

# Renewable Energy

## Introduction to Renewable Energy

In 2006 the UK Government set a target that 20% of the UK's electricity supply should come from renewable energy sources by 2020. Renewable energy is also an integral part of the government's longer-term aim of reducing Carbon Dioxide (CO<sub>2</sub>) emissions by 80% by 2050 (i.e., 80% reduction measured against 1990 levels).

In order for these targets to be reached, micro-generation must play a lead role. Micro-generation is the term used for the generation of both heat and electricity by householders from renewable energy systems. The most common renewable energy technologies employed in the UK by householders are:

- Biomass
- Ground Source Heat Pumps
- Solar Thermal
- Solar Photovoltaics (Solar PV)
- Wind Energy Conversion Systems.

These renewable energy technologies not only provide low and zero carbon energy but can reduce home energy bills and add value to your home.

Micro-generation technologies do require an initial capital investment that can make the conventional alternatives of oil gas and coal seem more attractive. However, in addition to the benefits listed above, most well designed and installed renewable systems will save you money within their lifetime as energy prices continue to rise.

In addition, as there are many organisations offering grants toward the installation of renewable energy systems, the financial return on these systems can be significant. This fact sheet provides a brief overview of the most popular renewable energy technologies that micro-generation systems comprises. For more comprehensive information, please see the list of useful website overleaf.

## Renewable Energy Technologies

### Biomass

Biomass is the collective term for plant or animal matter that can be digested or burned to release energy. In contrast to conventional fuels (oil, gas and coal), biomass forms quickly and absorbs as much CO<sub>2</sub> during its formation as it emits during combustion. This leads to biomass having the potential to be a very low-carbon sustainable fuel.

For domestic applications, biomass typically takes the form of wood products (logs, pellets or chips) and can be used to provide both space and water heating in stoves or boilers for entire houses or single rooms.

The cost of Biomass systems varies significantly depending on a variety of factors. A wood-pellet boiler that would provide both space and water heating for a typical three or four bedroom semi-detached house would cost approximately £8,000 installed.

### Ground Source Heat Pumps

Ground Source Heat Pumps (GSHP) can be a very efficient and effective central-heating system. GSHP extract heat from beneath the surface of the ground via collectors laid in horizontal trenches or vertical boreholes. The GSHP system then transfers the extracted heat to heat your home. GSHP typically provide between 3 and 4 units of heat energy for every 1 unit of electricity consumed.

The cost of GSHP systems varies significantly depending on a variety of factors. For example, the typical cost of a GSHP with vertical boreholes necessary for a 3 or 4 bedroom semi-detached house, is in excess of £ 10,000 installed—although costs do vary greatly depending on the type of installation.

### Solar Thermal

A solar thermal system captures energy from the sun and transfers it as heat to your domestic hot water supply. They are generally mounted on roofs with a southern aspect.

In most areas, planning permission is not required for solar thermal systems, provided that the building on which it is to be mounted is not a listed building or in a conservation area. It is wise to check with your local authority to ensure that this is the case for your property.

A typical solar thermal system for a four-person household, has a collector area of 4 m<sup>2</sup>, can supply half of a home's annual hot water demand and costs approximately £3,500.



## Solar Photovoltaics (PV)

Solar Photovoltaic (Solar PV), like solar thermal, are generally mounted on a roof with a southern aspect and convert solar radiation into electricity. They are comprised of 'cells' of a semi-conductor material (most commonly silicon) and can be encased in a frame as a panel or integrated into a roof as 'solar-tiles'.

A typical PV array (10-30m<sup>2</sup>) could supply up to half a home's electricity and would cost £6,000 installed. As with solar thermal they tend not to require planning permission in most instances and require little maintenance due to the lack of moving parts.

## Wind Energy Conversion Systems

Wind Energy Conversion Systems (WECS) convert kinetic (movement) wind energy into electricity. Most commonly this is done with a 'wind turbine'. For domestic applications, 'micro' or 'small-scale' turbines can be installed on the roof of the building itself or mounted on a free-standing mast.

Buildings, trees and other obstacles reduce the speed of the wind and cause it to become turbulent. This can greatly reduce the efficiency of the turbine. For this reason it is important that turbines are sited as high as possible and in a location that is as open to the prevailing wind as possible. Small wind energy installations may require planning permission and you must consult the planning officials before considering installation.



WECS up to 1 kW will cost around £1500, whereas larger systems in the region of 2.5 kW to 6 kW can cost between £11,000 to £19,000.

## Grants

Government grants and other incentives are available for the installation of renewable energy technology. For example, in Scotland grants are available to cover 30% of the cost of installing a renewable heating system at home, up to a maximum of £4,000.

In April 2010 the government introduced Feed in Tariffs, providing financial incentives for people to install electricity-generating technologies such as solar electricity panels and wind turbines.

## Useful websites

Renewable energy technologies:  
[www.nef.org.uk/actonCO2/renewableenergy.asp](http://www.nef.org.uk/actonCO2/renewableenergy.asp)

[www.bwea.com/index.html](http://www.bwea.com/index.html)

[www.solar-trade.org.uk](http://www.solar-trade.org.uk)

[www.gshp.org.uk](http://www.gshp.org.uk)

Grants:

[www.energysavingtrust.org.uk/scotland/Scotland-Welcome-page/At-Home/Grants-and-offers/Energy-Saving-Scotland-home-renewables-grants](http://www.energysavingtrust.org.uk/scotland/Scotland-Welcome-page/At-Home/Grants-and-offers/Energy-Saving-Scotland-home-renewables-grants)

[www.energysavingtrust.org.uk/Generate-your-own-energy/Sell-your-own-energy/Feed-in-Tariff-Clean-Energy-Cashback-scheme](http://www.energysavingtrust.org.uk/Generate-your-own-energy/Sell-your-own-energy/Feed-in-Tariff-Clean-Energy-Cashback-scheme)

