific buildings or developments. At a reasonably windy site, a typical 15kW turbine would provide

about the same electricity over a year as would be used by around 6 average size houses. Turbine masts, for this size of turbine, typically range up to 20 metres in height. Rooftop turbines are considerably smaller and need to be carefully located to avoid sites where there is excessive turbulence in the wind, which can lead to poor turbine performance.

In the large majority of cases, a nearby grid-connection point is required, and for larger turbines this may need to be upgraded to allow for electricity export to the grid.

It is also important to note that issues such as noise, visual impact and effects on the local ecology will be prominent factors in any decision on planning permission for a wind turbine.

Anaerobic digestion

AD is a process in which microbes break down plant or animal matter to produce a 'biogas' with a high methane content. It's a bit like composting, but with the absence of air or oxygen. The methane produced can be captured and burned to produce heat, electricity or a combination of the two.

An AD system can use a range of raw materials including sewage sludge, farm slurry, silage and some elements of domestic waste. The technology is well-established and is widely used by sewage treatment works to generate electricity.

Most plants will be located close to the waste source, and so smaller scale facilities treating locally produced waste are often found on farms as part of a farm waste management system. However, larger-scale centralised anaerobic digesters also exist which use feedstocks imported from a number of sources.

In addition to the biogas, the process also produces a nitrogen-rich liquor (known as digestate) and residual solid by-products which can be used respectively as a fertiliser and soil conditioner.

Heat pumps

Heat pump systems capture solar heat energy which is stored in the ground (ground source heat pumps), bodies of water (water source heat pumps) or air (air source heat pumps). They can be used for space heating, water heating, heat recovery and cooling in a range of buildings.

Although all the heat delivered by heat pumps comes from renewable energy (stored solar energy), a supply of electricity is required to power the heat pump system, which may or may not come from renewable sources. However, for each unit of electricity used, the system will typically extract several units of renewable heat energy, making the system more carbon efficient than some conventional forms of heating fuel.

A typical ground source heat pump system has three major components: a heat pump (located within the building and similar in size to a large refrigerator), a ground collector loop (either pipes laid in trenches in the ground or vertical pipes within boreholes) and an interior heating or cooling distribution system. Air source systems are commonly mounted directly on an external wall and are similar in appearance to conventional air-conditioning units.

Heat pumps work best with low temperature heating systems, such as underfloor heating, and in well-insulated buildings.

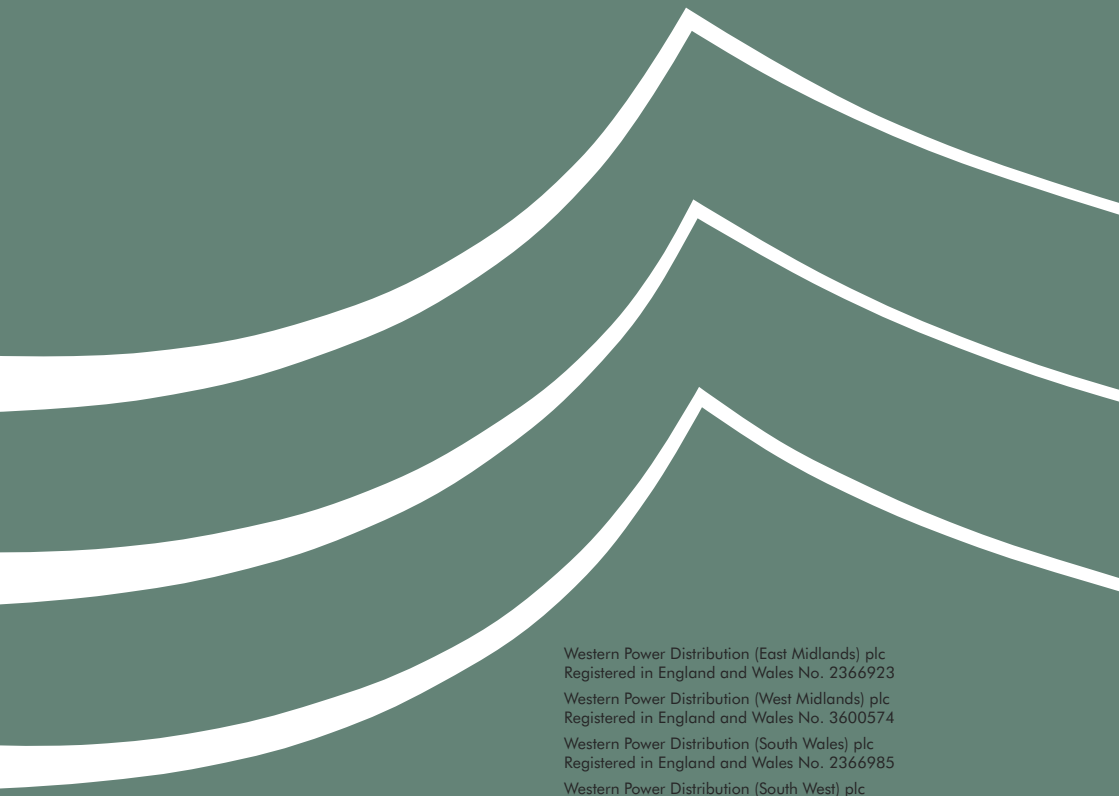
Combined heat and power

CHP systems produce both electricity and useful heat. This can be a much more efficient use of fuel than using a thermal process to produce electricity only, provided that the balance of demand for power and heat is right, and that the generating unit is located close to the source of heat demand.

CHP is used extensively in industry and is also used in some district heating schemes. However, gas-fired micro-CHP systems for individual homes have recently been developed and are physically similar in size and appearance to conventional domestic gas boilers. These provide the normal heat requirements of a home, but generate electricity whenever they are operating. The electricity generated may be used directly in the home, but where the demand is less than that generated the surplus will be exported to the grid.

For further information on technologies see: www.energysavingtrust.org.uk www.microgenerationcertification.org

Contact information
For further information contact WPD on:
Midlands: 0845 724 0240
South Wales: 0845 601 3341
South West: 0845 601 2989
e-mail: info@westernpower.co.uk



Western Power Distribution (East Midlands) plc
Registered in England and Wales No. 2366923

Western Power Distribution (West Midlands) plc
Registered in England and Wales No. 3600574

Western Power Distribution (South Wales) plc
Registered in England and Wales No. 2366985

Western Power Distribution (South West) plc
Registered in England and Wales No. 2366894

Registered Office: Avonbank, Feeder Road, Bristol BS2 0TB