



## Sustainable Energy

### Introduction to Renewable Energy

In 2000 the UK Government set a target of 10% of electricity supply being from renewable energy by 2010, and in 2006 doubled that target to 20% by 2020.

Renewable energy is also an integral of the Government's longer-term aim of reducing Carbon Dioxide (CO<sup>2</sup>) emissions by 80% of 1990 levels by the year 2050.

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, as energy prices continue to rise, most well designed and installed renewable systems will save you money within their lifetime.

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 'useful websites'.

### 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<sup>2</sup> 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 3 or 4 bedroom semi-detached house would cost approximately £8,000 installed.

#### Ground Source Heat Pumps (GSHP)

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 warm your home. GSHP typically provide between 3 and 4 units of heat energy for every one 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 dependant 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 household of four with a collector area of 4m<sup>2</sup>, can supply a half of a home's annual hot water demand at an initial installation cost of £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 (WECS)

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 to the roof of the building itself or mounted on a free-standing mast.

Buildings, trees and all 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.

All wind turbines currently require planning permission.

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



## Grants

Grants are available for householders for installing each of the technologies mentioned in this document from the Department of Business, Enterprise and Regulatory Reform (BERR) under the Low Carbon Buildings Programme (LCBP). The details of which can be seen in the following table. For more information on the LCBP - see the useful websites section.

## Suppliers

In order to be eligible to receive a low carbon buildings grant you must use a certified installer and a certified product. Details on how to select a supplier can be found on the LCBP website - see the useful websites section.

## Useful Websites:

Wind Energy:

<http://www.nef.org.uk/renewableenergy/wind.htm>

Solar Thermal:

<http://www.nef.org.uk/renewableenergy/solar.htm>  
<http://www.solar-trade.org.uk/>

Photovoltaics:

<http://www.nef.org.uk/renewableenergy/solar.htm>

Biomass:

<http://www.nef.org.uk/renewableenergy/biomass.htm>

Ground Source Heat Pumps:

<http://www.nef.org.uk/renewableenergy/geothermal.htm>  
<http://www.gshp.org.uk/>

Grants:

<http://www.lowcarbonbuildings.org.uk/home/>

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