Photovoltaics

Laurence GOULD PARTNERSHIP LTD renewables

Potential for the High Weald

The High Weald has an excellent solar resource being so close to the South coast.

However due to the heavily wooded nature of the area and the undulating landscape care needs to be taken to determine a buildings suitability.

Economically PV may be best suited to 'off grid' situations where there is a low energy requirement such as equestrian buildings.

Care needs to be taken to ensure the visibility and landscape impact of the array is minimised – this may be through careful selection of PV cell type when roof mounting arrays and through careful location of free standing arrays.

Introduction

PV systems convert daylight (not direct sunlight!) into electricity.

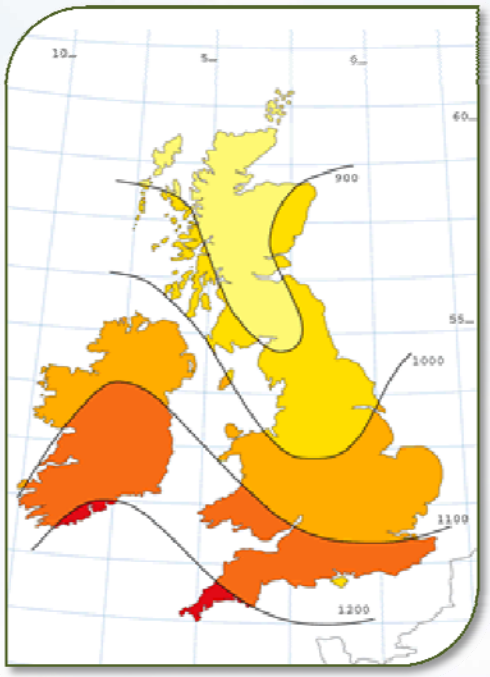
Most commonly this is in the form of a solar panel, fitted to a roof, consisting of layers of a semi conducting material. However other forms of PV technology such as solar tiles and transparent cells (ideal for conservatories) are becoming more common and can be integrated into new buildings or re-roofing projects, where they form part of the weatherproofing element.

Individual PV cells are connected together to form an array designed to meet a particular buildings need.

Can it work in the UK?

Solar energy in the UK is far greater than most people imagine.

The map of the UK shows the total solar radiation falling on a 1m-squared surface measured in kilowatt-hours.



Is the positioning of the panels important?

Ideally , PV modules need to be inclined at an angle of 20-40 degrees, and orientated facing due south. However, as this is not always practical on existing buildings they can be out on a roof that faces within 90 degrees of south, as long as they are not overshadowed.
It is important to remember that the output varies with the amount of daylight reaching the surface, so any shadowing from vegetation or buildings for even part of the day will decrease the energy output. Due to this PV systems are given a kWp (kilowatt peak) rating - Kilowatt peak stands for peak power. This value specifies the output power achieved by a Solar module under full solar radiation (under set Standard Test Conditions).

Can I sell excess power to the National Grid?

It makes more economic sense to use the power you generate yourself to directly replace what you would have normally purchased from an energy company (the price the energy company buys energy from you is usually about 2/3 of the price that they charge you!). Always shop around for the best deal, although you will have to buy and sell from the same company (combined supply and purchase agreement).

However if you are producing more electricity than you use, any excess or unused electricity can be exported or sold to the grid via an export meter.

It is unlikely that you will produce large amounts of excess power with a photovoltaic system as the high cost and low efficiences usually mean that they are well matched to your requirements and in fact you are more likely to have to make changes to the way you use electricity. There may however be periods when you are producing more than you require and it is a valuable commodity not to be wasted! So any excess could be exported OR stored within batteries.

For more information on income from energy generation visit our website.

To calculate the potential income of your project visit our website.

Can I create an 'Off grid' system?

PV has good potential in off grid situations, particularly where connection costs would be high and where energy is required for low energy devices – for example lighting in a chicken shed or equestrian building.

If designing an 'off grid' system you will need to consider all the electrical appliances you wish to run, the wattage and how long you will use the appliance per day and per week. The PV array will need to be sized to produce enough power to charge the batteries and supply power to the appliances. In addition the battery bank needs to big enough to supply enough power when there are periods of little or no sunshine.

The batteries used in a PV system are deep cycle batteries, similar to those that power electric golf carts, designed to deliver a consistent voltage during discharge and with the ability to discharge to as low as 20% of capacity.

Can technologies be combined?

PV can also be easily combined with other renewable energy technologies such as small wind turbines, this is particularly useful in 'off grid' situations where a more guaranteed electrical supply is required, or larger batteries require charging.

Is less power produced in the winter?

When sizing your system it is important to bear in mind the difference in the electricity generated between the summer and the winter is big, for example a small system rated at 650 Wp (Watts peak) – will produce 2.5KWh daily in midsummer but only 0.7kWh daily in midwinter.

Is there a good carbon payback?

Carbon payback is the amount of time it takes to repay the carbon that was used to make a product and is based on the carbon footprint of its manufacture.

There is large variation in paybacks depending on the choice of materials and scale of project. However real carbon savings can be delivered with large 90m² arrays taking only 3 months to pay back the energy used in its manufacture and construction.

What about cost and maintenance?

A qualified, professional installer should assess and design a configuration to meet your needs, including integrating it with your current electricity system / the grid.

The size of the array can vary depending on a number of factors including; roof space, energy requirements and of course budget. It may also depend on whether you plan to export excess energy to the grid if your location is suitable.

A typical system providing half an average families annual electricity supply, typically covering 10-15m² of roof space and generating 1.5- 2kWp (kilowatt peak) would cost between £4000 and £8000 per kWp depending on the site and materials used.

A typical small off grid system producing 500Wp (with a 24Vdc, 400Ah battery and 900W inverter and all wiring) would cost around £5,000. This system would provide enough power for a small building for example a shed or equestrian building with 5 20W low energy bulbs (each on for 5 hours a day)

The payback will of course vary depending on the efficiency and savings made.

Visit our website to use our savings / payback and potential income calculators.

Very little maintenance is required, although it is important to keep the panels clean and reduce overshading from surrounding vegetation.

The wiring should be checked on occasion by a qualified electrician.

Off grid systems utilising batteries may require more maintenance.

SWOT analysis

A SWOT Analysis is a strategic planning method used to evaluate the Strengths, Weaknesses, Opportunities, and Threats involved in a project or in a business venture.

STRENGTHS • Easy to integrate into new and existing buildings • Virtually no maintenance • Rapidly improving technology • Long life with no moving parts.	**WEAKNESSES** • Most expensive micro renewable technology – long paybacks • Needs large roof space area and aspect between SE and SW.
OPPORTUNITIES • Good for small off grid situations • Can be combined with other renewable technologies	**THREATS** • Long carbon payback

Planning Issues

Planning within the High Weald AONB

The High Weald Unit's role is to interpret government policy in the light of the AONB Management Plan (http://www.highweald.org/text.asp?PageId=254) and to provide advice to local authorities and others regarding planning applications. The Unit also responds to consultations regarding new planning policy at national, regional and local level, again based on the Components of Natural Beauty identified by the Management Plan. The Local Council is of course the responsible body as regards the exercise of planning powers.

Planning guidance (see below) actively encourages renewable development but makes allowances for designated areas such as the High Weald AONB:

In sites with nationally recognised designations planning permission for renewable projects should only be granted where it can be demonstrated that the objectives of designation in the area will not be compromised by the development, and any significant adverse effects on the qualities for which the area has been designated are clearly outweighed by the environmental, social and economic benefits.

Planning permission

Extracted from Planning and policy Statement (PPS) 22
http://www.communities.gov.uk/publications/planningandbuilding/pps22.

In many cases fixing solar panels to the roof of a single dwelling house is likely to be considered 'permitted development' under planning law with no need to apply for planning permission.

There are, however, important exceptions and provisos which must be observed.

The following limits apply to roof and wall mounted solar panels:

- Panels should not be installed above the ridgeline and should project no more than 200mm from the roof or wall surface.
- If your property is a listed building installation is likely to require an application for listed building consent, even where planning permission is not needed.
- If your property is in a conservation area, or in a World Heritage Site planning consent is required when panels are to be fitted on the principal or side elevation and they are visible from the highway. If panels are to be fitted to a building in your garden or grounds they should not be visible from the highway.
- Permitted development rights to alter the existing roofline of a dwelling do not necessarily apply in Areas of Outstanding Natural Beauty, Conservation Areas, Sites of Special Scientific Interest, National Parks or the Norfolk Broads. When considering applications in these areas the potential impact on the character or appearance of the area should be considered.

All solar installations are also subject to the following conditions:

- Panels on a building should be sited, so far as is practicable, to minimise the effect on the appearance of the building.
- They should be sited, so far as is practicable, to minimise the effect on the amenity of the area.

When no longer needed for microgeneration they should be removed as soon as possible.

Planning considerations

The development of systems for collecting and using solar energy raises a number of considerations which local planning authorities may need to take into account. These
include:

- Whether particular systems require planning permission.
- The importance of siting systems in situations where they can collect the most energy from the sun.
- The need for sufficient area of solar modules to produce the required energy output from the system
- The colour and appearance of the modules.

Information to accompany an application

A planning application or application for listed building consent for a solar PV system
could usefully include the following information:

- The design of the module or array
- Photographs of the existing built environment
- Detail of the roof mounting arrangement, if applicable
- Indicative drawings of the module or array in place;

- connection details to the building or grid if relevant;
- If the application involves a listed building, a photomontage of the proposed collectorarray could be useful.

Building Regulations

If you wish to install a solar panel on your roof building regulations will normally apply.

The ability of the existing roof to carry the load (weight) of the panel will need to be checked and proven. Some strengthening work may be needed.

Building regulations also apply to other aspects of the work such as electrical installation. It is advisable to contact an installer who can provide the necessary advice.

Further Information

Planning Policy Statement 22: Renewable Energy – http://www.communities.gov.uk/publications/planningandbuilding/pps22

Planning for Renewable Energy: A Companion Guide to PPS22 - http://www.communities.gov.uk/publications/planningandbuilding/planningrenewable

Useful contacts

Solar Trade Association - www.solartradeassociation.org.uk

British Photovoltaic Association – www.pv-uk.org.uk

Centre for alternative technology – www.cat.org.uk

Renewable energy association – http://www.r-e-a.net

Carbon Trust – www.carbontrust.co.uk

Energy Savings trust – http://www.est.org.uk

Potential Grant sources

Low Carbon Buildings programme – www.lowcarbonbuildings.co.uk

England Rural Development Programme – www.seeda.co.uk

WARR partnership (LEADER) – www.warrpartnership.org.uk

High Weald AONB (Sustainable Development Fund) – http://www.highweald.org

Carbon Trust (Interest Free Loans) – www.carbontrust.org.uk

Enhanced Capital Allowance Scheme – www.eca.gov.uk