SHETLAND ISLANDS COUNCIL

RENEWABLE ENERGY TECHNOLOGIES

Guidance for Householders

LOCAL DEVELOPMENT PLAN

December 2008

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RENWABLE ENERGY TECHNOLOGIES

Contents

This Guidance is just one of a suite of documents prepared by the Development Plans Team to help guide development:

Guidance Notes

The Shetland House
Guidance for Housing Development in Shetland

Housing & Colour
Guidance on using Colour in Shetland

Towards Sustainable Construction
Guidance on Sustainable Design and Construction for Dwellinghouses and other Buildings

Towards Better Design
Guidance on Design

Renewable Energy Technologies
Guidance on Domestic Renewable Energy

Reducing Carbon Emissions in New Development
Guidance for developers

Masterplan Development Handbook
A Best Practice Guide for Developers and Communities

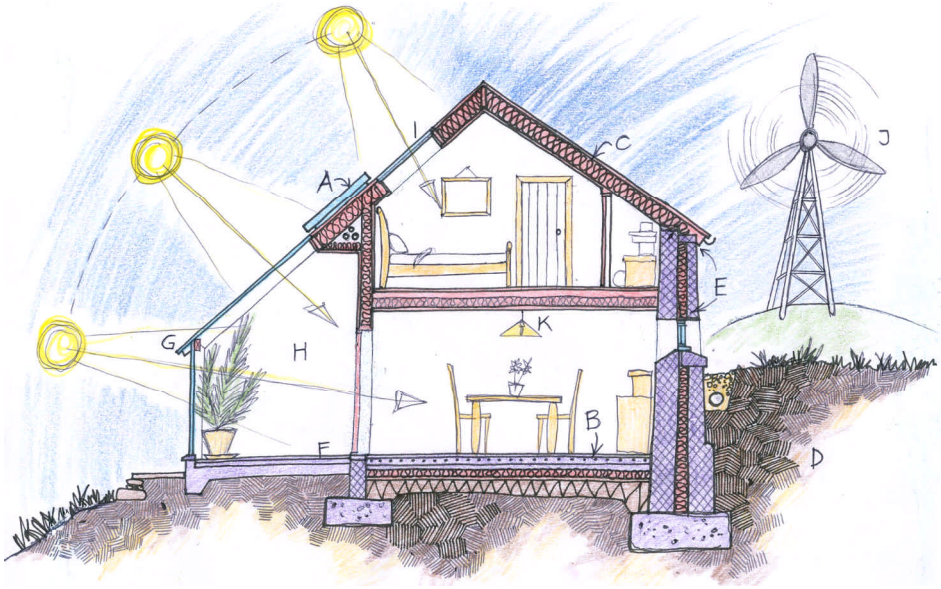
Design Statements
A good practice guide

Interim Planning Policy

Towards Sustainable Construction and Better Design in Shetland
Location, design and amenity guidance and policy for housing and other development in Shetland

Foreward

This advice note has been produced to highlight the options available to householders considering the installation of renewable energy devices. It describes ways to improve energy efficiency, highlights grants available, examines whether planning permission may be required and considers what issues should be taken into account.



A. SOLAR PANELS OR PHOTO-VOLTAIC ROOF-TILES.

B. UNDERFLOOR HEATING, IN SOLID FLOOR CONSTRUCTION,

C. INSULATION: THE WHOLE BUILDING ENVELOPE SHOULD BE WELL INSULATED, WITH NO GAPS (OR COLD BRIDGES).

D. EARTH SHELTER

E. LIKELY COLD BRIDGE POINTS ARE AT FLOOR/WALL/ROOF JUNCTIONS AND AROUND WALL OPENINGS. SMALL OPENINGS ON NORTH ELEVATION.

F. THERMAL MASS TO RETAIN HEAT.

G. AIR LEAKAGE/DRAUGHTS FROM SOURCES SUCH AS BADLY FITTED DOORS/WINDOWS OR UP CHIMNEYS, MINIMISED BY DESIGN.

H. A CONSERVATORY WILL ADD AN ATTRACTIVE LIVING SPACE TO A HOUSE AND ACT AS A SOLAR-GAIN COLLECTOR.

I. ROOF-LIGHTS (low energy glass).

J. DOMESTIC-SIZE WIND GENERATORS

K. LOW ENERGY LIGHTING

INTRODUCTION

The purpose of this Guidance Note is to give members of the public an introduction to methods of saving energy through energy efficient design and to consider some of the available renewable energy generation options.

It is therefore only intended to provide guidance on the methods, practices and devices that could be considered. It does not endorse any particular renewable, product or company.

This Guidance Note should be read in conjunction with the Council's other Guidance Notes, *The Shetland House*, *Towards Sustainable Construction* and the Interim Planning Policy relating to Domestic and Community Aerogenerators & Solar Energy and Reducing Carbon Emissions in New Development, all of which are available online at www.shetland.gov.uk/planningcontrol or from the Council's Planning Service, Grantfield, Lerwick. Tel: 01595 744800.

The following text pertaining to renewables is sourced from material supplied by the Energy Saving Trust:

Some Important Points to Bear in Mind at the Outset

- There is no point in using renewables if your house isn't energy efficient.
- Renewables provide a 'base load', and you will therefore need some form of supplementation.
- Proper design is the key. You should get advice on what is the most suitable system for you.

BACKGROUND

Why we should be energy efficient and consider renewables?

"Climate Change" and the "Greenhouse Effect" are two commonly used phrases today, but what are the implications here in Shetland? One of our greatest threats comes from sea level rise and a much higher occurrence of floods, caused by increased storms and frequency of heavy rainfall. In addition to this we can expect harmful effects on our unique wildlife heritage due to habitats change caused by global warming, whilst fuel and electricity costs will continue to rise as fossil fuels become increasingly scarce.

By altering the way you consume and use energy you can help to contribute to combating climate change.

Scotland's net CO2 emissions have fallen by 14% since 1990, but demand for energy continues to rise. The Scottish Government consider that **everyone** should take responsibility by using less energy and using energy more efficiently. The domestic and transport sectors have shown the most significant growth in energy consumption and CO2 emissions, with each household in the UK creating around six tonnes of CO2 a year. [1]

The above figures demonstrate the energy demand that is generated by domestic households, which significantly contributes to global warming. They also highlight the need for the consideration of renewable technologies and improvements in energy efficiency.

For more information on the impacts of climate change and sea level rise in Shetland visit:

http://www.shetland.gov.uk/developmentplans/documents/v2all.pdf

Heating and lighting buildings consumes a significant proportion of energy used in the domestic sector – typically

- about 60% of energy is consumed in space heating
- 20% for heating water
- and the remainder for domestic applicances and lighting.

[1] Energy Saving Trust

DOMESTIC AEROGENERATORS

Shetland's excellent wind resource means that wind turbines can be considered as a renewable energy source to provide heating and/or electricity to households. Developments in technology have led to a number of turbine manufactures in the UK, who provide a variety of products for domestic households.

When the wind blows houses invariably get colder, therefore wind turbines can take advantage of this by converting resources into energy. A turbine will produce electricity approximately 75-80% of the time. While the UK average capacity factor (see glossary) for wind is around 35%, in Shetland it is around 50%.

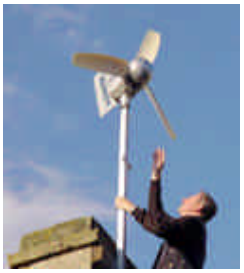
Horizontal Axis Turbines

Horizontal axis turbines are presently the most common type of turbine used in Shetland. While energy needs will have to be assessed individually, a 2.5kW system should be able to supply domestic electricity for an average sized dwellinghouse, whilst a 6kW system should be able to provide heating as well, provided that the house was well insulated. A 2.5kW turbine would cost in the region of £10,000 to £12,000 to install. Larger options such as a 6kW turbine cost around £20,000 to install.

2.5kW and a 6kW domestic aerogenerators. For more info visit: www.energytrust.org.uk or http://www.greenphase.com/wind.html

Roof-mounted Turbines

As with all renewables, technology is advancing and systems are becoming more efficient, and more affordable. One such example is the development of roof-mounted turbines, which are expected to become more commonplace in the future.



Examples of roof mounted turbines. Visit:: www.renewabledevices.com and www.windsave.co.uk for more information.

Vertical Axis Turbines

This type of turbine is less common in the UK, as they are currently less efficient and require higher wind speeds to operate effectively. However research is into their development is continuing and they have the advantage of being quieter than horizontal axis turbines.

Things to Take Into Consideration When Siting a Domestic Turbine

When finding a location for a turbine the average wind speed at the chosen site will be one of the most important factors, as it will determine how much energy is produced throughout the year. However, care should be taken to ensure that the chosen site has minimal visual and landscape impact and consideration should be given to the amenity of neighbouring properties. Thought should also be given to the potential adverse effects of shadow flicker, noise and safety implications.

For more advice on siting a domestic turbine visit The British Wind Energy Association website: www.bwea.com/you/siting.html

Shadow flicker

Shadow flicker refers to the moving and repetitive shadows cast by a turbines rotor blades. In practice this causes a nuisance when the sun is low in the sky and the shadow is being cast over windows of nearby houses.

To avoid the effects of shadow flicker, it is recommended that turbines are situated at least 10-blade diameters distance from neighbouring properties. For example a 6kw Proven aerogenerator has a blade diameter of 5.5m and should be situated at least 55m away from neighbouring properties in order to avoid shadow flicker. The topography of the site will also influence the extent of shadow flicker.

Visual and Landscape Impact

Turbines are available in a wide variety of designs, which vary in size and appearance. It is recognised that the installation of a turbine is likely to have some landscape and visual impact. Therefore, when siting a turbine due thought should be given to:

Visual Impact: This is the impact the turbine will have on available views, the reaction of viewers, for example neighbours and the public, and the visual amenity of the area where it is located.

Landscape Impact: This can be described as the impact the turbine will have upon landscape elements, local distinctiveness, regional context and special interests. Both visual

and landscape impact are closely interrelated and one rarely occurs without the absence of the other.

In areas of distinctive landscape character[2], which are valued for their appearance, greater care should be taken when deciding on a location for a turbine. You should ask yourself whether siting a turbine at the proposed location would have an adverse visual and/or landscape impact.

Advice should be obtained from the Council's Planning Service at the earliest opportunity, who will assess proposals alongside policies, which aim to maintain and enhance the character and appearance of these areas, as well as protecting visual and landscape amenity throughout Shetland.

Noise

Wind generated background noise increases with wind speed, and at a faster rate than turbine noise increases with wind speed. This means that in high wind conditions the sound of the wind will be greater than the sound of the turbine, therefore, noise is liable to be greatest when wind speeds are low as the turbine can be heard above the wind.

When siting a turbine consideration should be given to the prevailing wind direction (south westerly) and any domestic properties that are situated downwind of where the turbine is situated as in low-wind conditions noise from the turbine may be streamed towards the nearest property.

Many turbine manufacturers now provide details of noise generated by their turbine and how this will decrease as distance from the source increases. The Council will use this information to decide whether an independent noise assessment is required.

Distance and Noise

The Council's Environmental Health and Planning Service have agreed to the following guidelines for noise generated by domestic turbines:

Noise from the turbine should be limited to 5dB(A) above background for both day and night-time, remembering that the background level of each period may be different.

The Council will at their discretion advise as to whether a noise impact assessment is required and are currently producing background noise limits for Shetland to aid noise assessment calculation.

[2] National Scenic Areas, Lerwick and Scalloway Conservation Areas, Designated Gardens and Landscapes

The following table provides an indication of noise generated by wind turbines compared to everyday activities:

Source/Activity	***Indicative noise level dB (A)***
Threshold of hearing	0
Rural night-time background	20-40
Quiet bedroom	35
Wind farm at 350m	35-45 (the range takes into account the amount and size of turbines)
Car at 40mph 100m away	55
Busy general office	60
Truck at 30mph 100m away	65
Pneumatic drill at 7m	95
Jet aircraft at 250m	105
Threshold of pain	140

(Source: The Scottish Executive, Development Department, Planning Advice Note, PAN 45, Renewable Energy Technologies, January 2002)

Do I Need Planning Permission?

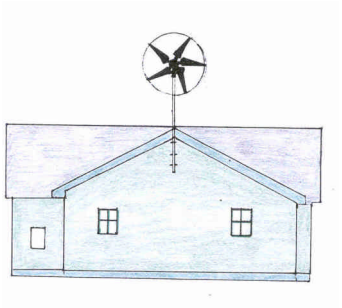
The Council's Planning Service should be contacted in the first instance for advice on whether planning permission is required for your proposal. One such way to do this is to write in with a 'pre-application enquiry' and include details of the size and type of turbine you wish to erect and enclose a location map showing where you wish to locate it.

Horizontal-Axis and Vertical-AxisTurbines: The majority of horizontal axis turbines will require planning permission, as they do not fall under any classes of 'permitted development' (see glossary).

Roof Mounted Turbines: At present there is a lack of examples and national guidance on whether roof mounted turbines will be deemed to be permitted development. However, since the turbine will result in the alteration to the roof of a dwellinghouse, by way of an addition, they can be assessed against Class 2 of The Town and Country Planning (General Permitted Development) (Scotland) Order 1992.

This states that planning permission will be required if:

- any part of the dwellinghouse would as a result of the works, exceed the height of the highest part of the existing roof;
- any part of the dwellinghouse would, as a result of the works, extend 10cm beyond the plane of the existing roof slope;
- the dwellinghouse is in a conservation area.



Example: planning permission will be required as the roof-mounted turbine exceeds the highest part of the existing roof.

In applying this criterion it appears that the majority of roof-mounted turbines will require planning permission, as they will be located above the highest part of the existing roof.

For more information on domestic turbines:

Energy Saving Trust, Small Scale Wind Energy, Factsheet 6
This is available from the Council's Planning Service, or online:
http://www.est.org.uk/uploads/documents/wind_energy.pdf

Hugh Piggot, 'It's a breeze' – A guide to choosing windpower, Hugh Piggot, 2001, Centre for Alternative Technology Publications.

Centre for Alternative Technology – www.cat.org.uk

British Wind Energy Association – www.bwea.com

Shetland Renewable Energy Forum (SREF) – www.sref.co.uk
Hagdale Industiral Estate, Baltasound, Unst, Shetland, ZE2 9DS
Tel: 01957 711832
Email: info@sref.co.uk

Contact the Northern and Western Isles Energy Efficiency Centre for more advice on systems and grant availability.
Free Phone: 0800 512 012,
Tel/Fax: 01856 870534
E-mail: info@energyadvice.plus.com

SOLAR ENERGY

Solar Energy is utilised in three main ways:

- **Photovoltaics** – These convert the suns energy (light) into electricity.
- **Solar Thermal Systems** – These are used to provide hot water for domestic/commercial/industrial properties.
- **Passive Heat** – See page 22 of this Guidance Note for a full description of using the sun to heat buildings.

Photovoltaics (PV)

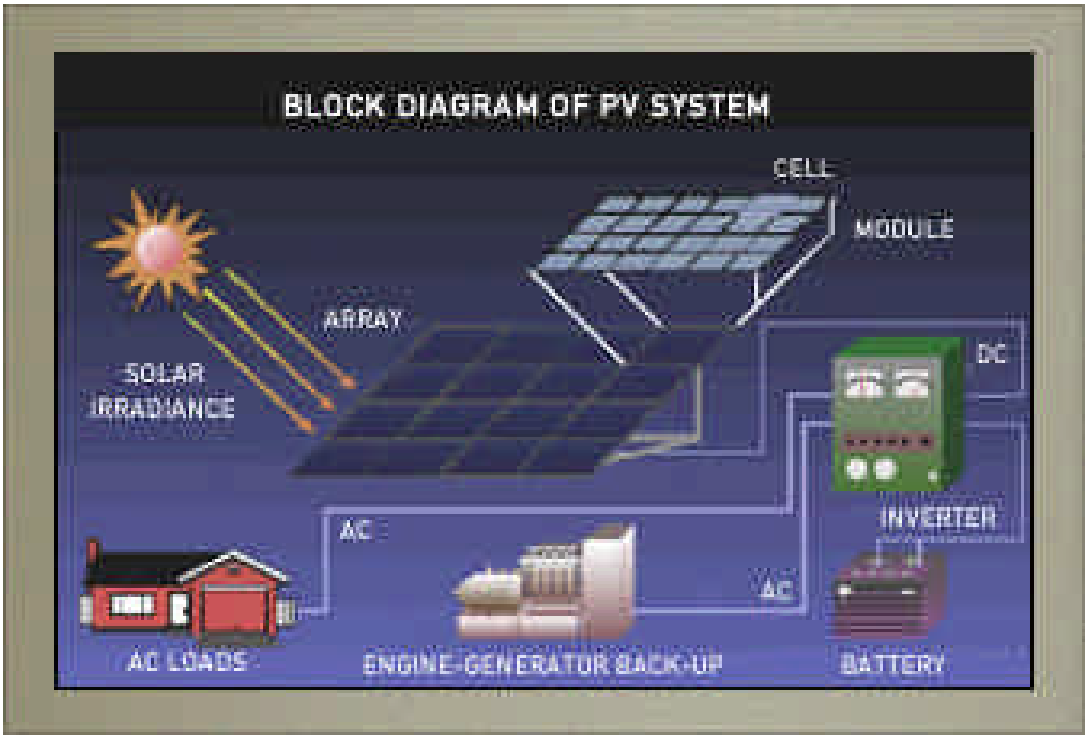


Diagram Courtesy of Energyhouse

Photovoltaics can be used to run appliances and lighting and come in a range of designs from panels and transparent cells to solar tiles that can blend well into the roof.

Rather than go into a technical description on how a PV system works, we recommend the following fact sheet and websites:

Energy Saving Trust, Photovoltaic (PV) – Solar Electricity, Factsheet 4:
http://www.est.org.uk/schri/downloads/Photovoltaics%20o_p.pdf
www.est.org.uk/myhome/uploads/documents/final_print_proof.pdf

Solar Century: http://www.solarcentury.co.uk/content.jsp?sectno=4&subno=2

Centre for Alternative Technology:
http://www.cat.org.uk/catpubs/display.tmpl?sku=fs_pvp&cart=111054574639927

Solar Thermal Systems

A solar thermal system installed in Sandwick

This system works by capturing energy, in the form of sunlight through a solar panel, which is converted into thermal energy by a heat collector. This thermal energy is transferred to water (by heating it) in a storage tank.

The solar panel is usually mounted on south facing roof of a property, although they can be ground based as well. The panels are connected to a circuit containing water with propylene glycol, and anti-freeze is added if necessary. The heated liquid flows around the circuit, either under the action of a pump to warm the main hot water tank, or by a thermo-siphoning action to warm a solar water storage tank that then feeds the hot water tank.

Developments in technology have led to anti-freeze free solar thermal systems that do not require heat exchangers and provide top down heating. You should therefore decide which is the best system to suit your needs.

For further information and advice on solar water heating visit:

Energy Saving Trust. This factsheet is available from the Council's Planning Service, or online at: www.est.org.uk/schri/downloads/Solar%20water%20o_p.pdf

The Solar Trade Association: www.greenenergy.org.uk/sta/

Solartwin. For information on systems and grants: http://www.solartwin.com/grants_info.htm

Some Points to Note About PV and Solar Installations

- They can be grid connected or used as part of a stand-alone system.
- They require little maintenance and once installed operate freely.
- Both PV and Solar have little environmental impact, for example they don't make noise, or have moving components.
- PV systems have high capital, but low-operating costs.
- Technology and systems continue to advance rapidly. This should help to decrease costs.
- PV will be most competitive in remote sites, located far from the electric grid and when relatively small amounts of power are required, typically less than 10 kW.

Do I Need Planning Permission?

For the majority of householders the installation of photovoltaics and solar panels typically fall within what are known as "permitted development rights". This means that, if a solar panel or system is more or less flush with an existing roof, the Council will not ask for a planning application.

However, your property may be covered by certain designations, which mean that an application for planning permission may be required. For example, if you live in a flat or a house divided into flats, a listed building, a conservation area, a National Scenic Area or an area covered by an "Article 4" direction from the Council.

It is therefore recommended that installers of PV or solar panels contact/or write to the Council's Planning Service to obtain confirmation as to whether planning permission is required.

Planning permission will be required if:

- the installation projects 10cm beyond the plane of any existing roof slope
- the installation results in the roof area of a dwelling being extended by 10%
- the roofing material (the extent of panels, slates etc) is deemed by the planning authority to materially affect the external appearance of the dwelling

Building Standards
The Council's Building Standards Service should be contacted to ascertain whether a building warrant is required, prior to commencement of works.

Contact the Northern and Western Isles Energy Efficiency Centre for more advice on systems and grant availability:

Free Phone: 0800 512 012
Tel/Fax: **01856 870534**
Email: info@energyadvice.plus.com

HEAT PUMPS

The use of heat pumps for domestic heating is a relatively new concept in the UK, in contrast, they have been used successfully throughout Europe, and particularly Scandinavia for a number of years. The two main types that could be considered in Shetland are ground source and air source heat pumps.

Ground Source

A ground source, or 'geothermal' heat pump, uses the constant temperature of the earth's surface (which is around 11-12C in the UK) as a heat source that is pumped into buildings to provide heating.

A heat pump operates in a similar way to a refrigerator or air conditioner. It is connected to a series of plastic pipes (called ground loops), which are buried underground. A water and antifreeze solution is circulated through these pipes and the solution is passed through a heat exchanger which concentrates the heat and distributes it throughout the building by means of radiators or water storage.

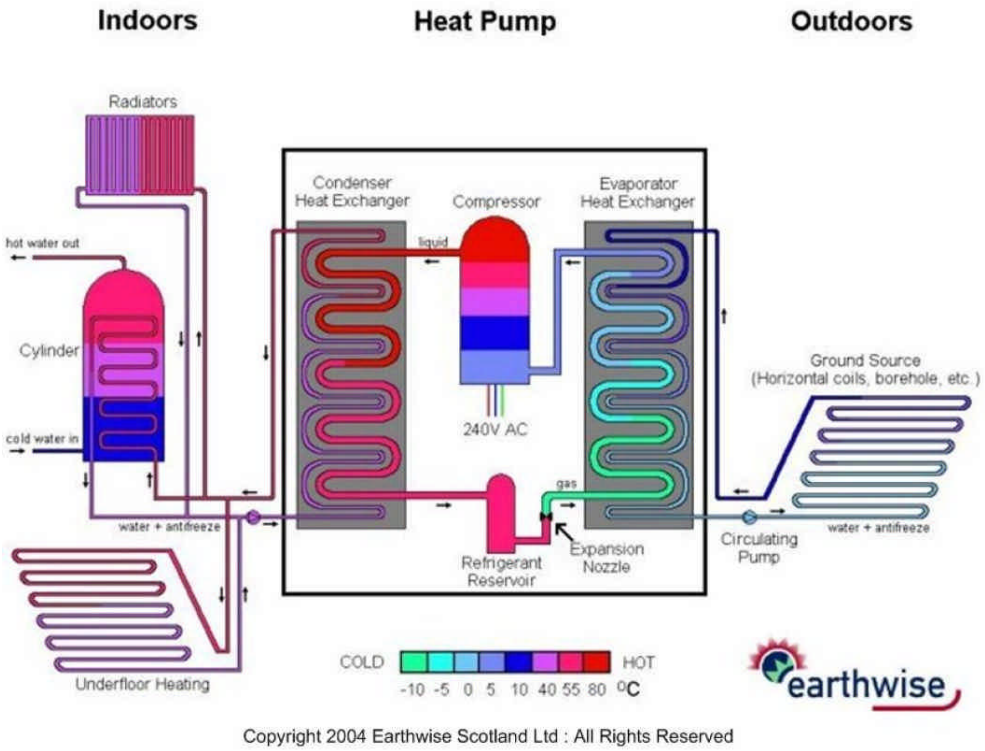


Diagram supplied courtesy of Earthwise Scotland: www.earthwisescotland.co.uk

How a Ground Source heat pump works:

A ground source heat pump is used to provide space heating and in some cases it can also pre-heat domestic hot water. However, the water temperature in ground source heat pumps is generally low grade (approx 45-50 degrees centigrade) and you may need some supplementation.

Air Source

An air source heat pump uses outdoor air to heat or cool a building and uses a similar system to a ground source pump to extract and move heat (refrigeration). Air source heat pumps convert heat best when outside temperatures stay above 40°F(4.4°C). When outdoor temperatures fall below 40°F, a less-efficient panel of electric resistance coils, similar to those in a toaster, kick in to provide indoor heating.

Air source heat pumps are easier and cheaper to install in comparison to ground source systems, but as mentioned, are less efficient in the winter requiring the use of back up boilers.

Do I Need Planning Permission?

The most appropriate time to install a heat pump would be when building or extending a house as combining the installation with other building works can help to reduce costs.
It is recommended that the installer contact the Council's Planning Service for confirmation, as planning permission may be required. Please note that a building warrant will be required for the installation, and it is recommended that the installer contact the Council's Building Standards Service for further advice.
After the heat pump is installed, any land disturbed by the installation should be reinstated.

For further detailed information on Heat Pumps:

Contact Home Energy Scotland for more advice on systems and grant availability:
Phone: **0808 808 2282**
https://energysavingtrust.org.uk/energy-at-home/heating-your-home/heat-pumps/

Energy Saving Trust – Solar Water Heating, Facts are available online at:
https://energysavingtrust.org.uk/advice/solar-water-heating

For Q&A's on heat pumps visit:
https://www.changeworks.org.uk/what-we-do/energy-and-fuel-poverty/energy-saving-advice/faqs-air-source-heat-pumps

For information on installers in Shetland contact: **https://mcscertified.com/**

The Centre for Alternative Technology Free information Service:
https://cat.org.uk/info-resources/free-information-service/

For information on products and performance:
https://www.bsria.com/uk/

MICRO HYDRO

Waterpower is one of oldest methods of harnessing renewable energy, and is a well proven and tested in Scotland. For example approximately 12% of Scotland's electricity is presently generated by large-scale hydro systems.

© Energy Saving Trust

There may be limited opportunities in Shetland for the use of micro hydro systems to produce electricity. One possibility would be by using a micro hydro system alongside a wind turbine, or solar panels for a 'stand-alone' system.

Principles of Micro Hydro

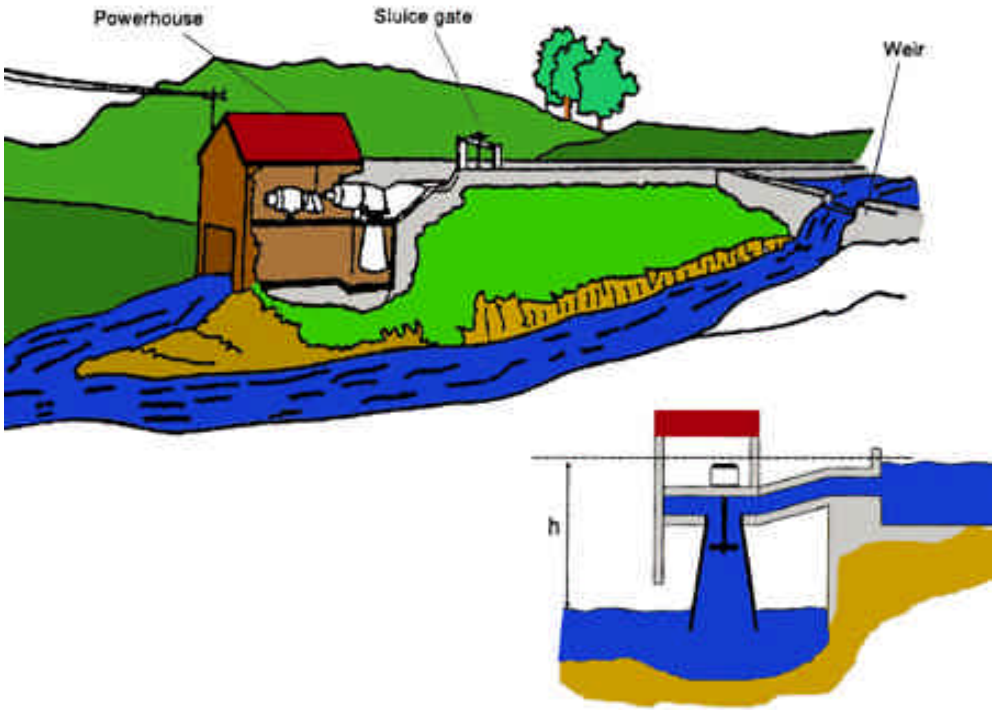
Micro hydro systems convert energy stored in water held at height into movement (or 'kinetic' energy), which then turns a turbine to produce electricity. Potentially even small burns can be used to produce power.

An intake, usually beside a weir, diverts water through a pipeline to a turbine house, in which water falls over a turbine that drives a generator and produces electricity. Most intake systems are fitted with screens to prevent the entry of fish and debris. The power available from a body of water depends on the speed of the watercourse and the height the water falls (also called the head).

The output capacity of the system depends upon the head and varying flow rate at the chosen site. Estimating this can be a complex and time consuming process. It is therefore recommended that you get specialist advice when assessing the potential of a scheme.

Hydropower must be situated close to the source of power usage, and they can either be grid connected or used for a stand-alone system.

Micro hydro systems can be more expensive per kW produced than other technologies but they do have the benefits of having a high efficiency, high capacity and can be engineered to last for 50 years or more.



A Micro Hydro System: courtesy of ResLab

Do I Require Planning Permission?

Planning permission will be required for micro hydro schemes, as they are not covered by any permitted development rights.

In addition to planning permission, consent must be sought from the Scottish Environment Protection Agency (SEPA), as the proposal may have adverse impacts upon the ecology of the water. Depending on the size of the scheme an environmental impact assessment may also be required

For further information/advice on Micro-Hydro Systems:

Contact the Northern and Western Isles Energy Efficiency Centre for more advice on systems and grant availability. 0800 512 012

Energy Saving Trust, Factsheet 7, Small Scale Hydroelectricity
http://www.est.org.uk/myhome/uploads/documents/Hydroelectricity_o_p.pdf

British Hydro Power Association: www.british-hydro.org
www.british-hydro.org/mini-hydro/index.asp

For information on abstraction consents and ecology issues contact: SEPA, The Esplanade, Lerwick, ZE1 OLL

Additional Considerations:

Stand Alone or Grid Connected Systems?

Small-scale renewable energy technologies such as wind power and solar (pv) are particularly suitable for 'off-grid' locations where connection to conventional supplies may be overly expensive or unattainable. A system that is not connected to the grid is called a 'stand-alone' system. Stand-alone systems may be expensive at the outset due to the cost of purchasing components such as batteries, which have a lifespan of around 6-10 years. However, batteries have the advantage of storing electricity, and can providing electricity in intermittent periods. Grid connected systems are more efficient than stand alone systems as they do not require batteries to store power and mains electricity can be used in periods of intermittency. Provided that an agreement is reached, grid connected systems allow the user to sell excess power to local electricity companies.

Intermittency and Hybrid Systems

When compared to fossil fuels, some renewable sources are affected by the problem of intermittent generation. This means that they cannot produce power, or struggle to produce a sufficient amount when environmental conditions are not right. Domestic grid connected systems will not be affected by this problem as when, for example, the wind stops blowing, the property will use the electricity provided the grid.

Stand-alone systems on the other hand may require their own diesel generator backup, or they can incorporate, more environmentally friendly 'hybrid systems'. Hybrid systems use several sources of power to produce electricity. For example, solar (pv) panels can operate in parallel to a wind turbine as they complement each other well, as it is often sunny when weather conditions are calm.

Business & Industry – Renewable Options

Improving energy efficiency and the potential for renewable energy should not just be limited to domestic households. There may be opportunities to incorporate renewable energy projects in old, and especially newly built properties. For example, industrial estates should be able to accommodate renewable developments with less environmental and visual impact than domestic sites. Possible options include the use of wind turbines and the installation of solar photovoltaics on large roofs. For more info visit: www.sref.co.uk and www.pure.shetland.co.uk

At the Hagdale industrial estate in Unst, two turbines supply the units with heating and electricity for conversion into hydrogen energy.

PASSIVE SOLAR DESIGN

'Approximately 15% of space heating in ordinary Scottish homes comes from solar energy though walls and windows'.

(source: Strathclyde University)

Passive Solar Design (PSD) refers to designing, constructing and orientating a building so that it maximises the sun's energy in the form of heat, light and warm air. Passive Solar Design can help to reduce energy consumption and costs, for example heating and lighting, by using what is in effect a free source of energy. Whilst PSD is best applied to new buildings it should also be considered when designing extensions or renovating buildings.

For example, a conservatory can provide additional living space and during the warmer months it can be used as a solar gain collector. It should be remembered though that when temperatures are cold large conservatories will be costly and energy-inefficient to heat.

Design and Layout

The following points apply when designing a building for solar gain:

- High levels of insulation must be incorporated into the house, especially when taking into consideration the prevailing wind direction in Shetland (south westerly).
- Glazing on the south elevation should be maximised, whist glazing on the north elevation should be kept to a minimum.
- Rooms which are frequently used, and therefore use the most energy, should be positioned on the south side of the building.
- Active ventilation and shading should be used to reduce the risk of overheating in the summer.
- The building should contain as few external doors as possible to minimise heat losses.
- Consideration should be given to indirect solar gain that is the collecting, storage and distribution of solar gain through thermal storage materials. Certain materials store heat better than others.
- Compact housing reduces energy demands. For example the heat and energy losses of a 1.5 storey house will be much lower than a bungalow.

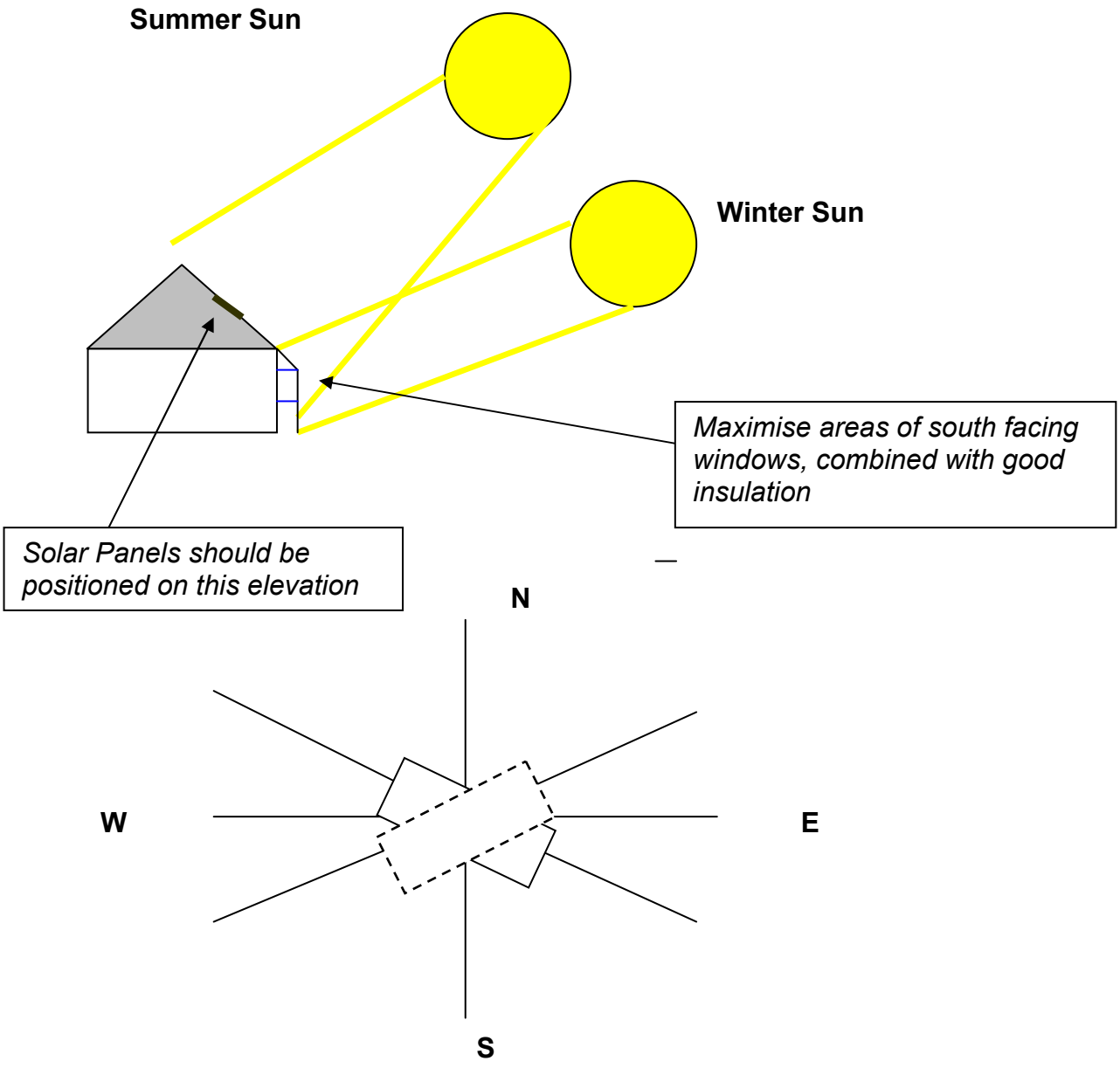
Orientation

The orientation of a building is central to PSD, and has been historically applied in Shetland for centuries now. Think for example the number of old crofthouses that have the majority of their windows on their south elevation and no, or minimal, window openings on their north elevation.

In Shetland, and the Northern Hemisphere in general, the summer sun passes almost directly overhead. However, in the winter, the sun follows a path that is much lower in the sky. In order to utilise the winter sun for heat and to make use of the sun for lighting, buildings can, where possible, be designed and orientated to take advantage of this.

In addition to orientation the siting of the house must be considered. For example, the building's southern exposure should ideally be clear of large obstacles i.e. adjacent buildings, trees (not too much of a problem in most parts of Shetland!). It should be remembered that a southerly sloping sites will require less separation distances between buildings in comparison to northerly sloping sites when taking into account exposure to the sun.

PASSIVE SOLAR DESIGN EXAMPLES



The south elevation of buildings should ideally be orientated within 30 degrees of due south to maximise solar gain. A building which faces this way will receive approximately 90% of the optimal winter solar gain.

Additional Considerations

Earth and Wind Sheltering

When building or renovating a house due consideration should be given to methods of sheltering the property from the elements. If houses are overexposed, even well insulated properties can suffer high heat losses.

One method of reducing exposure to the elements is to, where possible, build the house into a landscape to improve shelter and also minimise the visual impact. Refer to *The Shetland House* and *Towards Sustainable Construction*se' for examples of how to locate within the landscape.

Another method is to cover part of the house with earth, or even build underground.

source: http://www.bio-solar-haus.de/

The use of landscaping (earthworks) and planting (trees and plants) can shelter buildings from prevailing winds and help to reduce wind loss from the fabric of the building. While it is recognised that Shetland may not offer the ideal growing environment, there are a number of species that grow well provided they are well sheltered and maintained. It is recommended that a mixture of species be used to provide low and high level sheltering.

Finally be aware that trees need careful placing as they may eventually block views and cause overshadowing that will lead to loss of solar gain!

For more information on Earth and Wind Sheltering:
http://www.besa-uk.org/ - The British Earth Sheltering Organisation.
'Landscaping in Shetland' - Shetland Islands Council
'Selecting Sites and Trees for Woodland in Shetland' – Available from The Shetland Amenity Trust, Garthspool, Lerwick

For more information on Passive Solar Design
www.sseg.org.uk - The Scottish Solar Energy Group; provides good advice and examples of PSD and Solar products
www.cat.org.uk - The Centre for Alternative Technology
www.greenphase.com/passivesolar.html - For information and studies on PSD

ENERGY EFFICIENCY & INSULATION

Energy efficient, well-insulated buildings may be slightly more expensive to construct at the outset, but their benefits far outweigh these costs in the long term. They are cheaper to heat; they require less maintenance and they benefit the environment by reducing emissions that lead to global warming.

Improving energy efficiency and insulation should not just be limited to new build projects, existing properties can benefit immensely from improvements.

Some interesting figures:

- Every household in the UK creates around **six tonnes** of carbon dioxide every year.
- The average household could save around £200 a year by taking energy efficient measures. This is equivalent to saving around two tonnes of CO2.
- More than 40% of all the heat lost in an average home is through the loft space and walls.
- Around 20% of the heat in the average home is lost through ventilation and draughts.

(Source: Energy Saving Trust)

Some Possible Solutions:

- Cavity wall insulation is one of the most cost-effective energy efficiency measures. It can reduce heat loss through the wall by up to 60% and save between £70-100 each year on bills.
- Double-glazing cuts heat loss, reduces noise and condensation.
- Installing 250mm (10") loft insulation can save 25% of heating costs.

(Source: Energy Saving Trust)

For more advice on energy efficiency and insulation:

For advice on grants and methods:
The Northern and Western Isles Energy Efficiency Centre for more advice on systems and grant availability. 0800 512 012
For advice on energy efficiency, insulation and building standards contact: The Council's Building Standards Service, Grantfield, Lerwick. 01595 744800
'The Shetland House', pg 20-21. Available from the Council's Planning Service.

Web Links:
Energy Saving Trust: www.est.org.uk/aboutest/resources/factsheets/
www.est.org.uk/myhome/
Advice on energy efficiency:
www.adviceguide.org.uk/index/family_parent/housing/energy_efficiency.html

'The Carbon Trust' provides advice for businesses: www.thecarbontrust.co.uk

GRANTS

Under the Scottish Community and Householder Renewables Initiative (SCHRI) financial assistance is available to householders and community organisations for renewable energy projects. SCHRI offer householders grants of 30 percent of total installation cost, up to a limit of £4,000. In addition to this Builders and architects can now apply for on behalf of future owners, so make them aware of them SCHRI when getting your property built.

For more information:

Contact the SCHRI Hotline on 0800 138 8858.
Contact The Northern and Western Isles Energy Efficiency Centre, 0800 512 012
Visit the Energy Saving Trust website – www.est.org.uk/schri

The following Energy Saving Trust (EST) factsheets referred to in this guidance are available from the Planning Service:

EST, Scottish Community & Renewables Initiative – Household Grants
EST, Scottish Community & Renewables Initiative – Community Grants
EST, FACTSHEET 1, Renewable Energy - An Introduction.
EST, FACTSHEET 2, Green Electricity Tariffs.
EST, FACTSHEET 3, Solar Water Heating
EST, FACTSHEET 4, Photovoltaic (PV) – Solar Electricity
EST, FACTSHEET 5, Groundsource Heat Pumps
EST, FACTSHEET 6, Small Scale Wind Energy
EST, FACTSHEET 7, Small Scale Hydroelectricity

A FINAL NOTE

We hope that this guidance has provided you with some ideas of how to take sustainability issues into account when building, renovating or extending your property. The Planning Service would welcome supporting statements with applications that take sustainable design into account. For example:

- Siting: how the site makes use of Passive Solar Design, shelter.
- How the proposal is energy efficient and what types of insulation are being used or considered.
- Renewables: choice of renewable and why it was chosen, or why renewables were not considered for the proposal.
- Landscaping: how this will be incorporated into the site and the benefits it will bring.
- Materials: what types or materials are being used and whether these are from sustainable sources, their lifespan, and how much maintenance is required.

Cutting carbon dioxide emissions in the UK

The average household could save around 1.5 tones of carbon dioxide (CO2) a year by making their home energy efficient.

If everyone with gas central heating installed a new condensing boiler, we'd cut emissions by 12.5 million tonnes. We'd also save around £1.9 billion per year on our energy bills and enough energy to heat over 3.3 million homes for a year.

If everyone installed cavity wall insulation, we'd cut CO2 emissions by 4.6 million tonnes, enough to fill 1 million hot air balloons.

If every home that could had 270mm loft insulation we'd save 3.8 million tonnes of CO2, the same as the annual emissions of around 650,000 homes.

If everyone put an insulation jacket on their hot water tank, we'd cut CO2 emissions by 900,000 tonnes – enough to fill around 182,000 hot air balloons.

If everyone in the UK installed just one energy saving light bulb, we'd save enough CO2 to fill the Albert Hall over 1,900 times.

Source: Energy Trust

GLOSSARY OF TERMS USED:

Average Capacity Factor – The theoretical maximum output of a turbine. While a turbine may run approximately ¾ of the time, its average capacity factor in the UK is approximately 35%, while Shetland is approximately 50%.

EST – The Energy Saving Trust

Permitted Development – A development that does not require planning permission as defined in The Town and County Planning (General Permitted Development) (Scotland) Order 1992

Intermittency – A period when a renewable does not produce power. For example, a solar panel at night, or a wind turbine on a very calm day.

photo: courtesy EnergySaving Trust

RENEWABLE ENERGY TECHNOLOGIES

SHETLAND ISLANDS COUNCIL

Development Plans
Shetland Islands Council
Planning Service,
8 North Ness Business Park
Lerwick, Shetland
ZE1 0LZ