Appendix 1

Information Leaflets on renewables

Micro renewable information for applicants

Aim

- This document is intended to advise homeowners and community groups on whether planning permission is required for small-scale micro renewables. It highlights the environmental issues that must be considered, advises on the different technologies that are available and where to find out more information.

Background

- The main driver for increasing renewable energy production is the contribution that it can make to reducing CO 2 emissions. Using renewable energy can reduce the amount of fossil fuels used, and so reduce emissions of the greenhouse gases that is causing climate change.

- In 2003 in the UK, the energy used in homes produced 27% of the carbon dioxide emissions entering the atmosphere and only 2.7% of the total energy supply was from renewable energy sources. The average annual energy consumption for a UK household is between 3000kwh and 6000kwh (kilowatt-hours) for electricity and between 15,000kwh and 22,000 kwh for gas. The average household could save around £200 a year by taking energy efficiency measures. This is equivalent to a saving of around 2 tonnes of CO_2 (= 0.5 tC).

- The Moray Council adopted its 'Renewable Energy Strategy' in June 2006. This document sets out a strategy for developing and promoting the use of Renewable Energy in Moray. The strategy encourages domestic and small-scale community renewable energy schemes. It seeks sensitive design of installations to take full account of the historic and built or natural environment.

- Moray Development Plan Policies

  The Council has introduced two new policies on renewable energy namely ER1 and ER2 to the Moray Local Plan.

  ER1 Renewable Energy Proposals

  The policy conforms to NPPG6 – Renewable Energy Developments which is currently being revised (SPP6: Renewable Energy Developments), PAN 45 Renewable Energy Technologies, and the Council's Environmental Charter.

  Renewable energy proposals will be considered favourably where they meet the following criteria:

1. They are compatible with policies to safeguard and enhance the built and natural environment;
2. They do not lead to the permanent loss or permanent damage to, prime agricultural land;
3. They are compatible with tourism, recreational interest and facilities, they do not interfere with aircraft activity;
4. They do not result in an unacceptable impact in terms of visual appearance, landscape character, noise, electro- magnetic disturbance, watercourse engineering, peat land hydrological impacts, pollution, traffic generation or damage to the local ecology, and
5. They do not result in an unacceptable cumulative impact.

ER2 Renewable Energy Requirements in New Developments

This policy aims to promote the use of small – scale renewable energy technology at a domestic level. This could be provided through a variety of methods including solar panels or domestic scale wind turbines.

Proposals for new development of over 10 houses or non residential buildings of over 500 sq. metres must include provision for renewable energy generation, to reduce CO2 emissions by 10%. The location of renewable energy generation equipment should not significantly detract from the amenity, appearance or character of the site.

- Micro renewables is the production of heat and/ or electricity on small or domestic scale from a low carbon source such as those considered in this document. Micro-generation is the production of heat (less than 45 kilowatt) and/or electricity (less than 50kW capacity). It has the potential to reduce C02 emissions by providing low carbon sources of electricity and heat to dwellings.

- This guide is not comprehensive and for more detailed guidance further information should be obtained from the Energy Savings Trust (www.est.org.uk) who work with householders, businesses and the public sector. The Scottish Community Householder Renewables Initiative (SCHRI) can also be accessed from the same website. Costs for each technology will vary depending on the model used, size of installation, site constraints etc. To get more details on costs, the issues affecting them and grants available contact the Renewables Officer based in the EST's Advice Centre on 0800 512 012 or visit the website at www.est.org.uk/schri or at www.hie.co.uk. In addition an updated webpage for links on installers, technical providers, grants and funding can be viewed at www.moray.gov.uk.

Planning

Applicants are advised to contact the control services section of the planning department at an early stage in their development proposals to determine whether planning permission will be required.

Permitted development rights are extended to certain types of development through the Town and Country Planning (General Permitted Development) (Scotland) Order 1992 (GDPO). The Executive has commissioned research into a review of the GPDO to consider updating the permitted development rights and related conditions and restrictions. Some micro-renewables may already be covered by permitted development rights, whilst other technologies will require a planning application.

Consideration should be given to the most appropriate renewable energy technology to supplement or provide all your electricity and/or heating requirements. Before deciding on which micro-renewable energy technology you wish to install, it is very important to consider the following;

Is your property;
- within a Conservation Area?
- a listed building?
- Within/adjacent to a natural heritage or archaeological site?

Planning permission may be required where;

- a new building would be nearer the road/public footpath than the original dwelling house or the building is less than 20m from any road or public footpath;
- the installation of solar panels exceeds 10% of the roof area or extend more than 10cm beyond the existing plane of the roof;
- where works are proposed on the exterior of a building or structure in a conservation area;
- any part of the development exceeds the height of the highest part of the roof of any of the original dwelling house.
- all works to a non-residential building or flat
- where an article 4 Direction (removes permitted development rights) is in force in a conservation area.
- Where the installation will require excavating trenches or deep boreholes.

N.B Domestic wind turbines will require planning permission and there may be restrictions imposed on the siting of a wind turbine. These are normally for two reasons; expected noise output and visual impact on the landscape.

- **Design and Siting**

Consideration should be given to the design and siting in conjunction with small-scale micro renewable technologies. Development will be expected to make full use of energy conservation techniques, including the promotion of:
• siting, form, orientation and layout of buildings to maximise the benefits of solar energy, passive solar gain, natural ventilation and natural light;
• the use of landscaping and boundary treatment to modify temperature extremes, minimise heat loss due to exposure and create shelter on inner faces and entrances to buildings;
• optimum provision of insulation and the use of energy efficient heating/cooling systems;
• the use of a flexible design to facilitate possible future adaptation for other uses.

Types of small-scale micro-renewable technologies
For further details and costs of each technology visit the EST website

Solar PV

Photovoltaic systems use energy from the sun to create electricity to run appliances and lighting. A PV system requires only daylight, (not direct sunlight) to generate electricity. When light shines on the cell it creates an electric field across the layers causing electricity to flow. Importantly, their use and location should be considered as part of the architectural design.

Points to note
When connecting an electricity generator to the grid, you will need to get in contact with your local Distribution Network Operator (DNO). In general, the bigger the system being connected to the grid, the more complex the connection requirements and therefore discussions required with the DNO.

Does the roof, wall or conservatory face within 90 degrees south.

Solar Thermal Heating Systems

Solar water heating systems gather energy radiated by the sun and convert it into heat in the form of hot water. Solar water heating systems work alongside a conventional water heater to provide hot water and can provide up to 50% of hot water needs year round. Panels collect the heat then a cylinder stores the hot water that is heated during the day. Water is forced through the collector where it is heated by the sun then through a coil in the hot water cylinder to transfer its heat to the surrounding water, where it is stored.

Different types of system

There are two different types of solar collectors; flat plate and evacuated tubes.

- Evacuated tube systems occupy a smaller area and have an efficiency of approximately 40% but are generally more expensive.
- Flat plate systems have an efficiency of around 30% and are cheaper to install.

Points to note

Solar systems operate best when:

- You have south facing roof space for the panels
- The roof space for the panels is unshaded by trees etc
- The panels are inclined approximately 30°-45° from horizontal
- The tank is properly sized for your longer term needs

Small scale wind

Wind turbines harness wind energy to turn aerodynamic blades that turn a rotor which creates electricity. Individual turbines can range from few hundred watts to two or three megawatts, with the average typical domestic system being 2.5 kilowatts.

Types of turbines

There are horizontal or vertical axis wind turbines. Vertical axis turbines are generally more visually pleasing and quieter. However, they are generally less efficient at harnessing the wind energy and require a fairly high wind speed to start rotation. Small scale wind turbines are currently being developed ranging from very small turbines that can be mounted on boat's masts or for caravans and houses. Roof mounted turbines, turbines on towers, free standing and building integrated turbines that can be used as a design feature are also available.

Points to note

Noise from micro wind turbines will generally be of an acceptable level. However, to protect nearby residents from any potential noise a condition may be attached to any masts controlling the level of noise.

Small scale hydro energy

Hydropower is a well-established technology. Water is used to drive a wheel or turbine to produce electrical or mechanical energy. Micro hydro plants vary in size and power output, from a few hundred watts (possibly for use with batteries) for domestic schemes.

Points to note

Is there a back up power system and is there a grid connection point nearby?

Will there be an impact on the river's ecology or implications on recreation and access?

Will there be more than one end user?

Ground Source Heat Pumps

Heat Pumps remove heat stored in the earth and transfers it into the home. The sun naturally replaces the heat removed from the ground. Heat is transferred from the garden into the house by using a ground loop, or coils are used to extract heat and is connected to a heat pump inside your home (similar to a refrigeration cycle). A Ground Source Heat Pump is 3 to 4 times as energy efficient as the most efficient gas or oil burner.

Three options are available for the ground loop: borehole, straight horizontal and spiral horizontal.

Points to note

SEPA should be consulted by applicants as authorisation may be required for the construction, or extraction, of a borehole or well for the purpose of abstraction.

Bioenergy

Biomass can be used to generate heat and/or electricity at various scales. Biomass is fuel, usually compressed into pellets or chips, which is burned in domestic stoves. A range of biomass fuels can be used such as forestry products, energy crops or wastes from agricultural sources. This often replaces electricity, oil or gas as a fuel for heating homes. Wood fuel can be sourced in three main forms; pellets, chips or logs. The type of fuel used depends on the biomass heating system that is selected. Biomass can be used to heat your home in two ways, either by the smaller scale stand alone stove fuelled by logs or pellets to heat the room or by a biomass boiler which is connected to central heating and hot water systems.

Smaller domestic applications with a typical heat requirement of 2-12 kW are ideal for traditional room heaters or stoves. These will usually require fuel in the form of logs or pellets and can provide direct space heating, or be used in conjunction with a fossil-fuelled central heating system.

Points to note

- An accredited installer will be able to provide more detailed advice regarding suitability.
- It is important to check that there is enough storage room for fuel and a local supplier

The vent material of the flue must be specifically designed and all installations must comply with all safety and building regulations.

Case Studies

Findhorn Ecovillage

This project involved the installation of an $8m^2$ solar panel on the community kitchen within Findhorn Foundation. The project was completed by Secon Solar Ltd panels. The installation was one of the first solar installations for the Highlands and Island Enterprise Community Energy Unit. The community group estimate that the system will generate 4400kWh of heat and save 0.8 tonnes of carbon annually. Carbon savings are based on replacing LPG at $0.19/CO_2/kWh$. A grant of £4600 was awarded by the SCHRI.

In addition the Findhorn Ecovillage have four community-owned wind turbines, which have a total capacity of 750kW which supply more than 100% of the community's electricity needs. The system is unusual in that the community owns its own private electricity grid, the main campus having originally been a private caravan park. The electricity produced by the turbines is sent to a substation that meters the flows, alters the transmission voltages and acts as a switching station. When the wind blows the electricity is used on-site. If production exceeds demand the surplus is exported to the grid.

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Forestry commission, Huntly

The first wood-fuel system to be installed by the Forestry Commission in Scotland, and indeed one of the first installed by the public sector in the North-East is an automated boiler at the Forestry Commission offices in Huntly. It is a state-of-the-art, automatic boiler that burns wood chips from sustainably managed local forests to provide the 25 staff with warm rooms.

The boiler at Huntly uses chips made from wood harvested from local forests. It is fed automatically from a hopper that is refilled once every few weeks by the chip supplier, and generates about 30 kilowatts of heat output, which reduces electricity consumption by approximately 65,000kWh/year. Its installation received 50% funding assistance (£20,657.11) from the Scottish Executive through the Scottish Community & Householder Renewables Initiative (SCHRI). The office was previously heated by electric storage heaters.

Contact info:
Charlton Clark,
Forestry Commission Scotland press office,
t: 0131 314 6507;

Crown Estate, Tomintoul

A 28kw Froling boiler has been installed together with a new wet heating system at the Glenlivet Estate Office and Information centre. Moray Council, HIE Moray and the EU Community Economic Development Programme (CED) have provided grant support for this project. This is to help establish a demonstration project in the area to allow visitors and other potential businesses to see a domestic scale wood chip heating system in operation. The system helps provide more sustainable, energy efficient heating for the office and visitor centre and will help support a locally based firewood and woodchip supply business operated by Tomintoul resident Alec Thomson.

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Domestic micro-wind

In this example the applicant sought to install a micro-wind turbine on environmental/ sustainable grounds and due to the soaring costs of oil. The turbine (a 6 kW wind turbine by the company Proven Engineering Ltd) which is located a short distance from the coast has a hub height of 9m and a rotor diameter of 5.5m. A 6 Kw is better suited to a larger house or to someone who wants to generate an excess of electricity for exporting on to the national grid. The predicted annual output can produce up to 15,000 kWh.

The turbine cost £18,000 to install with a further £2000 to change the oil-based boiler that had previously been in place. The applicant has been awarded funding of up to £5000 by the DTI. As it is still newly installed the results have yet to be fully appreciated but it is expected a financial payback within 10-12 years.

- Further information

Visit www.moray.gov.uk for links and information on small-scale micro renewable technologies.

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Energy Savings Trust – 0800 512 012

Compliance with policy ER2 -information for applicants

Aim

- This document is intended to advise developers and their agents on whether planning permission is required for small-scale micro renewables. It highlights the environmental issues that must be considered, advises on the different technologies that are available, where to find out more information and how to achieve a 10% CO2 reduction.

Background

- The main driver for increasing renewable energy production is the contribution that it can make to reducing CO 2 emissions. Using renewable energy can reduce the amount of fossil fuels used, and so reduce emissions of the greenhouse gases that are causing climate change.

- In 2003 in the UK, the energy used in homes produced 27% of the carbon dioxide emissions entering the atmosphere. At the same time only 2.7% of the total energy supply was from renewable energy sources. The average annual electricity consumption for a UK household is between 3000kwh and 6000kwh (kilowatt-hours) and for gas between 15,000kwh and 22,000 kwh. The average household could save, by taking energy efficiency measures, up to an equivalent of around 2 tonnes of CO_2 (= 0.5 tC).

- The Moray Council adopted its 'Renewable Energy Strategy' in June 2006. This document sets out a strategy for developing and promoting the use of Renewable Energy in Moray. The strategy encourages domestic and small-scale community renewable energy schemes. It seeks sensitive design of installations to take full account of the historic and built or natural environment.

- The relevant Moray Development Plan Policy is ER2:

  ER2 Renewable Energy Requirements in New Developments

  This policy aims to promote the use of small – scale renewable energy technology at a domestic level. This could be provided through a variety of methods including solar panels or domestic scale wind turbines.

  Proposals for new development of over 10 houses or non residential buildings of over 500 sq. metres must include provision for renewable energy generation, to reduce CO2 emissions by 10%. The location of renewable energy generation equipment should not significantly detract from the amenity, appearance or character of the site.

- This guide is not comprehensive and for more detailed guidance further information should be obtained from the Energy Savings Trust (www.est.org.uk) who work with householders, businesses and the public sector. The Scottish Community Householder Renewables Initiative (SCHRI) can also be accessed from the same website. Costs for each technology will vary depending on the model used, size of installation, site constraints etc. To get more details on costs, the issues affecting them and grants available contact the Renewables Officer based in the EST's Advice Centre on 0800 512 012 or visit the website at www.est.org.uk/schri or at www.hie.co.uk. In addition an updated webpage for links on installers, technical providers, grants and funding can be viewed at www.moray.gov.uk.

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• siting, form, orientation and layout of buildings to maximise the benefits of solar energy, passive solar gain, natural ventilation and natural light;
• the use of landscaping and boundary treatment to modify temperature extremes, minimise heat loss due to exposure and create shelter on inner faces and entrances to buildings;
• optimum provision of insulation and the use of energy efficient heating/cooling systems;
• the use of a flexible design to facilitate possible future adaptation for other uses.

- **Information required with planning applications involving small-scale micro renewables.**

All applications for 10 or more houses or non residential buildings of over 500m2:

Applications will have to provide details of the technology that will be used and the size, design and siting of the technology.

In addition to the above, applications have to be accompanied by an Energy Statement which provides baseline information on the total floor area of the development, type of buildings, the total energy demand and demonstrate that a 10% reduction in carbon emissions will be achieved. It is recommended that the BREDEM-12 model, SAP 2001 or another approved assessment model is undertaken at an early phase.

- **Calculating carbon emissions**

The Government's Building Research Establishment Domestic Energy Model is the basis for the SAP 2001 or NHER model, which the council recommends to use for the base line information on assessing energy usage. (Other models may be used but must be accredited) Information can be found at http://www.nher.co.uk/pages/software/new_build.php or http://projects.bre.co.uk/sap2001/. These assessments should be carried out in advance of submission of planning applications, and be submitted with the application in the form of an Energy Statement.

The Council recommends the use of the Carbon Trust emission factors. Renewable energy offers differing carbon saving potential for typical domestic installations. Below is a table and example from The Carbon Trust showing emission factors which should be multiplied by the total predicted energy demand to provide the estimated carbon emissions.

Carbon emission factors		
Fuel	kg C/kWh	kg CO_2/kWh
Electricity	0.0453	0.1661
Natural gas	0.0518	0.19
Coal	0.0817	0.3
Gas/diesel oil	0.068	0.25
Heavy fuel oil	0.0709	0.26
LPG	0.0627	0.23

Example:

Fitting a micro-generation system that saves 1.2 MWh of electricity annually results in a saving of:

Carbon 1.2MWh = 1200 kWh
1200 x 0.0453 = 54.36 kg

Carbon dioxide 1.2MWh = 1200 kWh
1200 x 0.1661 = 199.32 kg

Calculating the 10% Carbon Emissions savings (CO2)
The Energy Statement should clearly identify the 10% saving to be achieved and how this is likely to be achieved.

Example 1
A development of 10 homes with a total predicted electricity demand of 122190 kwh/yr would result in;

122190 x 0.1661 = 20295 kg CO2/kwh carbon emissions

In this example the saving could be achieved by installing 9 solar panels with each panel contributing a saving of approx. 230 kg CO2/ Kwh

Example 2
A school with an internal floor area of 2000m2 with a total gas demand of 370000 kwh/yr would result in;

370000 x 0.19 = 70300 kg CO2/Kwh carbon emissions

In this example the saving could be achieved by installing one 3 kw wind turbine would contribute a saving of approx. 9500 kg CO2/ Kwh

- For more examples and information on calculating emission savings this can be found at:

'Renewable energy sources for homes in rural environments' (CE70), the 'London Renewable Toolkit' www.**london**.gov.uk/mayor/environment/energy/renew_resources.jsp
Meeting the 10 per cent target for renewable energy in housing – a guide for developers and planners. www.est.org.uk
The Carbon Trust website should be visited for further details - www.carbontrust.co.uk
NHER Builder is authorised software designed for assessing dwellings against the 2002 building regulations in England, Wales, Scotland and Northern Ireland - http://www.nher.co.uk/pages/software/new_build.php - www.est.org.uk/housebuilders/calculators/boilersizing/index.cfm this sizing wizard can be used to get the replacement boiler that runs most efficiently, has lower running costs and produces lower carbon emissions.

- Once the 10% quota is calculated for the proposal, the developer then has to demonstrate, by which Renewable Energy technologies, the 10% reduction will be achieved. The proposed Renewable Energy technology must be part of the planning application. For further details and costs of technologies visit the EST website.

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