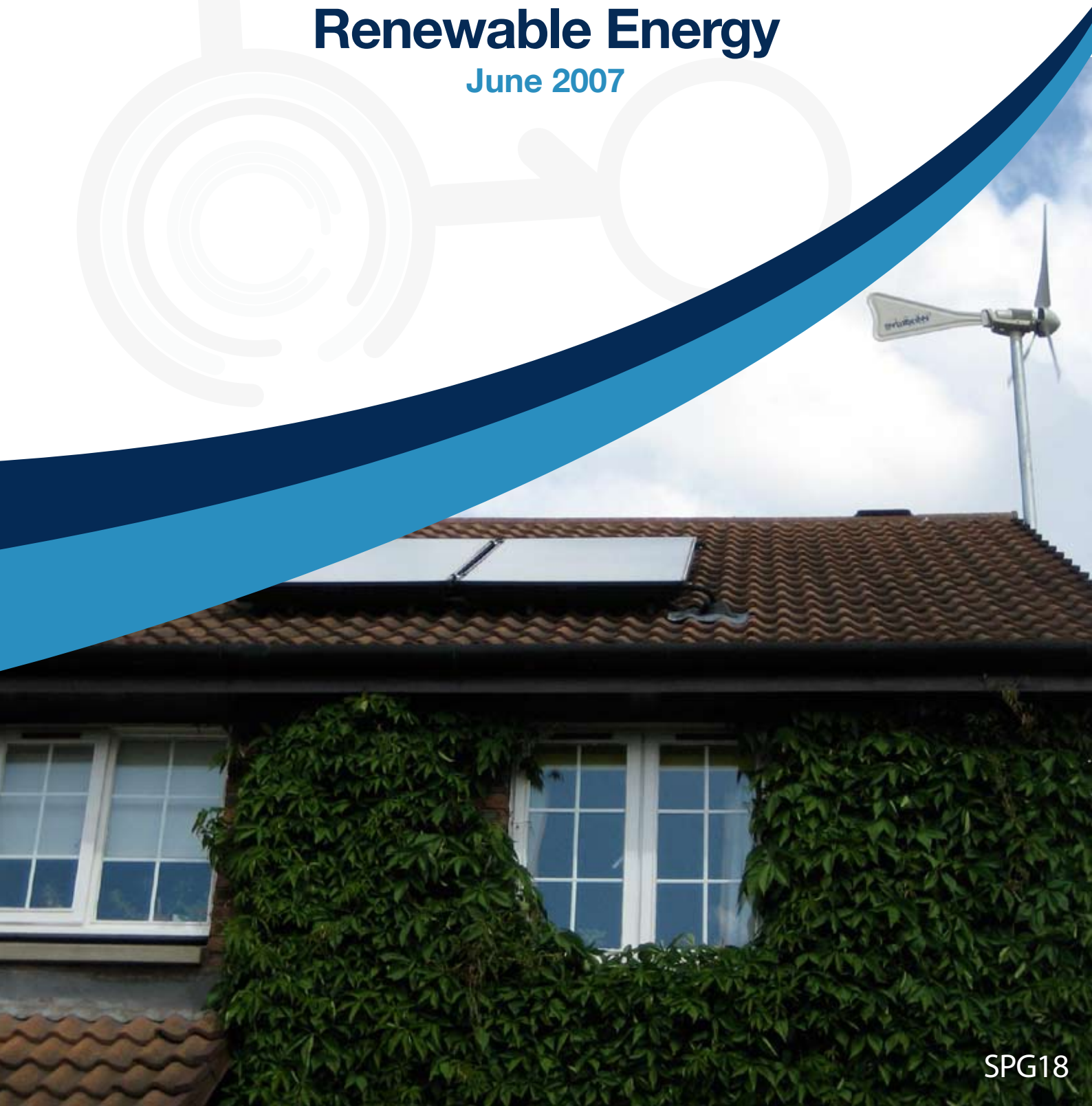
Our Scottish Borders
Your environment

Scottish Borders Local Plan

Supplementary Planning Guidance No 18

Renewable Energy

June 2007



SPG18

Contents

Summary of new requirements

SECTION 6: Planning policy

SECTION 7: Energy efficiency

SECTION 8: Combined Heat and Power (CHP)

SECTION 9: Carbon dioxide emissions assessments

SECTION 10: Further information

GLOSSARY

Summary of new requirements

This Supplementary Planning Guidance on Renewable Energy has been adopted by Scottish Borders Council and as such the guidance provided within it will be a material consideration in the determination of any relevant planning applications.

In summary

1. **The Council now requires all future developments with a total cumulative floorspace of 500m2 or more to reduce carbon dioxide emissions (CO2) by 15% beyond the 2007 Building Regulation carbon dioxide emission levels.**

2. **To achieve this 15% reduction, consideration should first be given to energy efficiency and building design measures.**

3. **Where the 15% reduction cannot be met through energy efficiency and design measures then on-site low or zero carbon technologies (LZCT) including renewable energy systems should be used.**

4. **Developments under 500m2 are also strongly encouraged to achieve an additional 15% reduction in carbon dioxide emissions through these measures.**

5. **Under the European Directive on Energy performance un Buildings new buildings and existing buildings undergoing major renovation which have a total useful floor area over 1000m2 now require alternative energy systems to have been considered before construction starts.**

6. **All applications for planning permission will also now require a statement on how energy efficiency measures and low and zero-carbon technologies have been incorporated into the development proposal.**

Back to contents page

Section 1: Introduction

1.1 Purpose of this guidance

The Finalised Scottish Borders Local Plan (Dec 2005) promotes a sustainable approach to development. The core elements of this approach are firstly to address the use and generation of energy; secondly to raise awareness of the potential to reduce energy use (energy efficiency); and thirdly to meet energy needs through the use of low and zero-carbon technologies (LZCT) including renewable energy technologies

The purpose of this Supplementary Planning Guidance (SPG) is to set out Scottish Borders Council planning requirements in relation to:

(i) the use of renewable energy systems for new and existing developments
(ii) the reduction of carbon dioxide emission levels from new developments.

This SPG requires all new developments of 500m2 or more and strongly encourages all other new developments to reduce carbon dioxide emission levels by an additional 15% beyond the 2007 Building Regulations carbon dioxide emission levels.

This SPG provides advice for householders, developers, and communities within the Scottish Borders on how to meet this additional 15% reduction in carbon dioxide emission levels through energy efficiency and design measures and through the use of low and zero-carbon technologies such as on-site renewable energy systems.

It also provides advice for those who are considering incorporating renewable energy systems into existing developments.

This guidance will help to ensure consistency in the interpretation of planning policies in relation to meeting the 15% reduction in carbon dioxide emission levels and in consideration of developments incorporating low and zero-carbon technologies and renewable energy systems within the Scottish Borders area.

1.2 The energy hierarchy

Whilst the focus of this guidance is on renewable energy, before even thinking about incorporating renewable energy technology into a development of any kind the first consideration should always be:

Has everything possible been done to minimise energy demand?

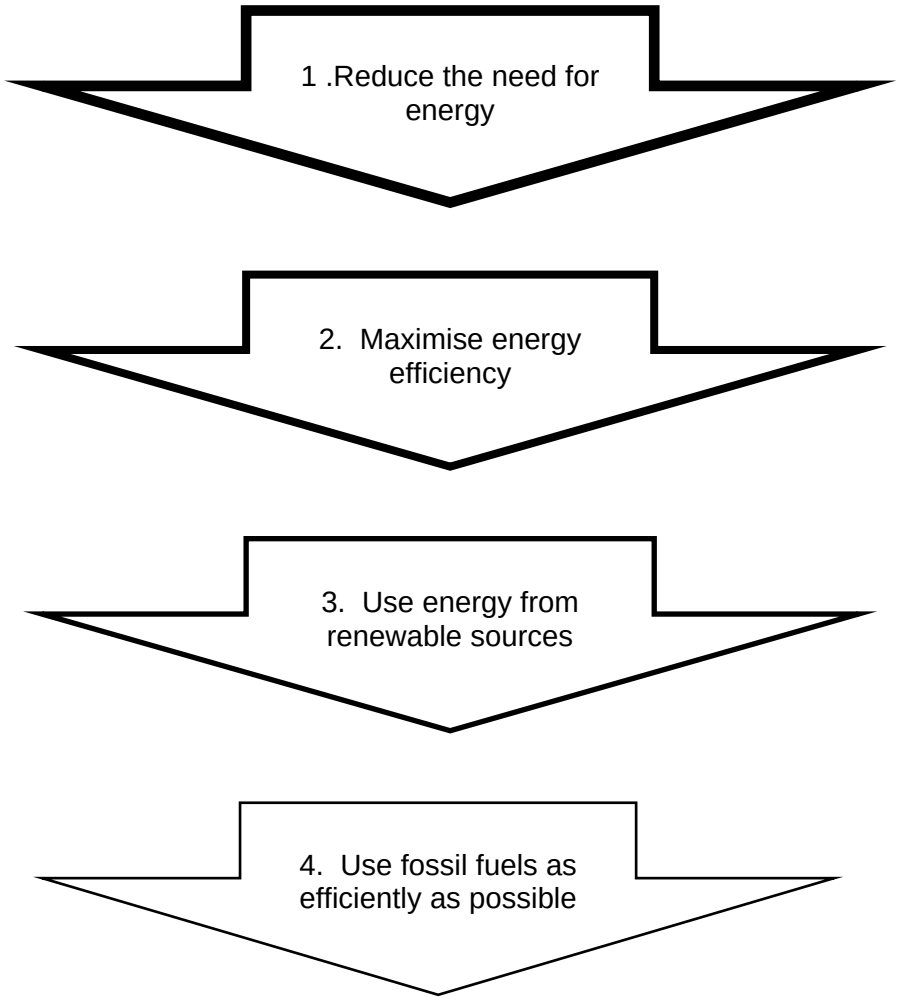
When considering energy use within a development the Energy Hierarchy is a useful reminder; a building designed to be energy efficient from the outset will use less energy for heating and electricity, whatever the chosen means of energy generation. It makes little sense to create unnecessary energy demands and then attempt to meet these demands through the use of

renewable energy technology. Designing-out energy demand is almost certainly likely to be a more cost effective option.

Energy demand can be reduced through choice of an appropriate location, building form and orientation and making best use of available daylight, natural ventilation and insulation. As a minimum all development proposals, especially major commercial and residential developments, should be able to demonstrate that consideration has been given to these issues.

More detailed information on energy efficiency can be found in Section 7.

The Energy Hierarchy



1.3 Layout of this guidance

This guidance has not been designed to be read from cover-to-cover, but rather to allow those with different interests to easily find the parts of the guidance which are most relevant to their needs.

Specific guidance is provided for:

- **Developers (Section 2)**
- **Householders (Section 3)**
- **Community Groups (Section 4).**

If you are viewing this document on-line simply click on the LINKS throughout the document to get to the appropriate sections.

This guidance provides information on how to achieve the required 15% reduction in carbon dioxide emissions and also seeks to answer the following frequently asked questions for a number of renewable energy technologies:

- What does it do?
- How does it work?
- What are the general considerations?
- What are the planning requirements?
- Where can I get further information?

The main parts of the guidance focus on:

- Renewable energy technologies (Section 5)
- Energy efficiency and design (Section 7).

Additional information is included on:

- Combined Heat and Power Systems (CHP) (Section 8)
- Assessing carbon dioxide emissions (Section 9)
- Sources of further information and advice (Section 10).

1.4 Scope of this guidance

Commercial Windfarms

This guidance does not cover commercial-scale windfarms. This issue is covered by the Scottish Borders Finalised Local Plan (December 2005), Policy D4: Renewable Energy Development. This document can be examined at any of the Council's Area Offices or public libraries, or viewed on-line at:
www.scotborders.gov.uk/life/planningandbuilding/plansandresearch/9088.html.

Micro-renewables

"Micro-renewables" is the term which is used to refer to the generation of energy at a small scale ie: the production of heat (less than 45 kW capacity) and/ or electricity (less than 50kW capacity) from renewable energy technologies which harness the power of wind, water, daylight/ sun to produce heat and electricity. The focus of this guidance is micro-renewables technologies as these generally have a greater impact on the public realm and are therefore planning issues.

"Micro-generation" is the term used to refer to small scale energy generation through any means, including but not limited to renewable energy. For example, micro-generation includes combined heat and power systems (CHP) not all of which are driven by renewables.

Technologies covered by this guidance

This guidance is based on the most common types of renewable energy technologies currently available. It should be noted that the field of renewable energy is growing in terms of both the technologies and their application. The flowcharts used in Section 5 identify some of the key issues which should be considered, but cannot be exhaustive.

Further information
Please note that Scottish Borders Council cannot be held responsible for the content or accuracy of information contained on any of the external websites which are identified in this guidance.

1.5 National policy on renewable energy

The Scottish Executive is committed to increasing the amount of renewable energy which is generated and used in Scotland. The Scottish Ministers have set a target of generating 40% of Scotland's electricity (6GW) from renewable sources by 2020.

Use of renewable energy will help to address the causes of climate change, many of which have been attributed to conventional power generation which releases huge amounts of carbon dioxide through its use of fossil fuels. The Government has set a target of cutting carbon dioxide emissions by 60% by the year 2050, and ensuring a secure supply of energy from local, renewable resources.

Scottish Planning Policy 6: Renewable Energy (SPP6), published in March 2007, sets the national planning policy context within which these targets must be achieved. SPP6 states in paragraph 35 (page 10) that:

> *The expectation should be that all future applications proposing development with a total cumulative floorspace of 500 square metres or more should incorporate on-site zero and low-carbon equipment contributing at least an extra 15% reduction in CO2 emissions beyond the 2007 building regulations carbon dioxide emissions standard.*

In producing this Supplementary Planning Guidance Scottish Borders Council has aligned itself with this national policy and in future will require a 15% reduction in CO2 emissions to be met.

CO2 emissions can be reduced through the use of on-site renewable energy systems and through energy efficiency measures, including building design and orientation. To meet the required 15% reduction in CO2 emissions the Council promotes the energy hierarchy approach outlined in Section 1.2 of this guidance and favours the use of energy efficiency measures as the first step in meeting the required emissions reduction.

SPP6 states in paragraph 7 (page 2) that:

> *The Scottish Ministers are also keen to see a major increase in the smaller scale production of heat and electricity from renewable sources.*

It is likely that this will be largely achieved through domestic scale applications of renewable energy technologies such as micro wind turbines, woodchip boilers, heat pumps and solar heating systems. Further details of these technologies can be found in Section 5 of this guidance.

Back to contents page

SECTION 2: Guidance for Developers

2.1 Introduction

With increasing public and political interest in environmental issues, especially climate change, some companies and clients are specifically looking to invest in buildings or developments which have not only been designed to high specifications but which will also use the company's own environmental credentials.

The inclusion of renewable energy technologies in developments can have benefits for both the developer and the end user. Developers are able to demonstrate their competence and enthusiasm in an area of building and design in which opportunities are likely to expand as political and public understanding and concern over environmental issues continue to grow.

The users of finished developments which incorporate renewable energy technologies can look forward to being insulated against any rise in energy costs and issues around security of supply by using natural resources such as the sun and wind to generate energy locally.

Barriers remain to the installation of renewable energy technologies on a wider scale. These include lack of public awareness of the benefits and costs together with limited availability of people trained to install and maintain renewable energy systems. It will therefore remain important for all new developments to have an eye on the future in terms of being able to retro-fit renewable energy technologies.

2.2 Planning Requirements

a) This Supplementary Planning Guidance has been adopted by Scottish Borders Council and as such the guidance provided within it will be a material consideration in the determination of any relevant planning applications.
b) The Council requires all future applications for development with a total cumulative floorspace of 500m2 or more, and strongly encourages all other developments to reduce CO2 emissions by an extra 15% beyond the 2007 building regulations carbon dioxide emissions standard through incorporation of on-site low or zero carbon technologies (LZCT[1]), where technically feasible[2]. The preferred approach for meeting this 15% reduction is through incorporation of energy efficiency measures. Where the additional 15% is met through efficiency measures the requirement for on-site LZCT will be waived.
c) Undertaking a carbon dioxide emissions assessment will be necessary to determine the scale of localised or building integrated LZCT or renewable energy system that is required to meet this reduction. Planning applications for qualifying developments should be accompanied by this assessment (Section 9).
d) Planning applications should indicate how energy efficiency measures and renewable energy technologies have been incorporated into the development proposal.
e) To achieve the best outcomes, renewable energy technologies should be included in the design considerations for the development from the outset.

[1] LZCT includes the renewable energy technologies described in Section 2 of this guidance.
[2] Developers will be required to demonstrate that they have explored the options for renewable energy and explain their reasoning if incorporating the minimum 15% is deemed not feasible.

f) Retro-fitting of some renewable energy technologies such as photovoltaic panels (PV), is relatively straightforward. Therefore any major developments which do not initially incorporate PV should be designed and orientated so that PV panels can subsequently be incorporated.
g) Best industry standards should be followed to ensure that visual implications of renewables equipment is fully addressed, including connecting structures, pipes, wires, etc.
h) If the renewable energy proposal is located within a listed building then Listed Building Consent will be required for works which the planning authority considers will alter the character of the building. In some instances Listed Building Consent will be required whilst planning permission may not.

2.3 How to use this guidance

This guidance provides information on:

- A range of renewable energy technologies: Section 5
- Planning policy context: Section 6
- Energy Efficiency: Section 7
- Combined Heat and Power (CHP): Section 8
- Carbon dioxide emissions assessment: Section 9
- Further information: Section 10.

2.4 Additional considerations

If the renewable energy proposal is located within a listed building then Listed Building Consent will be required for works which the planning authority considers will alter the character of the building. In some instances Listed Building Consent will be required whilst planning permission may not. In the case of applications at Category A or B listed buildings, it is recommended that pre-application discussion is arranged via the Council with the Area Inspector from Historic Scotland.

Officers in the Heritage & Countryside Section of the Council will be able to provide advice on listed buildings and conservation areas as well as the natural heritage and archaeology:

Scottish Borders Council
Planning & Economic Development
Council Headquarters
Newtown St Boswells
Melrose TD6 0SA
Telephone: 01835 825060

Historic Scotland
Historic Scotland Head Office
Longmore House
Salisbury Place
Edinburgh, EH9 1SH
Telephone: 0131 668 8600

Early consultation with Planning and Building Standards officers will confirm whether planning permission and/ or a building warrant will be required and the type of information which will need to be provided. Useful websites include:

www.historic-scotland.gov.uk/listedbuildings
www.scotborders.gov.uk/life/environment/buildtheritage/2676.html.

2.5 European Directive on Energy Performance in Buildings

It is a requirement under the European Directive of Energy Performance in Buildings (EU Directive 2002/91/EC) that new buildings which have a total useful floor area over 1,000m^2 will require the technical, environmental and

economic feasibility of alternative energy systems to have been considered before construction starts.

These technologies are:

- decentralised energy supply systems based on renewable energy (Section 5)
- Combined Heat and Power (CHP) (Section 8)
- district or block heating or cooling and heat pumps (Section 5).

A similar requirement applies to existing buildings with a total useful floor area over 1000m^2 that are undergoing major renovation.

Back to contents page

SECTION 3: Guidance for Householders

3.1 Introduction

Energy and environmental issues seem to hit the news headlines almost on a daily basis with increasing political and public concern on the issue of climate change.

Incorporating renewable energy technology into your home has many benefits for the environment, but it can also help to reduce your running costs for providing heating, hot water and energy.

Using natural resources such as the sun and wind to provide heat and power means that you will be insulated against the rising costs of conventionally produced energy, and from the possible interruption of energy supplies from distant and potentially, politically unstable countries.

Barriers to incorporating renewable energy technologies into your home exist, but there are an increasing number of places to go for help and advice on finding suitably qualified trades people to undertake installation and maintenance work.

Check out the flowcharts in Section 5 to find out which renewable energy technologies might be suitable for you.

To achieve the best outcomes, renewable energy technologies should be considered from the outset of any development proposal. Incorporating renewable energy technologies into a new house should be considered by the architect and builder as an integral part of the building design.

Best industry standards should be followed to ensure that visual implications of renewables equipment is fully addressed, including connecting structures, pipes, wires, etc.

Building design, orientation and location will all influence the choice of renewable energy technology most suited to your development.

The way the building is intended to be used and by whom will also influence the type of renewable energy technology which will most suit your needs.

Installing renewable energy technologies for existing buildings or extensions is more straightforward for some technologies (such as solar water heating or photovoltaic panels) than for others (such as a ground source heat pump).

Renewable energy technologies can be combined to take advantage of more than one resource available at a site eg: a solar-powered water heating system combined with electricity generated through a wind turbine.

This Supplementary Planning Guidance has been adopted by Scottish Borders Council and as such the guidance provided within it will be a material consideration in the determination of any relevant planning applications.

3.2 Planning requirements

a) The Council requires all future applications for development with a total cumulative floorspace of 500m2 or more, and strongly encourages all other

developments to reduce CO2 emissions by an extra 15% beyond the 2007 building regulations carbon dioxide emissions standard through incorporation of on-site low or zero carbon technologies (LZCT[3]), where technically feasible[4]. The preferred approach for meeting this 15% reduction is through incorporation of energy efficiency measures. Where the additional 15% is met through efficiency measures the requirement for on-site LZCT will be waived.

b) Undertaking a carbon dioxide emissions assessment will be necessary to determine the scale of localised or building integrated LZCT or renewable energy system that is required to meet this reduction. Planning applications for qualifying developments should be accompanied by this assessment (Section 9).

c) Planning applications should indicate how energy efficiency measures and renewable energy technologies have been incorporated into the development proposal.

d) There is no short answer to whether your proposed renewable energy technology will require planning permission as it depends on the technology you chose and the location of the development.

e) The diagrams in Section 5 of this guidance give an indication of the types of issues which you will need to consider.

3.3 How to use this guidance

This guidance provides information on:

- A range of renewable energy technologies: Section 5
- Planning policy context: Section 6
- Energy Efficiency: Section 7
- Combined Heat and Power (CHP): Section 8
- Carbon dioxide emissions assessment: Section 9
- Further information: Section 10.

3.4 Additional considerations

If the renewable energy proposal is located within a listed building then Listed Building Consent will be required for works which the planning authority considers will alter the character of the building. In some instances Listed Building Consent will be required whilst planning permission may not. In the case of applications at Category A or B listed buildings, it is recommended that pre-application discussion is arranged via the Council with the Area Inspector from Historic Scotland.

Officers in the Heritage & Countryside Section of the Council will be able to provide advice on listed buildings and conservation areas as well as the natural heritage and archaeology:

[3] LZCT includes the renewable energy technologies described in Section 2 of this guidance.
[4] Developers will be required to demonstrate that they have explored the options for renewable energy and explain their reasoning if incorporating the minimum 15% is deemed not feasible.

Scottish Borders Council
Planning & Economic Development
Council Headquarters
Newtown St Boswells
Melrose TD6 0SA
Telephone: 01835 825060

Historic Scotland
Historic Scotland Head Office
Longmore House
Salisbury Place
Edinburgh, EH9 1SH
Telephone: 0131 668 8600

Early consultation with Planning and Building Standards officers will confirm whether planning permission and/ or a building warrant will be required and the type of information which will need to be provided.

Useful websites include:
www.historic-scotland.gov.uk/listedbuildings
www.scotborders.gov.uk/life/environment/buildtheritage/2676.html.

Back to contents page

SECTION 4: Guidance for Community Groups

4.1 Introduction

Energy and environmental issues are increasingly in the news headlines, and there is rising political and public concern on the issue of climate change.

Incorporating renewable energy technology into community projects/ buildings will not only have benefits for the environment, but it can also help to reduce running costs for providing heating, hot water and energy.

Using natural resources such as the sun and wind to provide heat and power means that you will be insulated against any rise in costs of conventionally produced energy, and from the possible interruption of energy supplies from distant and potentially, politically unstable countries.

Barriers to incorporating renewable energy technologies into community projects exist as they do at the domestic scale. There are however an increasing number of places to go for help and advice on finding suitably qualified trades people to undertake installation and maintenance work.

The renewable energy technologies you chose will depend on the type of development you are proposing. Section 5 provides an introduction to the most commonly used renewable energy technologies and will help you to find out which renewable energy technologies might be suitable for your proposed development.

Some key influences on the type of renewable energy technology which will be most suitable for you include: building design, orientation and location; the purpose of the proposed building; how often the building is to be used; what the purpose of the building is; by whom it will be used.

Renewable energy technologies can be combined to take advantage of more than one resource at a site eg: a solar-powered water heating system combined with electricity generated through a wind turbine.

There is no short answer to whether your proposed renewable energy technology will require planning permission as it depends on the technology you chose and the location of the development.

4.2 Planning requirements

a) This Supplementary Planning Guidance has been adopted by Scottish Borders Council and as such the guidance provided within it will be a material consideration in the determination of any relevant planning applications.
b) The Council requires all future applications for development with a total cumulative floorspace of 500m2 or more, and strongly encourages all other developments to reduce CO2 emissions by an extra 15% beyond the 2007 building regulations carbon dioxide emissions standard through incorporation of on-site low or zero carbon technologies (LZCT[5]), where technically feasible[6]. The preferred approach for meeting this 15% reduction is through incorporation of energy efficiency measures. Where

[5] LZCT includes the renewable energy technologies described in Section 2 of this guidance.
[6] Developers will be required to demonstrate that they have explored the options for renewable energy and explain their reasoning if incorporating the minimum 15% is deemed not feasible.

the additional 15% is met through energy efficiency measures the requirement for on-site LZCT will be waived.

c) Undertaking a carbon dioxide emissions assessment will be necessary to determine the scale of localised or building integrated LZCT or renewable energy system that is required to meet this reduction. Planning applications for qualifying developments should be accompanied by this assessment (Section 9).
d) Planning applications should indicate how energy efficiency measures and renewable energy technologies have been incorporated into the development proposal.
e) To achieve the best outcomes, renewable energy technologies should be included in the design considerations for the development from the outset.
f) Retro-fitting of some renewable energy technologies such as photovoltaic panels (PV), is relatively straightforward. Therefore any major developments which do not initially incorporate PV should be designed and orientated so that PV panels can subsequently be incorporated.
g) Best industry standards should be followed to ensure that visual implications of renewables equipment is fully addressed, including connecting structures, pipes, wires, etc.
h) If the renewable energy proposal is located within a listed building then Listed Building Consent will be required for works which the planning authority considers will alter the character of the building. In some instances listed building consent will be required whilst planning permission may not.
i) The provision of a management plan for the use of the energy technology in a finished development can help improve the efficiency of operation by the occupiers.

4.3 How to use this guidance

This guidance provides information on:

- A range of renewable energy technologies: Section 5
- Planning policy context: Section 6
- Energy Efficiency: Section 7
- Combined Heat and Power (CHP): Section 8
- Carbon dioxide emissions assessment: Section 9
- Further information: Section 10.

4.4 Additional considerations

If the renewable energy proposal is located within a listed building then Listed Building Consent will be required for works which the planning authority considers will alter the character of the building. In some instances Listed Building Consent will be required whilst planning permission may not. In the case of applications at Category A or B listed buildings, it is recommended that pre-application discussion is arranged via the Council with the Area Inspector from Historic Scotland.

Officers in the Heritage & Countryside Section of the Council will be able to provide advice on listed buildings and conservation areas as well as the natural heritage and archaeology.

Early consultation with Planning and Building Standards officers will confirm whether planning permission and/ or a building warrant will be required and the type of information which will need to be provided.

Scottish Borders Council
Planning & Economic Development
Council Headquarters
Newtown St Boswells
Melrose TD6 0SA
Telephone: 01835 825060

Historic Scotland
Historic Scotland Head Office
Longmore House
Salisbury Place
Edinburgh, EH9 1SH
Telephone: 0131 668 8600

Useful websites include:
www.historic-scotland.gov.uk/listedbuildings
www.scotborders.gov.uk/life/environment/buildtheritage/2676.html.

4.5 European Directive on Energy Performance in Buildings

It is a requirement under the European Directive of Energy Performance in Buildings (EU Directive 2002/91/EC) that new buildings which have a total useful floor area over 1,000m^2 will require the technical, environmental and economic feasibility of alternative energy systems be have been considered before construction starts.

These technologies are:

- decentralised energy supply systems based on renewable energy (Section 5)
- Combined Heat and Power (CHP) (Section 8)
- district or block heating or cooling, and heat pumps (Section 5).

A similar requirement applies to existing buildings with a total useful floor area over 1000m^2 that are undergoing major renovation.

Back to contents page

Section 5: Renewable energy technologies

5.1 Introduction

Renewable energy is energy which has been generated from inexhaustible sources such as the sun, wind, water and plant material, rather than traditional energy generation methods which rely on fossil fuels (coal, oil, and gas) or nuclear power.

Renewable energy technologies generally fall into two categories: those which produce power (electricity) and those which produce hot water and/ or space heating. Combining renewable energy technologies enables power and hot water/ heat to be produced.

This section provides brief details for the following technologies

- **Solar photovoltaic panels and solar water heating (section 5.2)**
- **Small scale wind turbine (section 5.3)**
- **Small scale hydro electric (section 5.4)**
- **Heat pumps (section 5.5)**
- **Biomass (section 5.6).**

5.1.1 Comparing the costs and benefits

Having addressed the energy efficiency issue, deciding how best to meet the development's remaining energy demand is the next step. Although incorporating renewable energy technology into a development can help to reduce running costs there will almost certainly be a financial cost associated with the purchase, installation and maintenance of the system. As with traditional energy systems used to supply heat and power (including oil, gas or electricity from the national grid) the costs involved will be dependent on the type of technology chosen.

Unlike energy supplied by the national grid, or systems powered by oil, coal or gas systems, once a system powered by renewables is installed there is no on-going cost for fuel as the system will simply tap natural resources such as daylight or wind for example. Renewable energy systems which use biomass are the exception as they usually need an on-going supply of fuel to be purchased (such as wood chips or pellets).

The Energy Saving Trust produces a series of factsheets on renewable energy technologies which includes information on installation, maintenance and running costs for many systems. Details of how to obtain these factsheets are given in Section 10 of this guidance.

During periods when conventional energy costs rise, renewable energy technologies can help to buffer consumers against these rises in costs of conventional energy supply.

In addition to the financial costs associated with use of energy there are also environmental costs. Governments at all levels are now very concerned

about climate change. One of the biggest challenges to addressing climate change is our use of energy generated by traditional fossil fuel systems.

Use of renewable energy sources is becoming increasingly important as a result of international imperatives to address climate change. Renewable energy is also energy that is generally produced locally and can therefore help to ensure a secure and more diverse energy supply network.

5.1.2 Frequently asked questions

Q. What if there is a period of no sun/ wind or the water source dries up?
A. Most properties remain connected to the national grid and therefore have a conventional power back-up system. Alternatively a complementary source of renewable energy generation could be installed, or a conventional diesel-powered generator.

Q. What happens if too much energy is generated?
A. Surplus energy can be sold back into the national electricity grid. For a community scheme this is likely to require the set up of a management company.

Q. How much does it cost?
A. This depends on the technology chosen and the scale of system which is installed (Section 5). Grants are available for some of the initial capital costs (Section 10).

Back to contents page

5.2 Solar photovoltaic panels (PV) and solar thermal

5.2.1 What does it do?

- Solar photovoltaic panels (PV) generate electricity
- Solar thermal systems heat water.

5.2.2 How does solar photovoltaic work?

- Solar photovoltaic panels (PV) convert daylight into electricity, potentially providing a household with 30-50% of its electricity needs over a year
- Solar PV panels are available in a variety of colours and formats including roof tiles. Wall mounted cladding and free-standing solar PV arrays are also available
- PV panels require only daylight not direct sunlight in order to generate electricity.

5.2.3 How does solar thermal work?

- Water is heated by the sun using panels, mounted on a roof or walls or a free-standing array, which is then stored in a hot water cylinder
- This is currently the most cost-effective and affordable renewable technology for housing, providing up to 50% of domestic hot water needs over the course of a year.
- Consideration must be given as to whether the proposed solar system is compatible with any existing water heating system.

5.2.4 General considerations

- The visually acceptable levels of roof/ wall coverage with PV panels will vary with the technology. For example solar tiles, which have a similar appearance to traditional roof coverings, may cover a large percentage of the roof, whereas conventional flat plate collectors that look similar to roof lights will generally need to cover a smaller percentage of the roof, particularly where they are installed in traditional tiled roofs
- PV panels are likely to be less visible on valley roofs, double pitched roofs, roofs contained within parapets, low-pitched roofs not easily seen from the street, flat roofs and platformed roofs
- Wherever possible solar panels should be flush with the roof and mounted at the same angle as the roof to minimise contrast
- Free-standing arrays may be located in garden ground.

5.2.5 Is planning permission required?

- PV panels may have a visual impact on local amenity. The planning authority will need to assess the impacts, if any, of the proposal
- If the PV panels are part of a new development which requires planning permission anyway, the planning authority's assessment will be made as part of the assessment of the whole development proposal
- Planning permission may be required if the solar panels exceed 10% of the roof area or extend more than 10cm beyond the existing plan of the roof or where any part of the proposed development exceeds the height of the highest part of the original roof

- In some instances, provided that the solar panels are not of an unusual design, sited on a listed building, or in a designated area, they can be regarded as permitted development and therefore do not require planning permission
- The General Permitted Development Order (GPDO) Class 2 explains permitted development rights in relation to additions or alternations to the roofs of dwelling houses. Class 23 covers industrial and warehouse developments
- However, in all conservation areas within the Scottish Borders permitted development rights for householders have been removed by an Article 4 Direction. Works to the exterior of buildings or structures in conservation areas are therefore likely to require planning permission
- You should consult the planning authority to find out whether your proposal requires planning permission
- Irrespective of whether planning permission is required, a Building Warrant may be required for some PV panels – contact the Council's Building Standards Officers for further information.

5.2.6 Is Listed Building Consent required?

- Listed Building Consent will be normally required for any alteration to a listed building that impacts on its character or appearance
- A high level of design quality will be required on listed buildings, in conservation areas and on scheduled ancient monuments
- There are examples of PV panels being approved on listed buildings - normally the advice would be to avoid prominent positions. In some circumstances consent may simply not be possible – pre-application discussion is recommended for all such proposals at listed buildings
- Sensitive siting and design will also be required if an application is submitted for the installation of solar panels close to a listed building or scheduled ancient monument
- Historic Scotland will provide advice on solar panels proposed for scheduled monuments. Advice on Listed Buildings and Conservation Areas is given in their Memorandum of Guidance within Appendix 1, section 1.7.1.

5.2.7 Examples in the Scottish Borders

There are examples of solar panels in many different parts of the Borders, including those at (a) Coldstream and (b) Galashiels shown below.

(a) Coldstream

(b) Galashiels

Berwickshire Housing Association has also installed six freeze tolerant solar panels in homes in Coldingham and Duns that provide whole house ventilation with excess energy going into a hot water cylinder. The solar panels allow user control of ventilation output and provide a heat recovery system.

5.2.8 Further information and key contacts

Scottish Borders Council Area Offices

Galashiels Area Office
Albert Place
Galashiels TD1 3DL
Telephone: 01896 662705

Duns Area Office
Newtown Street
Duns TD11 3DT
Telephone: 01361 886105

Hawick Area Office
Town Hall
High Street
Hawick TD9 9EF
Telephone: 01450 364705

Peebles Area Office
Rosetta Road
Peebles EH45 8HQ
Telephone: 01721 726305

Planning & Economic Development
Council Headquarters
Newtown St Boswells TD6 0SA
Telephone: 01835 825060
Website: www.scotborders.gov.uk

Officers in the Heritage & Countryside Section, able to provide advice on listed buildings, conservation areas, natural heritage and archaeology can also be contacted at Council HQ.

Listed Buildings

Historic Scotland Head Office
Longmore House
Salisbury Place
Edinburgh, EH9 1SH
Telephone 0131 668 8600

Useful websites:

www.historic-scotland.gov.uk
www.pastmap.org.uk

Conservation Areas in the Scottish Borders can be found on-line at: www.scotborders.gov.uk/life/environment/buildtheritage/2676.html.

Information on **Building Warrants** is available from the Council's Building Standards Officers who can be contacted at the Area Offices listed above.

General Permitted Development Order can be found on-line at: www.opsi.gov.uk/si/si1992/Uksi_19920223_en_1.htm

Factsheets

Factsheets are available on a range of renewable energy technology systems including Photovoltaic (PV) Solar Electricity, Solar PV: your guide to generating clean electricity, and solar water heating. Contact:

Energy Efficiency and Advice Centre
Changeworks
36 Newhaven Road
Edinburgh EH6 5PY
Telephone: 0800 512 012
Website: www.energysavingtrust.org.uk/generate_your_own_energy

Back to contents page

Diagram 5.2a: Key considerations for solar photovoltaic panels

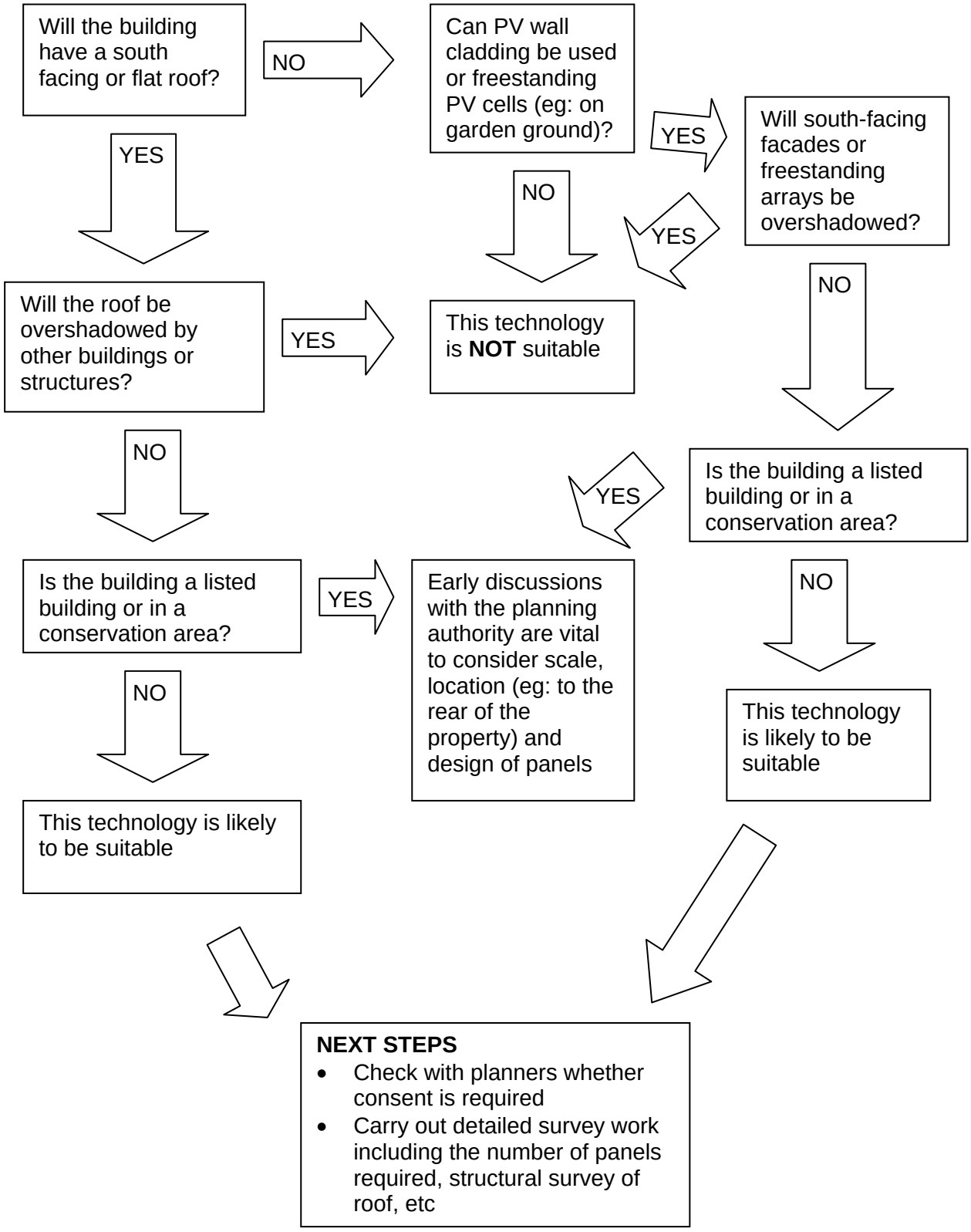


Diagram 5.2b: Key considerations for domestic solar water heating

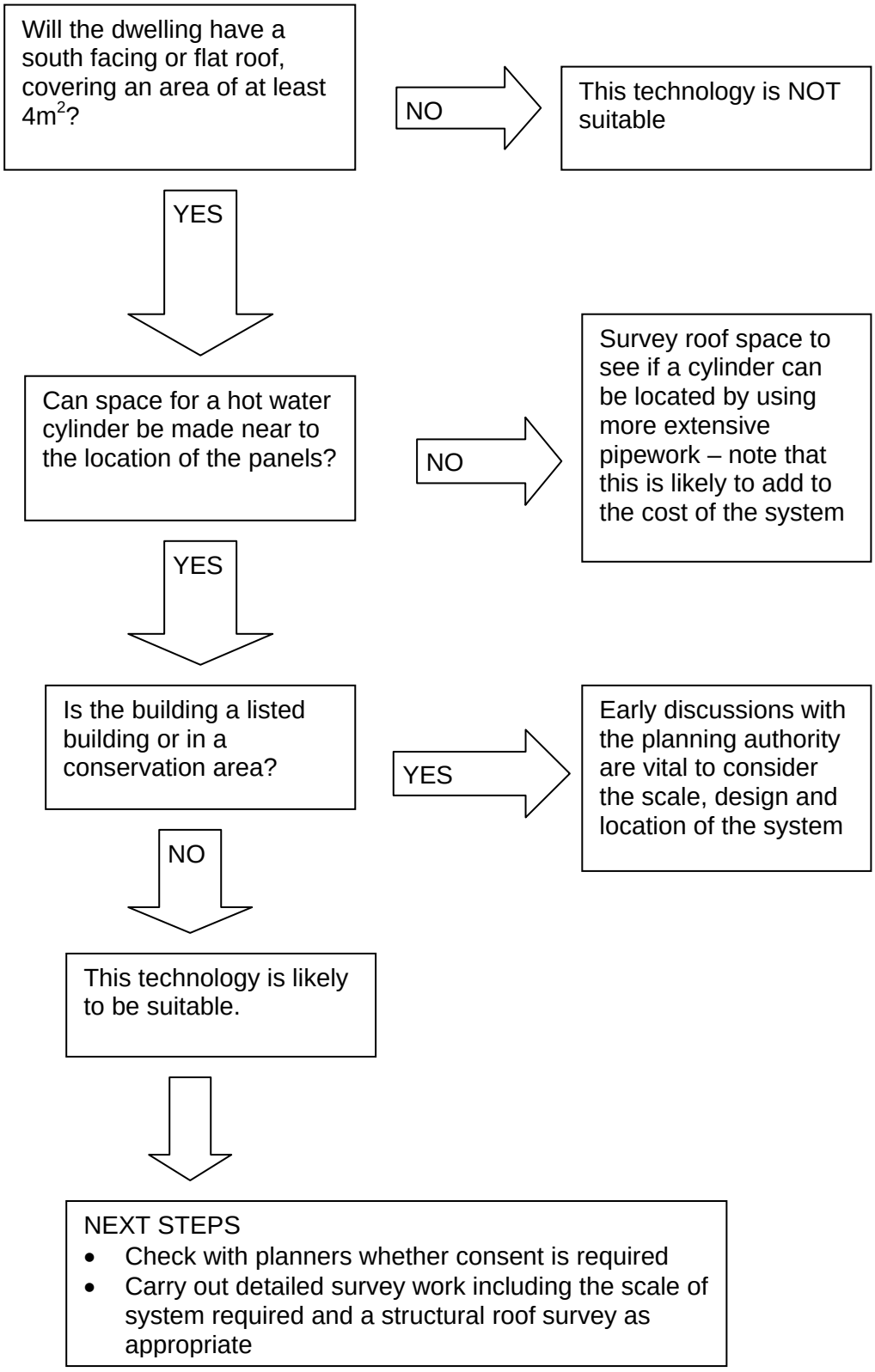
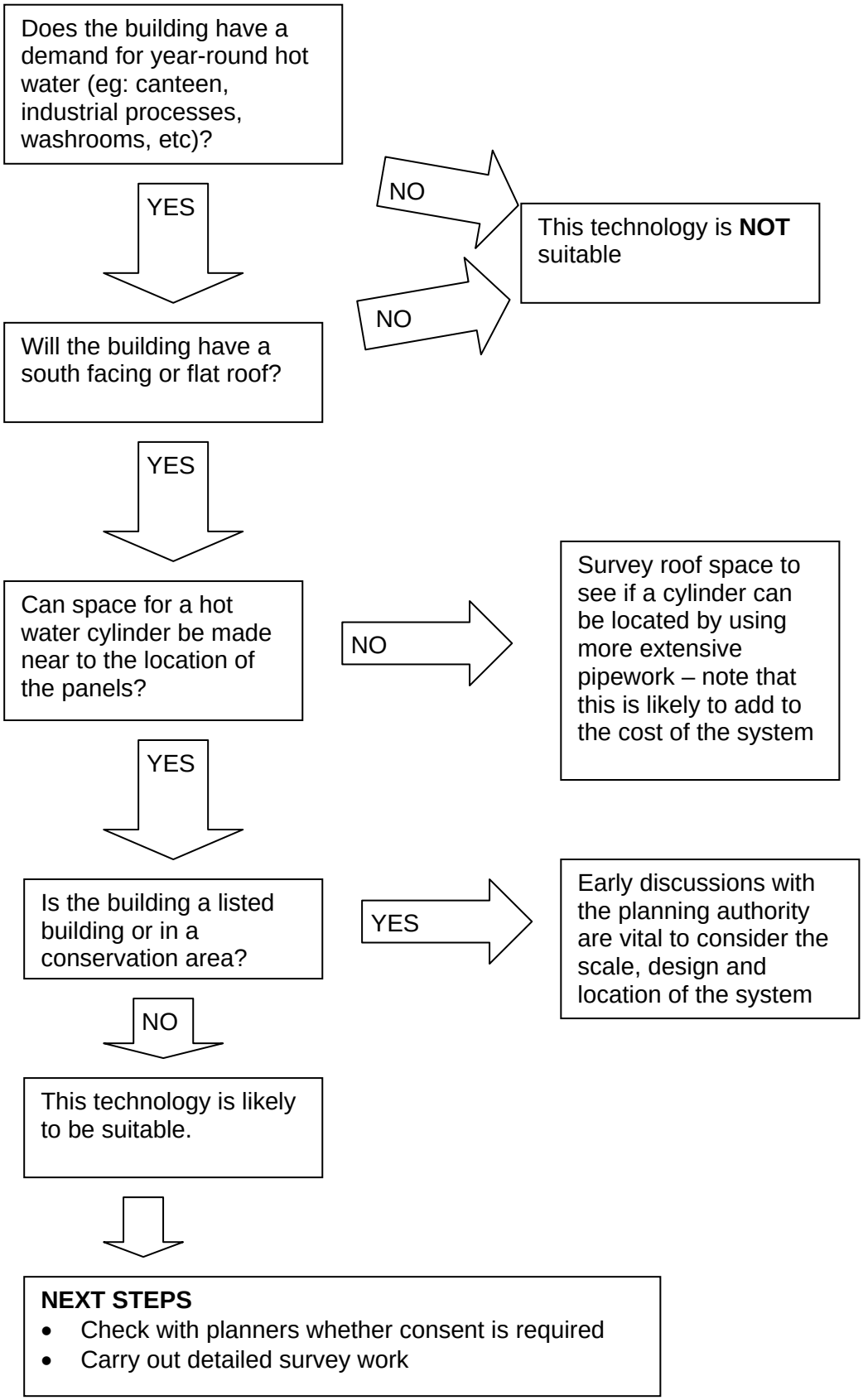


Diagram 5.2c: Key considerations for non-domestic solar water heating



5.3 Small-scale wind turbines

5.3.1 What does it do?

- Generates electricity.

5.3.2 How does it work?

- Wind turbines use the wind to generate electricity. As wind is not a constant source of power a back-up power system will be required
- Back-up systems can be provided by a connection to the national electricity grid, a diesel generator or a complementary renewable energy technology
- Turbines can be used to provide electricity to power single dwellings, businesses, community buildings or whole communities.

5.3.3 General considerations

- In Scotland the prevailing wind is predominantly south westerly with some northerlies in the winter
- An ideal site has a high average wind speed and clear "wind fetch" in the direction of the prevailing wind. However, in practice, especially when positioning small turbines, there is a compromise between choosing the best wind site and other considerations, particularly planning issues
- Obstacles cause wind turbulence that can decrease the life-time and efficiency of a turbine. Where the “obstacle” is a tree, you should check whether it is protected by a Tree Preservation Order – contact the Council’s Landscape Architects for further information
- It is important to assess the viability of your location for a turbine – information on wind speed can be obtained through the British Wind Energy Association
- In all cases consideration must be given to landscape and visual impact particularly in rural areas and on the urban edge. Micro-wind turbines are likely to be an appropriate development within natural heritage designations (including National Scenic Areas and Areas of Great Landscape Value) provided that an appropriate approach to siting and design has been undertaken, avoiding areas of high sensitivity
- Good siting should relate to existing features and patterns within the local landscape, whether this is the grouping of farm buildings, the line of hedgerow or the proximity of power lines
- New designs of micro-wind systems have greatly reduced noise levels due to improved blade design and reduced mechanical noise. Modern turbines are also easier to control and can be shut down at very high wind speeds. Conditions may be applied to any planning consent in order to control the level of noise
- Where turbines are fixed to a building, there may be a risk of noise disturbance from vibration to the building itself or neighbouring buildings and a condition may be attached to ensure that appropriate measures are taken to mitigate any such vibration
- The small diameter and likely location of micro-wind turbines greatly reduces the probability of shadow flicker occurring. Therefore in the majority of cases shadow flicker will not be an issue, however, information on shadow flicker can generally be provided by the companies who produce the equipment
- The potential for micro-wind turbines to distract road users may need to be assessed. However, potential for them to distract drivers will reduce as the number of micro-wind turbines increases and they become more of an accepted and unobtrusive feature of urban and rural areas. It is unlikely that

micro-wind systems will be any more of a visual distraction than existing elements in the environment, such as advertising hoardings

- Although an individual domestic scale turbine is unlikely to have significant effects on birds or habitats there may be cumulative effects if a number are to be located at properties within any one area
- Where a roof or wall mounted turbine is proposed consideration should be given as to where there is a known bat roost or any nesting birds in the roof or eaves. Both bats and nesting birds are protected by law. Scottish Natural Heritage or the Council are able to provide further advice on this issue.

5.3.4 Roof Mounted Turbines

- Micro-wind turbines which can be mounted on buildings and other structures, including domestic properties, have now been developed
- Roof mounted turbines are likely to increase the overall height of a building to take advantage of higher wind speeds. They are usually comparable in height to a large television aerial or chimney stack
- Micro-turbines are mounted onto sturdy structural elements, such as external walls. Chimney stacks are not generally suitable
- The building must be able to take the extra weight and the extra wind load caused by the turbine. Installations should meet the satisfaction of the Council's Building Standards officer
- If more than one turbine is proposed the aim should be to achieve a balanced composition, for example by grouping them together or using symmetry as shown in (a) below.

(a) Gable Mounted Micro-Turbines
Whitsome, Berwickshire

(b) Tower Mounted Wind Turbine
Nenthorn, Cheviot

5.3.5 Turbines on Towers

- Micro-wind turbines can be fitted onto free-standing towers (see (b) above).
- In some circumstances it may be better to site a turbine on a tower in the land adjacent to a building, particularly where a roof mounted turbine will damage the building's architectural integrity
- Towers can be either a lattice framework or solid towers, but must be set in secure foundations
- Taller towers may need to be supported by guide wires to ensure their stability
- Although higher towers will reach greater wind speeds and therefore have increased power generation capacity, they will also have an increased visual impact.

5.3.6 Vertical axis wind turbines

Although the most commonly seen wind turbines are horizontal axis machines which need to face into the wind, vertical axis wind turbines are a consideration for those in urban areas. Vertical axis turbines are not sensitive to wind direction and are therefore well suited to areas where wind speed and direction is more changeable and turbulent, as frequently experienced in urban areas.

The other main advantage of a vertical axis turbine is that it will generally be quieter than a horizontal axis turbine. The main disadvantage however is that they are generally less efficient at harnessing the power of the wind and will not begin to rotate until a fairly high wind speed is achieved.

5.3.7 Is planning permission required?

- Planning permission will be required for each location
- The erection of micro-wind turbines must ensure that environmental impacts are kept to a minimum whilst still ensuring they provide sufficient power to make them viable
- Sensitive siting and design is important in both urban and rural areas and plays an important part in making these installations an accepted feature
- The optimum position for a micro-turbine will depend on individual circumstances and will be influenced by the size of the installation and its surrounding environment
- The siting of micro-wind turbines close to, on or integrated with buildings means that special attention must be given to the need to protect amenity
- Careful consideration should be made to the height of the turbine. While it is desirable to avoid undue turbulence and areas of low wind speed, the choice of height needs to be carefully balanced with the visual prominence of the turbine in relation to existing buildings and surrounding landscape features
- Where possible the height of towers should relate to the height of existing vertical elements in the landscape such as light columns, telegraph poles, trees, buildings and other structures. Where possible towers should be coloured to minimise the visual impact
- A turbine sited on a prominent ridge is generally not desirable
- Applicants should include a copy of the manufacturer's brochure showing the technical details of the equipment to be used with their planning application
- A detailed noise assessment will generally not be required, however applicants will be required to submit the following information, which is generally available from the manufacturer: a 1/3 Octave noise output analysis for the installation, together with details of the methodology used to produce the data. Noise from the installation should not give rise to levels, assessed within a dwelling or noise sensitive building with windows closed, in excess of Noise Rating Curve NR 30 between the hours of 0700-2200 and NR Curve 20 at all other times.

5.3.8 Is Listed Building Consent required?

- In the case of mounting a turbine on a listed building, formal Listed Building Consent will be required
- As such a turbine would impact on the character or appearance of the listed building, consent would not normally be supported. However, alternative free standing locations may be possible
- Pre-application discussions are therefore recommended for all such proposals at listed buildings.

5.3.9 Further information and key contacts

Scottish Borders Council Area Offices

Galashiels Area Office
Albert Place
Galashiels TD1 3DL
Telephone: 01896 662705

Duns Area Office
Newtown Street
Duns TD11 3DT
Telephone: 01361 886105

Hawick Area Office
Town Hall
High Street
Hawick TD9 9EF
Telephone: 01450 364705

Peebles Area Office
Rosetta Road
Peebles EH45 8HQ
Telephone: 01721 726305

Planning & Economic Development
Council Headquarters
Newtown St Boswells TD6 0SA
Telephone: 01835 825060
Website: www.scotborders.gov.uk

Officers in the Heritage & Countryside Section, able to provide advice on listed buildings, conservation areas, natural heritage, archaeology, and Tree Preservation Orders, can also be contacted at Council HQ.

Small scale wind energy factsheet

Energy Efficiency and Advice Centre
Changeworks
36 Newhaven Road
Edinburgh EH6 5PY
Telephone: 0800 512 012
Website: www.energysavingtrust.org.uk/generate_your_own_energy

Wind speed information

British Wind Energy Association
Renewable Energy House
1 Aztec Row, Berners Road
London, N1 0PW, UK
Telephone: 020 7689 1960
Website: www.bwea.com

Listed Buildings

Historic Scotland Head Office
Longmore House
Salisbury Place
Edinburgh, EH9 1SH
Telephone 0131 668 8600

Useful websites:

www.historic-scotland.gov.uk
www.pastmap.org.uk.

Conservation areas in the Scottish Borders can be found on-line here: www.scotborders.gov.uk/life/environment/builtheritage/2676.html.

Designated Areas

To find out about National Scenic Areas (NSA) or Areas of Great Landscape Value (AGLV) contact Scottish Borders Council Plans and Research Team. Maps showing these areas are included in the Scottish Borders Finalised Local Plan index map and key for policy maps. These can be viewed at Area Offices and public libraries or on-line at:
www.scotborders.gov.uk/life/planningandbuilding/plansandresearch/9395.html

Natural history information
Scottish Natural Heritage
Anderson's Chambers
Market Street
Galashiels,
TD1 3AF
Telephone: 01896 756652
Website: www.snh.org.uk

Additional information on local species including bat roost information is available from Scottish Borders Biological Records Centre which can be contacted at:

Scottish Borders Biological Records Centre
Harestanes Countryside Visitor Centre
Scottish Borders Council
Ancrum
Jedburgh TD8 6UQ
Telephone: 01835 830405
Website: www.scotborders.gov.uk/outabout/visit/harestanes/3301.html

Back to contents page

Diagram 5.3a: Key considerations for stand alone wind turbines

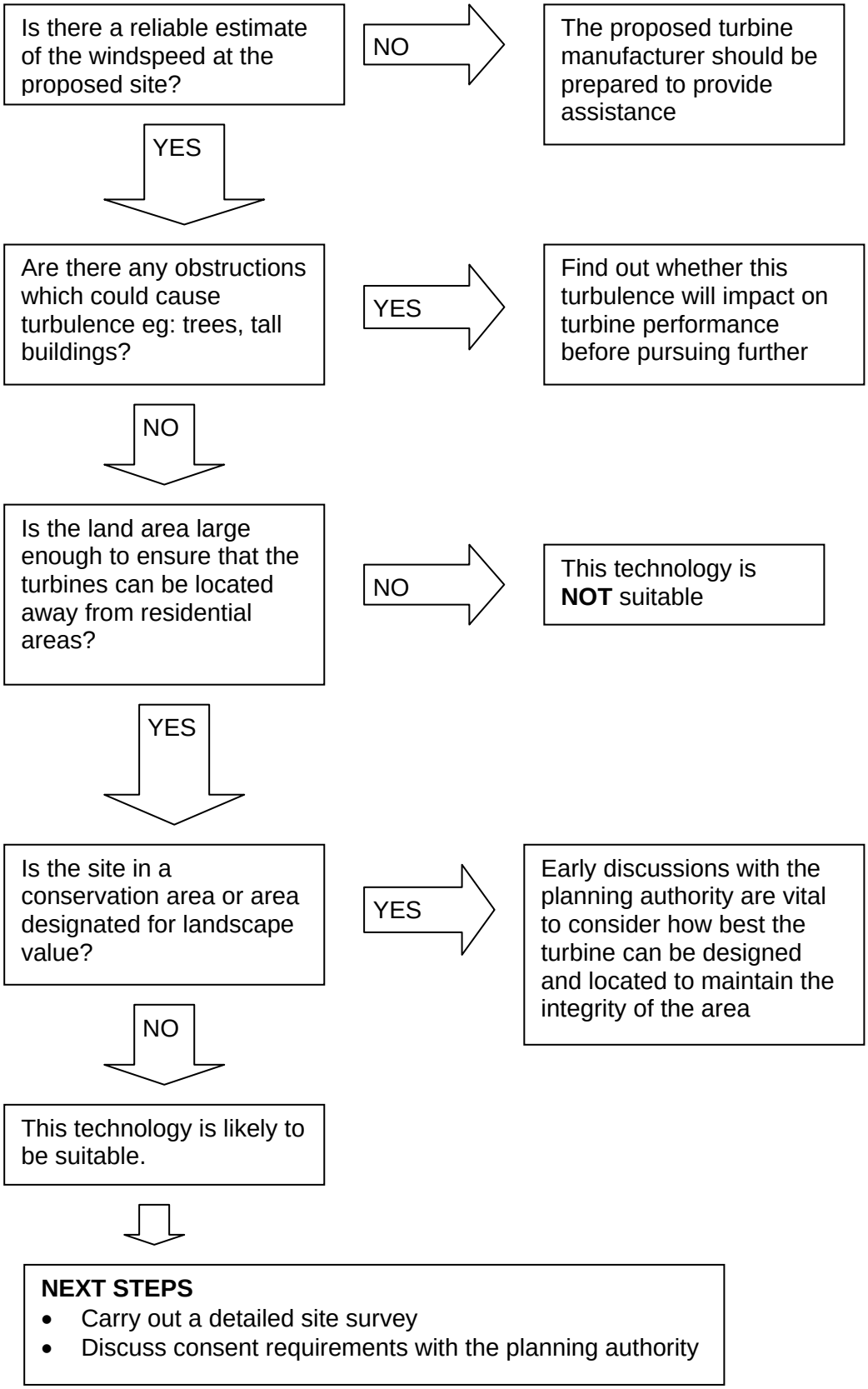
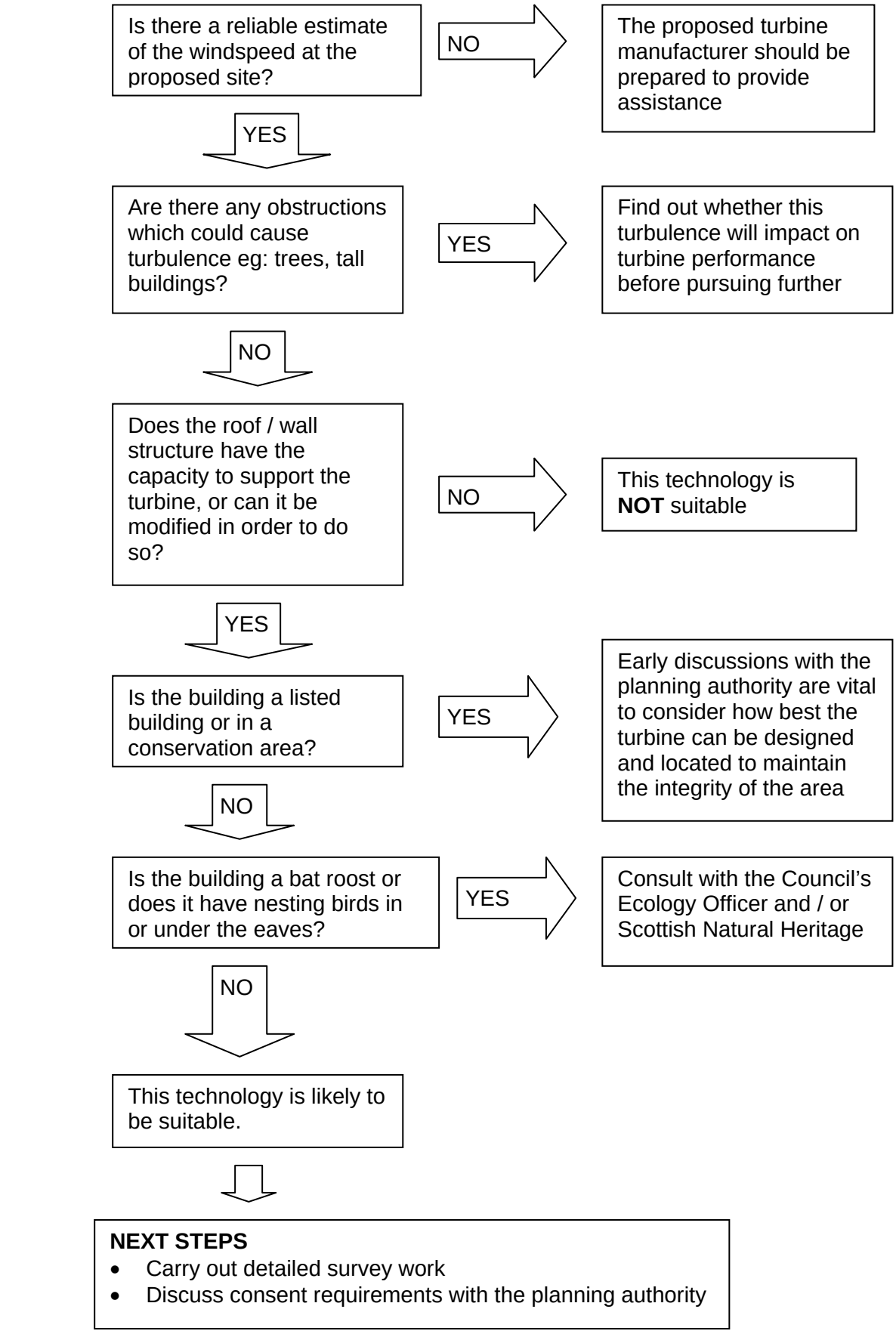


Diagram 5.3b: Key considerations for roof mounted wind turbines



5.4 Small-scale hydroelectric

5.4.1 What does it do?

- Generates electricity.

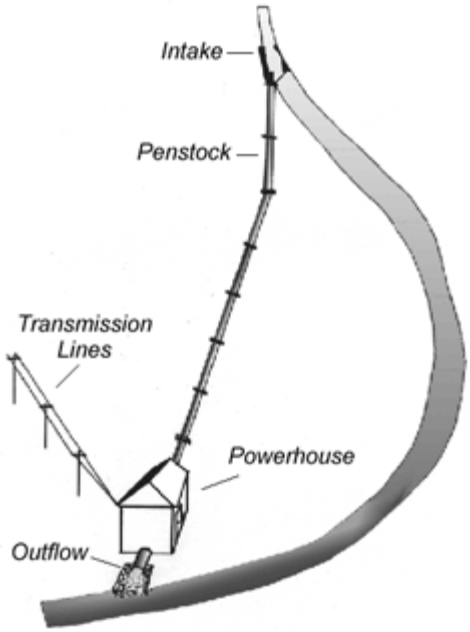
5.4.2 How does it work?

- Hydro-electric systems are well-known in Scotland, using an earth or masonry wall to dam water at a height to turn a turbine to produce electricity
- For stand-alone systems eg: for individual homes or community systems the source of water must be located relatively close to where the power will be used
- A back-up power system may be required for stand alone systems (ie: systems where there is no connection to the national electricity grid) during periods of low or no flow. This may be provided by another renewable technology or diesel generator
- Micro-hydro schemes harness the power from flowing water such as streams
- Where the 'head height' (ie: the height at which the water is held above the turbine) is less than three metres efficiencies are considerably reduced
- However, it is important to remember that similar power levels can be drawn from large quantities of water falling a short distance (low head), or smaller quantities of water falling a large distance (high head).

5.4.3 General considerations

The essential elements in a typical hydro scheme are:

- a suitable water catchment area
- a hydraulic head
- a method of transporting the water from the intake to a turbine, such as a penstock/ leat/ old mill run
- a turbine, a generator, valve equipment (for regulation of the water supply), and associated buildings
- a tailrace (or outflow) for returning the water to its natural course
- a link to local users of the power generated or to the local electricity distribution network



- The River Tweed system is of international nature conservation value and all proposed hydroelectric schemes will be carefully assessed in the light of this. Early consultation with the Scottish Environment Protection Agency (SEPA) and Scottish Natural Heritage (SNH) is recommended
- Irrespective of the location of the proposed scheme, all protected wildlife species must be considered throughout all phases including construction and operation. Advice should always be sought from the SNH and SEPA
- In addition to this any hydropower scheme which abstracts water will require an abstraction licence from SEPA under the Water Environment (Controlled

Activities) (Scotland) Regulations 2005 (CAR). SEPA supports hydro schemes and welcomes discussion about such implications

- SNH can also offer advice and guidance on the wildlife impacts of small scale hydroelectric schemes and how effects can be mitigated against during both construction and operation
- Hydro development in the open landscape is more likely to have a significant impact on the environment. Rivers are likely to be in a more pristine condition and ecologically important so that weirs and pipelines will have a higher impact
- The visual impact of infrastructure is also more noticeable in open countryside. Nevertheless there may be instances where impacts can be kept to acceptable levels and hydropower may therefore still be considered a viable option
- There are currently no examples of micro-hydro power plants in the Scottish Borders. However, there is a significant opportunity for low head systems to be installed as there are numerous unused mill runs on the River Tweed and its significant tributaries. Equally, the upland streams of the Borders provide many opportunities for off-grid high head systems.

5.4.4 Low Head Systems

- Low-head systems are typically installed at lowland sites where a large volume of flow is diverted at a weir, and through a turbine (see (a) below)
- They either use water running from a small reservoir (or millpond) or are 'run of river'
- Water from the intake above the weir or reservoir is usually fed directly into the turbine. No penstock is needed as water is abstracted immediately upstream of the structure and discharged immediately downstream
- The main impact of these schemes is therefore from the physical barrier produced by the weir – this may affect recreational uses of the river (e.g. navigation) or wildlife movement such as fish migration
- A similar impact occurs at some lowland sites when flows are diverted from the main watercourse into side channels to feed hydropower turbines - for example, old mill leats with a gentle gradient over significant lengths of channel may be used to obtain the necessary generating head.

(a) Low head system

(b) High head system

5.4.5 High Head systems

- High head systems use smaller flows than low-head sites

- They divert water over several hundred metres or more and take advantage of the difference in height over that distance - as shown in (b) above
- They are typically installed on mountain streams. The main features are a small dam to provide an intake pool; a pressure pipe or penstock (often several hundred metres long) and the powerhouse itself. They usually redirect only part of the water flow from the channel through the turbine before returning it to the river.

5.4.6 Is planning permission required?

- Planning permission would almost certainly be required for a micro-hydro installation – consult the planning authority in order to confirm this
- The most appropriate location for such installations in the Borders is likely to be in the development of old mill buildings, many of which may have Listed Building or Conservation Area designations
- In all conservation areas within the Scottish Borders permitted development rights for householders have been removed by an Article 4 Direction. Works to the exterior of buildings or structures in a conservation area are likely to require planning permission
- A licence is likely to be required for abstraction and discharge of water from the turbine – you should contact SEPA to confirm the details of these requirements
- Irrespective of whether planning permission is required a Building Warrant may be required for any buildings to house plant – contact the Council's Building Standards Officers for further information.

5.4.7 Is Listed Building Consent required?

- A number of former mill buildings and associated caulds and lades are listed buildings. In principle it may be possible to support a small scale hydro plant at these properties, although Listed Building Consent would normally be required – pre-application discussion is recommended for all such proposals at listed buildings

5.4.8 Further information and key contacts

Scottish Borders Council Area Offices

Galashiels Area Office
Albert Place
Galashiels TD1 3DL
Telephone: 01896 662705

Duns Area Office
Newtown Street
Duns TD11 3DT
Telephone: 01361 886105

Hawick Area Office
Town Hall
High Street
Hawick TD9 9EF
Telephone: 01450 364705

Peebles Area Office
Rosetta Road
Peebles EH45 8HQ
Telephone: 01721 726305

Planning & Economic Development
Council Headquarters
Newtown St Boswells TD6 0SA
Telephone: 01835 825060
Website: www.scotborders.gov.uk

Officers in the Heritage & Countryside Section, able to provide advice on listed buildings, conservation areas, natural heritage, archaeology, and Tree Preservation Orders can also be contacted at Council HQ.

Conservation areas in the Scottish Borders can be found on-line here: www.scotborders.gov.uk/life/environment/builtheritage/2676.html.

Listed Buildings
Historic Scotland Head Office
Longmore House
Salisbury Place
Edinburgh, EH9 1SH
Telephone 0131 668 8600

Useful websites:

www.historic-scotland.gov.uk
www.pastmap.org.uk.

Information on **Building Warrants** is available from the Council's Building Standards Officers who can be contacted at the Area Offices listed above.

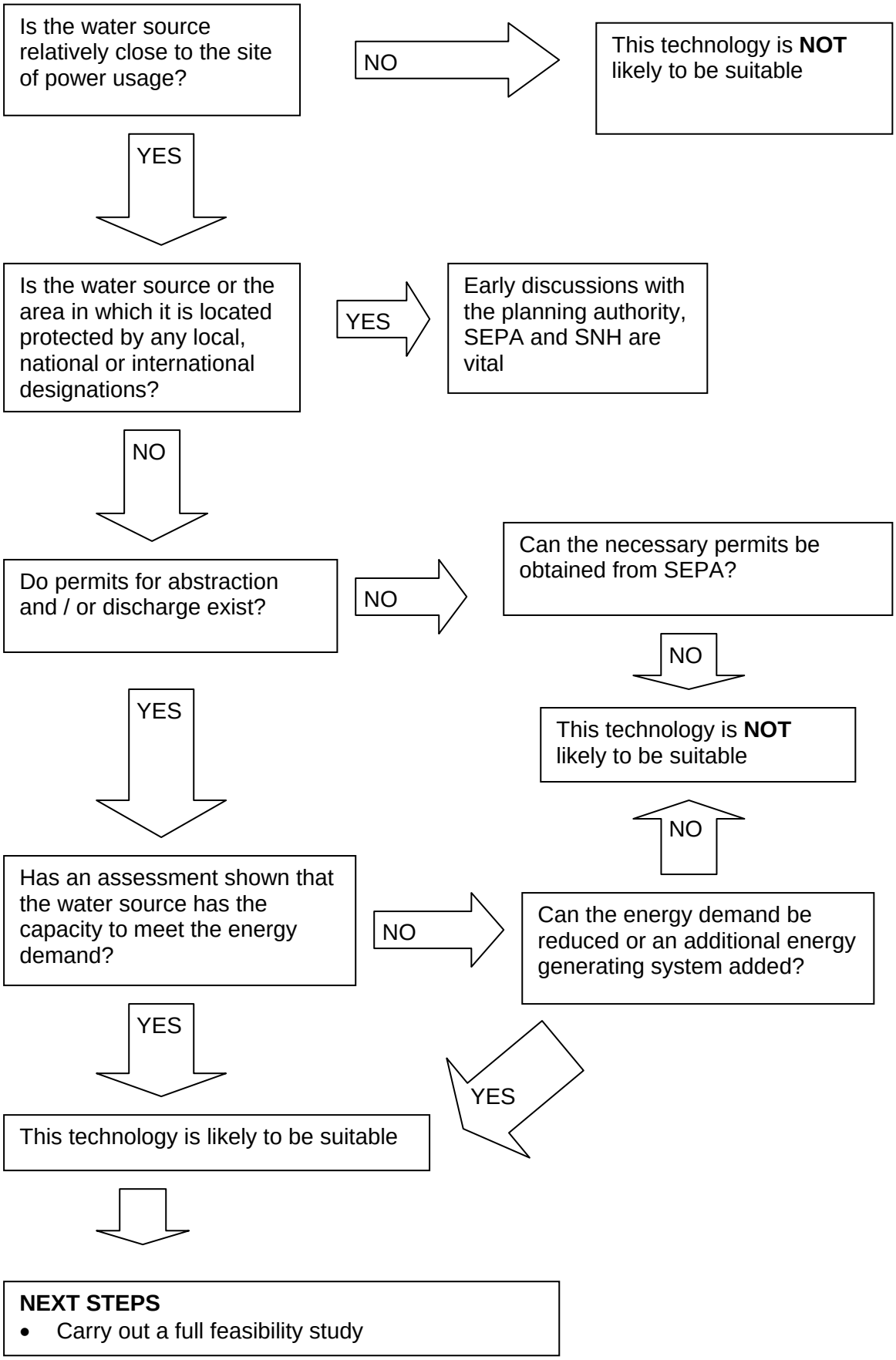
Abstraction & discharge permits
Scottish Environment Protection Agency
Galashiels Office
Burnbrae
Mossilee Road
GALASHIELS, TD1 1NF
Telephone: 01896 754797
www.sepa.org.uk/wfd/index.htm
www.sepa.org.uk/pdf/wfd/regimes/car_practical_guide.pdf

Natural heritage issues
Scottish Natural Heritage
Anderson's Chambers
Market Street
Galashiels TD1 3AF
Telephone: 01896 756652
www.snh.org.uk

Small scale hydroelectric factsheet
Energy Efficiency and Advice Centre
Changeworks
36 Newhaven Road
Edinburgh EH6 5PY
Telephone: 0800 512 012
Website: www.energysavingtrust.org.uk/generate_your_own_energy

Back to contents page

Diagram 5.4a: Key considerations for small scale hydro-electric



5.5 Heat pumps

5.5.1 What does it do?

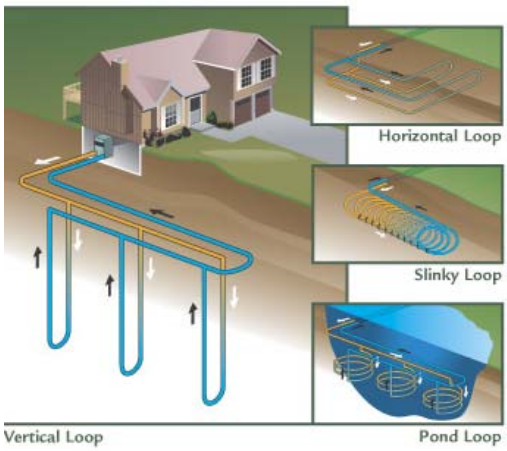
- Generates heat.

5.5.2 How does it work?

- There are 3 main types of heat pump; ground source, air source and water source
- A heat pump takes energy from the air, water or soil to provide heating and hot water
- Even at temperatures considered to be cold, air, ground and water contain useful heat that is continuously replenished by the sun. By applying a little more energy, a heat pump can raise the temperature of this heat energy to the level required
- The heat-pump consists of four components; a compressor, a source of heat, a condenser and a pressure reducer.

5.5.3 Ground Source Heat Pumps

- Ground source heat pumps harness the energy from the ground. Whilst air temperatures vary throughout the year, the temperature of the ground remains stable
- Ground source heat pumps can therefore be used for providing space heating during the winter (the most efficient use being underfloor heating) and cooling during the summer. They can also be used for pre-heating domestic hot water
- For a ground source heat pump a heat exchanger (also known as a 'slinky' or 'ground coil') is laid in the ground, water passes within this system and 'absorbs' the heat from the ground, a heat pump then relays this heat into the building
- The heat pump converts the heat generated from the ground into a usable higher temperature for the building
- The heat exchanger can be a series of pipes driven deep into the ground, pipes laid in a series of trenches at shallower depths or a series of panels which are buried under the ground.



5.5.4 Water and Air Source Heat Pumps

- Heat from ground water can be captured by pumping water from a traditional well or from a borehole and returning it to the ground via a sump
- Generally two boreholes are used – one for extraction and one for return of the water

- The British Geological Society may be able to provide a borehole prognosis report based on the postcode for the site. This is useful in considering whether to proceed with plans for a water source heat pump at a particular site
- An air source heat pump literally sucks in the heat from fresh air through a ventilator.

5.5.5 General considerations

- Ground source heat pumps which use a trench system require a large area of ground, whilst those using borehole systems require access for drilling and a geological survey
- Most heat pumps have two main parts; the outdoor unit and the indoor unit. The outdoor unit includes the outdoor heat exchanger, the compressor and a fan. This is where the heat from outside is picked up during the heating season, and where the heat from inside the house is expelled during the cooling season
- The indoor unit contains the indoor heat exchanger and the fan that distributes heated or cooled air to the distribution system of the house
- For water and ground source heat pumps sufficient land or a water body (eg: a well or pond) on-site is required to house the necessary equipment. The exact dimensions will vary between manufacturers
- The ground above where heat pipes are installed can be used for open space, planting or covered over with hard materials eg: for car parking
- Where there are existing lakes or ponds or where it is proposed to install Sustainable Urban Drainage Systems (SUDS), the opportunity to install ground source heat pumps beneath the surface of the water should be considered
- Similarly in larger developments with open space requirements, ground source heat pumps can be laid beneath green spaces.

Digging the trench

Heat exchanger and distribution system

5.5.6 Is planning permission required?

- Heat pumps cannot generally be seen from the outside of a building, and so planning permission is not usually required for the pumps themselves
- However, where a heat pump is being fitted to an existing building, a building/ shed may be required to house the equipment - in some circumstances this may require planning consent

- Engineering operations are covered by planning legislation, and activities which fall within the definition of engineering operations do include drilling of exploratory bore holes. Therefore consultation with the Planning Authority is important
- Following drilling and installation of heat pumps the ground can be returned to its original state
- In all conservation areas within the Scottish Borders permitted development rights for householders have been removed by an Article 4 Direction. Works to the exterior of buildings or structures in a conservation area are therefore likely to require planning permission
- It is possible that archaeological works would be required prior to excavation. It is advisable to speak with the Council's Archaeological Officer who is based in the Countryside and Heritage section
- Any groundwater abstraction for a water source heat pump system will require Scottish Environment Protection Agency authorisation and compliance with the Water Environment (Controlled Activities) (Scotland) Regulations 2005 (CAR)
- Care should be taken when constructing boreholes to prevent contamination of the borehole itself and of the groundwater resource in general. Abstraction or discharge to the water environment will also require authorisation from SEPA
- Irrespective of whether planning permission is required, a Building Warrant may be required for any buildings to house plant – contact the Council's Building Standards Officers for further information.

5.5.7 Further information and key contacts

Scottish Borders Council Area Offices

Galashiels Area Office
Albert Place
Galashiels TD1 3DL
Telephone: 01896 662705

Duns Area Office
Newtown Street
Duns TD11 3DT
Telephone: 01361 886105

Hawick Area Office
Town Hall
High Street
Hawick TD9 9EF
Telephone: 01450 364705

Peebles Area Office
Rosetta Road
Peebles EH45 8HQ
Telephone: 01721 726305

Planning & Economic Development
Council Headquarters
Newtown St Boswells TD6 0SA
Telephone: 01835 825060
Website: www.scotborders.gov.uk

Officers in the Heritage & Countryside Section, able to provide advice on listed buildings, conservation areas, natural heritage and archaeology can also be contacted at Council HQ.

Listed Buildings

Historic Scotland Head Office
Longmore House
Salisbury Place
Edinburgh, EH9 1SH
Telephone 0131 668 8600

Useful websites:

www.historic-scotland.gov.uk
www.pastmap.org.uk.

Conservation areas in the Scottish Borders can be found on-line here: www.scotborders.gov.uk/life/environment/builtheritage/2676.html.

Information on **Building Warrants** is available from the Council's Building Standards Officers who can be contacted at the Area Offices listed above.

Ground source heat pump factsheet
Energy Efficiency and Advice Centre
Changeworks
36 Newhaven Road
Edinburgh EH6 5PY
Telephone: 0800 512 012
Website: www.energysavingtrust.org.uk/generate_your_own_energy

Abstraction and discharge permits
Scottish Environment Protection Agency
Galashiels Office
Burnbrae
Mossilee Road
Galashiels TD1 1NF
Telephone: 01896 754797
www.sepa.org.uk/wfd/index.htm

Controlled activities Regulations can be found on-line here:
www.sepa.org.uk/pdf/wfd/regimes/car_practical_guide.pdf

Borehole information
The British Geological Society holds the national archive of borehole and well records. These can be accessed on-line at: www.bgs.ac.uk/boreholes/home.html

Borehole Records Enquiries (North)
British Geological Survey
Murchison House,
West Mains Road,
Edinburgh EH9 3LA
Telephone: 0131 650 0282
Website: www.bgs.ac.uk

Back to contents page

Diagram 5.5a: Key considerations for ground source heat pumps

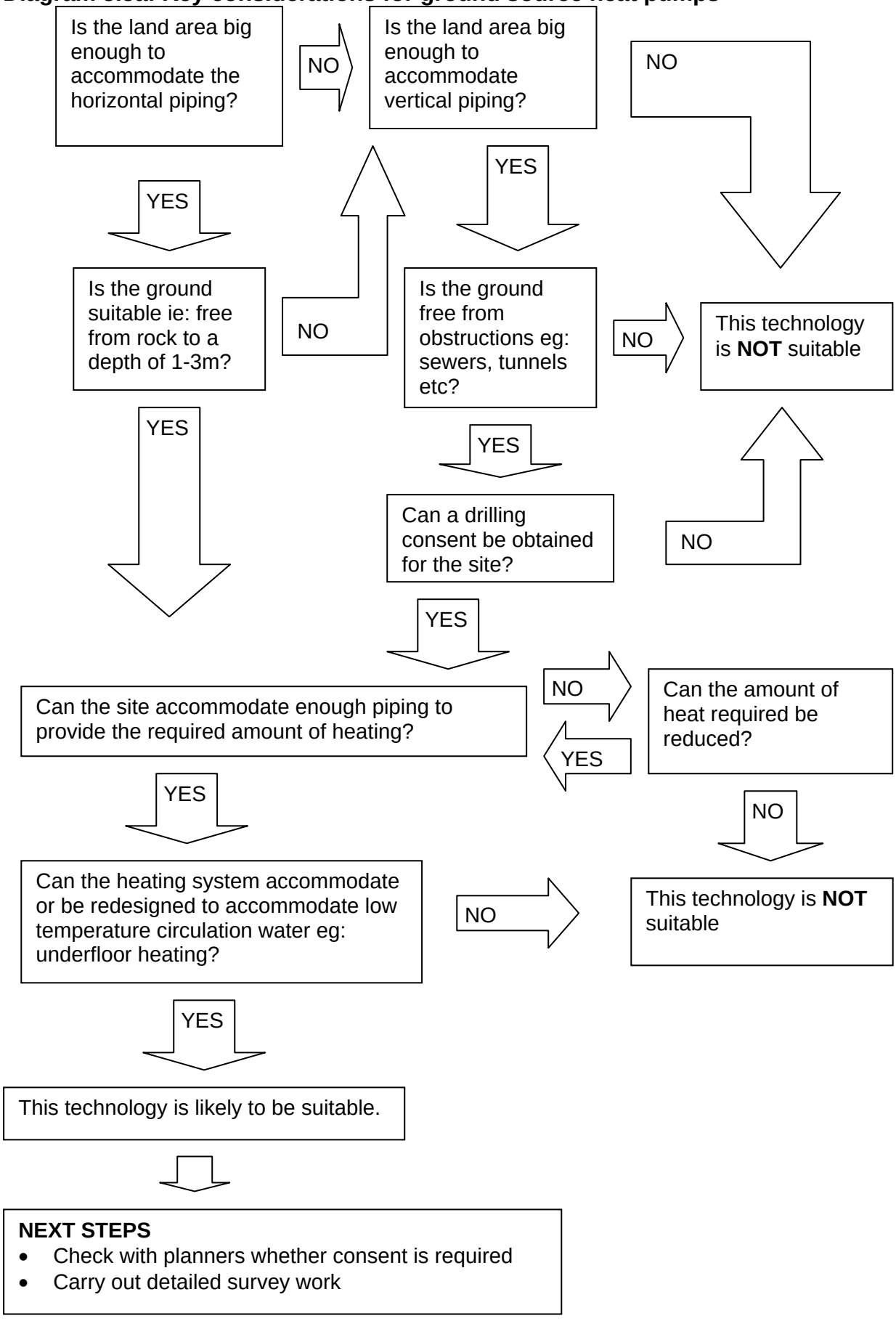
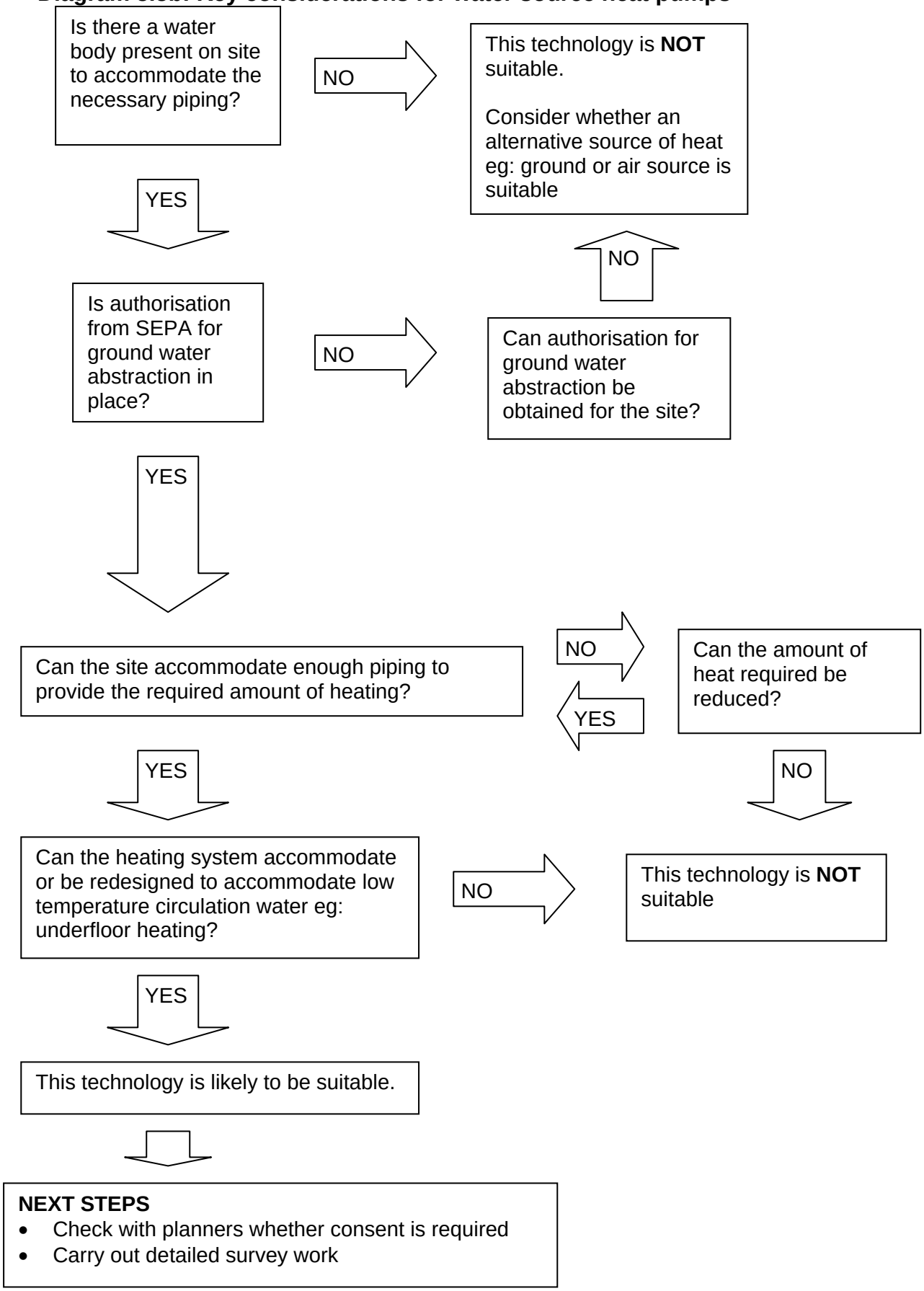


Diagram 5.5b: Key considerations for water source heat pumps



5.6 Biomass

5.6.1 What does it do?

- Generates heat.

5.6.2 How does it work?

- Biomass is the generic term for organic matter from forestry or agricultural sources which is processed to form either solid or liquid fuel (eg: wood chip/ wood pellets, bio-diesel*)
- Biomass is burnt to generate energy in domestic, public and commercial settings. Energy can be used for space heating (eg: stand alone stoves for heating and/ or cooking) or linking up to central heating and hot water systems
- Traditional log stoves are not energy efficient and are therefore not eligible for grant funding however domestic batch burning log boilers have an energy efficiency rating of over 90% and pellet stoves and boilers have an efficiency rating of over 80% (both of these are eligible for grant funding).

5.6.3 General considerations

- Unlike other sources of renewable energy, biomass typically requires on-going payments to be made for the fuel
- Biomass is most effective when a local fuel source is used as this reduces transport impacts, ensuring that the carbon benefits from using biomass are not lessened by emissions created when transporting it, and also reducing the financial costs associated with transporting the fuel
- There are a range of micro and small-scale biomass heating systems commercially available covering a wide range of sizes, combustion technologies and fuel sources
- Small scale biomass heating systems range from single room heaters hand fed with logs, through to industrial units with fully automated fuel handling systems using wood chips for large scale steam or combined heat and power (CHP) operation (Section 8)
- For domestic applications of biomass the fuel usually takes the form of wood pellets or wood chips. Currently domestic scale woodchip boilers are only suitable for large buildings eg: manse or farmhouse. However, pellet boilers are suitable for more average domestic users
- When sourcing biomass supplies of woodfuel look for UKWAS/ FSC symbols which indicate that the wood is certified as being from sustainably managed forests under the UK Woodland Assurance Standard / Forest Stewardship Council schemes
- There are two main ways of using biomass to heat a domestic property; (1) stand alone stoves and (2) boilers connected to the central heating and hot water systems
- It is important to have sufficient storage space for the fuel, appropriate access to the boiler for loading and a local fuel supplier
- Should the biomass to be used consist of waste such as non-virgin or chemically treated wood then the incineration process will require authorisation from the Scottish Environment Protection Agency (SEPA) and authorisation should be in place prior to commencement of the activity. This authorisation reflects the need to comply with the Waste Incineration Directive, Pollution Prevention and Control Legislation and Waste Management legislation, and is a costly process

- Large scale biomass plants require SEPA authorisation ie: >20MW (4MW is enough to heat 100 houses)
- Any new planting for bio fuels must be appropriately located and designed to ensure that important open ground or species which rely on open ground are not displaced.

Wood chips

Wood pellet stove

Industrial scale wood chip boiler producing heat only Buccleuch Estates, Selkirk

5.6.4 Is planning permission required?

- Where a biomass system is being fitted to an existing building and includes an external flue it is likely that planning permission will be required
- Where any part of the proposed development exceeds the height of the highest part of the original roof planning permission is likely to be required.
- Some micro biomass schemes involve the construction of outhouses to store the materials. In some instances this may require the construction of a new means of access for service vehicles
- Consult the local Area Planning Office to confirm which elements will require planning permission
- For new build projects, planning permission is likely to be required for the building which will house the biomass plant – consult the planning authority for confirmation
- In all conservation areas within the Scottish Borders permitted development rights for householders have been removed by an Article 4 Direction. Works to the exterior of buildings or structures in a conservation area are therefore likely to require planning permission
- Many micro biomass schemes will not require planning permission as they only require internal alterations. However, if the building is listed the planning authority should be contacted to clarify requirements
- There is considerable variation between the storage needs associated with different boiler systems and fuels such as wood pellets. Sufficient storage is needed to avoid frequent transport deliveries which would reduce the carbon savings generated from using biomass. Where proposed, the hopper, which is used for storing wood fuel, can be attached to the outside of the building in a least sensitive, but accessible location, or in an underground lined pit. Details of proposed storage locations should be discussed with a Planning Officer and clear information on how these are to be accessed by service vehicles will be required
- Irrespective of whether planning permission is required, a Building Warrant may be required for buildings to house plant – contact the Council's Building Standards Officers for further information.

5.6.5 Bio-diesel*

- Bio diesel is a liquid bio-fuel which is made using a variety of feedstock which includes oil producing crops such as oilseed rape, used cooking oil and tallow (animal fats)
- It is used in diesel engines as a substitute for mineral diesel. It can be used alone or mixed with mineral diesel
- Bio-diesel is currently seen as one of the most viable green transport fuels for Scotland in the short to medium term. It can also be used in Combined Heat and Power (CHP) systems (Section 8).

5.6.6 Further information and key contacts

Scottish Borders Council Area Offices

Galashiels Area Office
Albert Place
Galashiels TD1 3DL
Telephone: 01896 662705

Duns Area Office
Newtown Street
Duns TD11 3DT
Telephone: 01361 886105

Hawick Area Office
Town Hall
High Street
Hawick TD9 9EF
Telephone: 01450 364705

Peebles Area Office
Rosetta Road
Peebles EH45 8HQ
Telephone: 01721 726305

Planning & Economic Development
Council Headquarters
Newtown St Boswells TD6 0SA
Telephone: 01835 825060
Website: www.scotborders.gov.uk

Officers in the Heritage & Countryside Section, able to provide advice on listed buildings, conservation areas, natural heritage and archaeology can also be contacted at Council HQ.

Biomass factsheet

Energy Efficiency and Advice Centre
Changeworks
36 Newhaven Road
Edinburgh EH6 5PY
Telephone: 0800 512 012
Website: www.est.org.uk

Listed Buildings

Historic Scotland Head Office
Longmore House
Salisbury Place
Edinburgh, EH9 1SH
Telephone 0131 668 8600

Useful websites:

www.historic-scotland.gov.uk
www.pastmap.org.uk.

Conservation areas in the Scottish Borders can be found on-line here: www.scotborders.gov.uk/life/environment/builtheritage/2676.html.

Information on **Building Warrants** is available from the Council's Building Standards Officers who can be contacted at the Area Offices listed above.

Back to contents page

Diagram 5.6a: Key considerations for domestic biomass

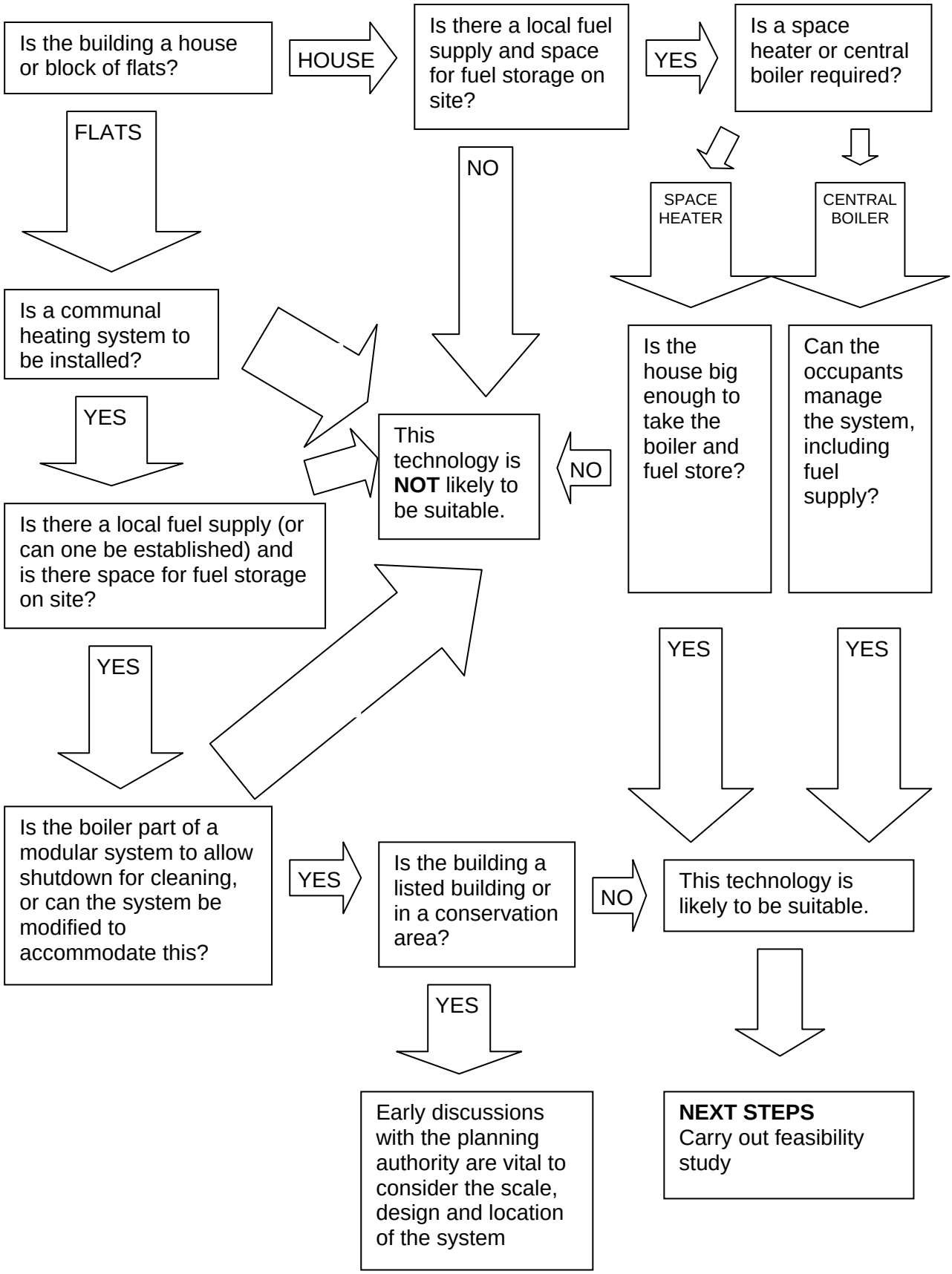
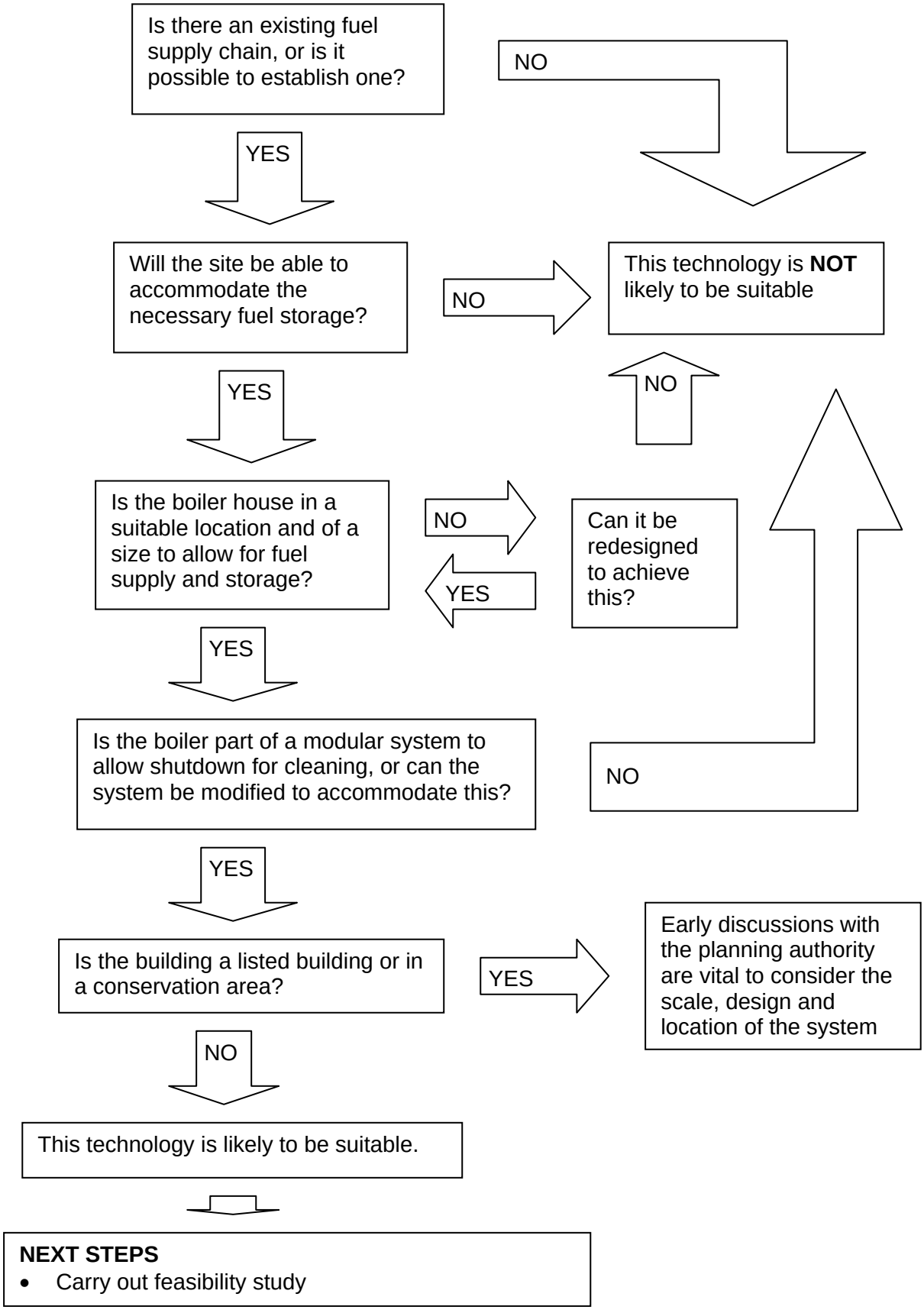


Diagram 5.6b: Key considerations for non-domestic biomass



Section 6: Planning Policy

6.1 National Planning Policy

The Planning etc (Scotland) Act 2006 requires development plans to contribute to sustainable development. Renewable energy technologies have a great contribution to make to sustainable development including reducing harmful greenhouse gas (CO2) emissions, promoting new business opportunities in the design, manufacture, installation and maintenance of renewable energy technologies, providing cost-effective and environmentally-friendly means of providing power and heating, and de-centralising energy supplies to allow for more localised control over production and use of energy.

The Scottish Executive is committed to increasing the amount of renewable energy which is generated and used in Scotland. The national policy framework with regards to planning for renewable energy is set out in Scottish Planning Policies (SPPs), their predecessors – National Planning Policy Guidelines (NPPGs) and Planning Advice Notes (PANs). Those which are most relevant are listed below.

SPP 6: Renewable Energy
www.scotland.gov.uk/Publications/2007/03/22084213/0
The national planning context for renewable energy is set out in SPP6. This sets out how local authority planning systems must manage the process of encouraging, approving and implementing renewable energy proposals when preparing development plans and determining planning applications. SPP6 will therefore be a useful reference for anyone considering the incorporation of renewable energy into an existing or proposed development.

PAN 45: Renewable Energy Technologies
www.scotland.gov.uk/Publications/2002/02/pan45/pan-45

Annex to PAN 45: Planning for micro-renewables
www.scotland.gov.uk/Publications/2006/10/03093936/0
This PAN and its Annex aim to raise awareness of the range of micro-renewable technologies that are available and is of relevance to planners, developers and others considering micro-renewable energy technologies.

“Micro-renewables” simply means renewable energy generation at a small scale eg: householder or community.

The Annex includes good practice in terms of installation and use of a wide range of renewable energy technologies at the micro-scale.

NPPG 18: Planning and the Historic Environment
www.scotland.gov.uk/Publications/1999/04/nppg18
If the proposed development is likely to have an impact on the historic environment it will be useful to refer to NPPG 18. This covers planning considerations when dealing with historic buildings, landscape, parks and gardens, townscapes and ancient monuments.

Additional information on dealing with listed buildings and conservation areas is available in the **Memorandum of Guidance on**

Listed Buildings and Conservation Areas, available from Historic Scotland
www.historic-scotland.gov.uk/index.htm.

NPPG 14 Natural Heritage
www.scotland.gov.uk/Publications/1999/01/nppg14
This NPPG summarises the main statutory obligations regarding conserving the natural heritage, describes the role of the planning system in safeguarding the natural heritage, and draws attention to the importance of safeguarding and enhancing natural heritage beyond the confines of designated areas.

PAN 71: Conservation Area Management
www.scotland.gov.uk/Publications/2004/12/20450/49052
Designing Places (2001) sets out the Scottish Executive's expectations of the planning system to deliver high standards of design and quality. PAN 71 fits with Designing Places and forms part of the design series of Advice Notes, which provide the foundations for conservation areas.

PAN 60 Planning for Natural Heritage
www.scotland.gov.uk/Publications/2000/08/pan60-root/pan60
This advice note provides guidance on how development and the planning system can contribute to the conservation, enhancement, enjoyment and understanding of the natural environment. It includes examples of good practice from across Scotland.

The Town and Country Planning (General Permitted Development) (Scotland) Order 1992
www.opsi.gov.uk/si/si1992/Uksi_19920223_en_1.htm
This is the Statutory Instrument which sets out the types of development which are permitted without the need for formal planning permission.

It should be noted that exemption from planning permission does not exempt the proposed development from the need for any other type of permit that may be required for example a building warrant from the Council or authorisation from SEPA for a controlled activity such as water abstraction.

Further information on national planning policy
The Scottish Executive is able to provide further information on the national planning context:

Scottish Executive Development Department
Victoria Quay
Edinburgh EH6 6QQ
Telephone: 08457 741741
Website: www.scotland.gov.uk/Topics/Planning

6.2 Scottish Borders Development Plan Policy

The local planning policy with regards to renewable energy is set by the **Scottish Borders Structure Plan 2001-2011** which was approved by Scottish Ministers on 16 September 2002. The Structure Plan includes a number of policies in support of renewable energy development:

Policy I19 – Renewable Energy
The Council supports the development of renewable energy sources that can be developed in an environmentally acceptable manner.

Policy I20 – Wind Energy Developments
Proposals for wind energy developments will be assessed against the following criteria:

- *(i) impact on the landscape of the areas, and neighbouring Structure Plan areas, as guided by Landscape Character assessments,*
- *(ii) the Structure Plan's environmental policies,*
- *(iii) the impact of noise on residential and other noise-sensitive developments,*
- *(iv) interference with aircraft activity,*
- *(v) a significantly increased risk of 'shadow flicker' or 'driver distraction', or*
- *(vi) any unacceptable cumulative impacts.*

Policy I21 – Small scale renewable energy technologies
Proposals for community and small-scale renewable energy generation (or related techniques) will be encouraged where they have no significant adverse impact on the natural and built environment or amenity of any area.

All developers, whatever the nature of their proposals will be encouraged to consider the potential to use materials, designs and technologies which either reduce energy consumption or reduce the environmental impact of energy generation when formulating their proposals.

The Structure Plan policies are further supported through the renewable energy policy contained in the **Scottish Borders Finalised Local Plan** (Dec 2006) www.scotborders.gov.uk/life/planningandbuilding/plansandpolicy/9895.html

Policy D4 – Renewable Energy Development:
The Council will support proposals for both large scale and community scale renewable energy development including commercial wind farms, single or limited scale wind turbines, biomass, hydropower, biofuel technology and solar power where they can be accommodated without unacceptable impacts on the environment. The siting and design of all renewable energy developments should take account of the social, economic and environmental context.

Renewable energy developments will be approved provided that,

1. *There are no unacceptable adverse impacts on the natural heritage including the water environment, landscape, biodiversity, built environment and archaeological heritage, or that any adverse impacts can be satisfactorily mitigated;*

2. *There are no unacceptable adverse impacts on recreation and tourism, including access routes, or that any adverse impacts can be satisfactorily mitigated.*

If there are judged to be significant adverse impacts that cannot be mitigated, the development will only be approved if the Council is satisfied that the contribution to wider economic and environmental benefits outweighs the potential damage to the environmental or to tourism and recreation.

The elements of Policy D4 which is reproduced below apply to all renewable energy developments. Information that relates solely to commercial-scale windfarms is not included here as this guidance document does not cover commercial-scale windfarms.

Other Renewable Energy Development
Small scale of domestic renewable energy developments including community schemes, single turbines and micro-scale photovoltaic / solar panels will be encouraged where they can be satisfactorily accommodated into their surroundings in accordance with the protection of residential amenity and the historic and natural environment.

Renewable technologies that require a countryside location such as the development of biofuels, short rotation coppice, "biomass" or small scale hydro-power will be assessed against the relevant environmental protection policies.

Waste to energy schemes involving human, farm and domestic waste will be assessed against Policy Inf7 Waste Management Facilities.

Further information on local planning policy

The Scottish Borders Structure Plan and Finalised Local Plan can be examined at Council Headquarters, all Area Offices and public libraries.

Further information on the Scottish Borders planning policy context is available from:

Plans and Research Team
Planning and Economic Development
Scottish Borders Council
Council Headquarters
Newtown St Boswells
Melrose TD6 0SA
Telephone: 01835 825060
Website: www.scotborders.gov.uk

Back to contents page

Section 7: Energy Efficiency

7.1 Introduction

The Building (Scotland) Regulations 2004 sets the energy efficiency requirements for new buildings. In terms of energy efficiency, the Regulations should be regarded as the minimum legal standard.

Going beyond the legal requirements for energy efficiency will help to reduce the amount of energy required once the building is in use, thereby helping to save money and reduce carbon dioxide emissions (one of the most important factors in addressing climate change).

7.2 Domestic buildings

There are a number of actions which can be taken in existing and new build domestic dwellings to improve energy efficiency. The key considerations are briefly outlined below:

Passive solar gain: the sun can be used to provided heat and light in domestic settings if buildings follow a few key design considerations:

- Choose a location which allows the building to face within 30° of south – south-easterly (rather than south-westerly) to reduce the potential for overheating in the afternoon
- Ensure the largest proportion of window area faces south rather than north to reduce exposure to cold northerly winds
- Locate main living spaces on the south side of the building and circulation space to the north
- Using masonry construction gives thermal mass to the building which will help to absorb solar gain releasing it once the sun has set, and help to prevent overheating in the summer
- Conservatories can significantly increase energy use if heated and open to the main dwelling. A sun-space with a large glazed area and solid roof, which has external quality doors to close it off from the main dwelling, will help to reduce both heat loss and overheating
- In mixed height developments taller and terraced properties should be sited to the north of detached and lower buildings.

Micro-climate:

- Sheltered sites at lower elevations will have less heat loss than buildings on exposed sites
- Planting hedges as shelter belts and designing a building appropriate to the site will help to mitigate against building heat loss
- External shading (eg: eaves) will help to protect highly glazed areas from excessive midday sun.

Layout: greater surface area means more heat loss – a bungalow will lose more heat than a 2 storey house of the same floor area. If using a more expansive layout, with greater surface area, going beyond the legal energy efficiency requirements will help to cut down on the energy required to make the home comfortable.

Insulation: insulation should be applied to all exposed areas of the building (ie: walls, floor and roof). Applying insulation whilst a dwelling is being built is the most cost and time effective method. However, insulation installed in existing buildings will also contribute to reducing energy demand.

Glazing: double glazing or even triple glazing can significantly reduce heat loss. In the case of new buildings this can be accommodated fairly easily and it can also be fitted retrospectively to existing buildings. However in the case of listed buildings and buildings within conservation areas, it is not always possible to replace single glazing with double glazing – pre-application advice is recommended in these circumstances.

Heating system: a well designed and insulated dwelling reduces the amount of heat required when compared to a house of a similar size.

- Mains gas is both economical and has the lowest carbon dioxide emissions of the fossil fuels (ie: coal, oil and gas)
- Electricity has high financial and environmental costs (unless electricity is generated by renewable energy)
- Condensing boilers are amongst the most energy efficient option (www.boilers.org.uk and www.est.org.uk/bestpractice/boiler)
- Feature fires which are enclosed (a stove) are more efficient than open ones which lose heat through the chimney or flue
- Thermostatic valves, timers and zone controls enable temperatures to be controlled more efficiently eg: in individual rooms
- Provision of ventilation is required by the Building Regulations. Creating a draught lobby (ie: an additional door creating an unheated space between entrance door and dwelling) will help reduce heat loss.

Lighting: maximising daylight will obviously cut down on the need for artificial light.

- Compact fluorescent bulbs use less energy and last longer than ordinary bulbs
- Background lighting should be at a level to enable general movement and be supplemented for specific purposes or tasks as required
- Tungsten halogen lamps, popular for lighting pictures and being recessed into ceilings, use a lot of energy and can increase heat loss from the house through draughts in ceilings.

Appliances: if your home is energy efficient, the proportion of energy used by appliances will become much more significant.

- Many appliances are now rated for energy efficiency – chose 'A' rated ones
- To identify products currently endorsed by the Energy Saving Trust go to www.est.org.uk/myhome.

The Energy Saving Trust identified a checklist for energy efficient homes in its publication *Energy efficiency best practice in housing: building your own energy efficient house.*
The checklist is re-produced below:

Energy Saving Trust Checklist

1. Get the right team

- Choose an architect or package supplier with knowledge and enthusiasm for low energy design
- Brief builders on the low energy aims of the development
- Select trades people with knowledge and experience of energy efficiency.

2. Minimise heat losses

- Design a compact house plan
- Ensure high levels of insulation in all external elements
- Provide controlled ventilation
- Draught-strip all external openings
- Ask your designer for energy calculations.

3. Maximise solar heating

- Orientate the house towards south
- Locate most windows on the south side and reduce size of north facing windows
- Place living rooms and main bedrooms on the south side
- Install a responsive heating system and controls
- Consider shading methods to avoid overheating in summer.

4. Install efficient services

- Ensure the system has the right capacity for the user's requirements
- Fit condensing boilers (oil or gas or micro-CHP) where possible
- Install good easy-to-use controls
- Design-in low energy lighting that looks good.

5. Ensure the success of energy measures

- Overlap insulation between elements eg: between lofts and walls
- Keep cavities clear of debris
- Don't compress insulation materials
- Keep insulation materials dry
- Seal holes where services enter the home, but don't block air bricks.

6. When moving in

- Make sure the user understands the heating system
- Set heating controls to suit the user's needs
- Allow the house to dry out – particularly masonry houses
- Buy low energy appliances
- Avoid permanent shading, such as net curtains, that prevent solar gain.

The **Energy Saving Trust** provides detailed information on numerous aspects of energy efficiency for developers, householders, and the public sector.

To find out more visit the website: www.est.org.uk

Or contact the local energy advisor for the Scottish Borders at:
Energy Efficiency and Advice Centre
Changeworks
36 Newhaven Road
Edinburgh EH6 5PY
Telephone: 0800 512 012

7.3 Non-domestic Buildings

Passive solar gain: keeping workspaces cool is likely to be one of the key considerations in non-domestic buildings whether they are offices or industrial units:

- Limit glazing on the south-facing side of buildings
- Where large amounts of glazing are present consider larger eaves or external shading – including use of other buildings or trees
- Use masonry construction to give thermal mass to the building which helps to absorb solar gain, releasing it once the sun has set, and helps to prevent summer overheating.

Micro-climate:

- Sheltered sites at lower elevations will have less heat loss than buildings on exposed sites
- Planting hedges as shelter belts and designing a building appropriate to the site will help to mitigate against building heat loss
- External shading (eg: eaves) will help to protect highly glazed areas from excessive midday sun
- Arranging buildings in an irregular pattern will avoid channelling wind.

Insulation: insulation should be applied to all exposed areas of the building (ie: walls, floor and roof). Applying insulation as a building is constructed is the most cost and time effective method, however, insulation installed in existing buildings will also contribute to reducing energy demand.

Heating system: a well designed and insulated building reduces the amount of energy required in its operation.

- Consider whether a combined heat and power (CHP) system is suitable (see below)
- Heating systems powered by electricity are expensive and have a high environmental cost (unless generated by renewable energy technologies)
- Condensing boilers are the most energy efficient option (www.boilers.org.uk and www.est.org.uk/bestpractice/boiler)
- Provision of ventilation is detailed in the Building Regulations – in addition to the trickle vents included in double glazing units and extractor fans in toilet and kitchen facilities the incorporation of draught lobbies (ie: an additional door creating an unheated space between entrance door and main building) will help reduce heat loss.

CHP systems: community or district heating systems which use a central boiler plant to supply heat to individual dwellings or commercial units via insulated underground water mains have many advantages:

- Overall maintenance costs can be reduced
- Greater flexibility over fuel sources is possible (and so advantage can be taken of the most competitively priced fuel)
- Improved safety and reduced running costs for individuals
- Traditional centralised power stations eject around 60-65% of the energy they generate as heat into the atmosphere. CHP systems allow power to be generated at the site on which it is to be used, and allows the “waste” heat to be circulated to nearby residential or commercial units or industrial processes. This enables a CHP system to be 80-85% efficient compared to 35-40% for conventional power stations.

Encouraging energy efficient behaviour: this can enable considerable savings to be made on the running costs of buildings. This can be achieved through various mechanisms including:

- A formal environmental auditing system (eg: EMAS or ISO 14001 LINK).
- Individual energy-saving initiatives eg: keeping an operating manual for heating and lighting systems and ensuring that staff know how to use the systems
- Use zoning and task heating and lighting systems which have a greater degree of control, including systems which prevent lights begin left on unnecessarily
- Initiating staff travel plans.

The **Carbon Trust** can help businesses and the public sector to cut their carbon emissions and supports the development of low carbon technologies, including providing advice on energy efficiency. Contact the Carbon Trust in Scotland at:

The Technology Centre
Scottish Enterprise Technology Park
East Kilbride G75 0QF
Telephone: 01355 581810

Or visit the Carbon Trust website: www.carbontrust.co.uk/energy

Back to contents page

Section 8: Combined Heat and Power (CHP)

8.1 Introduction

Combined heat and power (CHP) systems are not strictly speaking a form of renewable energy. However, where the fuel source for the CHP is renewable eg: wood chip or bio-diesel then CHP is considered to be a form of renewable energy.

The main advantage of all CHP systems is that it is a more efficient way to generate heat and power, and is therefore particularly appropriate for energy intensive industries or buildings including hospitals.

8.2 Large Scale CHP

CHP plants provide both heat and power to a site, reaching 85% efficiencies when compared to 35-40% efficiency from traditional centrally generated electricity where heat is treated as a waste product. These schemes are also sometimes called District or Community Heating networks.

The cost-effectiveness of CHP schemes comes from the reuse of the heat generated in the production of the electricity. If heat is not required at a site then other outlets in the vicinity can be considered including housing, public facilities such as schools, hospitals and swimming pools, industrial processes, and offices. If there is no outlet for the heat then CHP is not such an attractive option.

CHP schemes generally run on gas or diesel fuel, although many new schemes are coming forward which use biofuels eg: wood chips or pellets and bio-diesel and are suitable for many circumstances including:

- **Mixed use developments** – heat from industrial/ commercial sites can be directed to district heating systems for residential properties or on a smaller scale to supplying heat to shops and offices
- **Large buildings** are suited to CHP – eg: offices or large building complexes, including shopping centres, hospitals and leisure centres
- **Refurbished buildings** – opportunities to either develop dedicated CHP systems for the refurbished building or to connect into a neighbouring CHP to draw down heat should be considered

8.3 Micro-scale CHP

The technology for micro-scale CHP is constantly being improved. These systems are currently particularly suitable for nursing homes and processes that have a high demand for heat.

Emerging micro-scale CHP technology now also allows households to generate all their heating needs and a significant proportion of electricity needs by installing a gas-fired micro-CHP generator which is about the size of a standard washing machine. Models around the same size as a conventional wall-mounted boiler are now becoming available.

The house remains connected to the National Grid and any surplus energy generated can potentially be sold back to the grid.

Whilst this type of gas-fuelled CHP system is not a renewable energy technology it can work at efficiencies of up to 90% which will help to reduce the

carbon emissions from power generation. It will also help to reduce energy costs to the householder.

8.4 Further information

The Combined Heat and Power Association is the trade association for CHP. They can be contacted at:

Combined Heat and Power Association
Grosvenor Gardens House
35/37 Grosvenor Gardens
London SW1W 0BS

Telephone 020 78284077
www.chpa.co.uk

Back to contents page

Section 9: Carbon dioxide emissions assessments

9.1 Average carbon dioxide emissions

According to the Energy Savings Trust (EST), the average household has a carbon dioxide (CO2) emissions level of 6 tonnes per year. The following table, which uses EST figures, gives a broad idea of how some renewable energy systems may contribute to reducing these emissions.

Renewable Energy Technology (household scale)	**Average CO2 emissions reduction per year**
Solar water heating (provides 50% hot water year round)	0.4 to 0.75 tonnes
Photovoltaics (2 to 2.5 kWp)	0.8 tonnes
Biomass boiler (15kW providing heating and hot water)	6 to 7 tonnes
Mast mounted wind turbine 2.5 kW 6 kW	1 to 2 tonnes 2.5 to 5 tonnes
Roof mounted wind turbine	Not enough data available

9.2 Revised Building (Scotland) Regulations 2004

Section 6 of the Building (Scotland) Regulations 2004 has been revised and a new Mandatory Standard 6.1 has been introduced which presents overall carbon dioxide emissions levels for new buildings. The standard aims to achieve an improvement of 18-28% fewer emissions than previous standards by addressing carbon dioxide emissions arising from the use of heating, hot water and lighting.

Standard 6.1 states:

> *Every building must be designed and constructed in such a way that:*
> *(a) the energy performance is calculated in accordance with a methodology which is asset based, conforms with the European Directive on the Energy performance of Buildings 2002/91/EC and uses UK climate data*
> *(b) the energy performance of the building is capable of reducing carbon dioxide emissions.*

The purpose of Section 6 of the Building Regulations is to ensure that effective measures for the conservation of fuel and power are incorporated in buildings. The carbon dioxide emissions standard means that buildings need to be considered in a holistic way, rather than a consideration of the individual elements which contribute to fuel and power provision and consumption such as boilers and light bulbs.

Scottish Planning Policy 6: Renewable Energy and this Supplementary Planning Guidance both require a 15% reduction in CO2 emissions beyond the 2007 Building Regulations CO2 emissions standard.

9.3 How to calculate carbon dioxide (CO2) emissions ratings

The objective of Building Regulations Standard 6.1 is to ensure that the carbon dioxide emissions from a proposed new building are less than that required by the previous Building Regulations.

The Standard Assessment Procedure (SAP) for domestic buildings has been in use for many years. A version for non-domestic buildings is under development – the Simplified Building Energy Model (SBEM).

The SBEM and a revised version of the SAP methodology which is now available allow results to be expressed as a CO2 emissions indicator.

9.3.1 Domestic dwellings

Section 6 of the Building (Scotland) Regulations identifies the Government approved Standard Assessment Procedure for Energy Rating of Dwellings (SAP 2005) as a suitable tool for use in calculating energy performance and carbon dioxide emissions of individual dwellings.

Software models are available to undertake the SAP 2005 calculations which will automatically generate a target carbon dioxide emissions level when provided with information including the proposed fuel type and building dimensions.

The Building Research Establishment provides information on SAP 2005 including a manual and list of approved software.

9.3.2 Non-domestic buildings

The Simplified Building Energy Model (SBEM) is the Government approved methodology for assessing non-domestic buildings.

The software required for SBEM can be downloaded free of charge from the BRE website: www.ncm.bre.co.uk.

9.4 Meeting Scottish Borders Council CO2 reduction requirements

Essentially the SAP 2005 and SBEM software calculates the Development Emission Rate (DER) for the proposed development and compares it with the Target Emissions Rate (TER) for a notional development of the same size and scale.

In line with national planning policy, Scottish Borders Council now requires an additional 15% reduction of CO2 emissions on top of the TER for developments with a total floorspace of 500m2 and strongly encourages all other development to make a similar reduction.

9.4.1 Use of low and zero carbon technologies (LZCT)

This additional 15% CO2 reduction can be met through the use of on-site low or zero-carbon technologies (LZCT) which includes the renewable energy technologies described in Section 5 of this guidance (Section 5).

This will require a statement from the developer as to how this additional 15% reduction in CO2 emissions beyond the SAP 2005 Target Emissions Rate will be achieved.

9.4.2 Use of energy efficiency measures

Alternatively, the additional 15% CO2 reduction can be met by going beyond the Building Regulations requirement in terms of the energy efficiency of the development.

In some instances this may be a more attractive option as there may be cost-savings to be made by constructing an energy efficient building in the first

place as opposed to installing renewable energy technologies in order to meet the energy demand of a standard building.

This approach would simply require the SAP 2005 or SBEM to demonstrate the additional 15% CO2 reduction.

9.5 Further information

The Building (Scotland) Regulations 2004 are available from the Scottish Building Standards Agency (SBSA).

Scottish Building Standards Agency (SBSA)
Denholm House
Almondvale Business Park
Livingston
EH54 6GA
Telephone: (01506) 600 400
Email: info@sbsa.gsi.gov.uk
Website: www.sbsa.gov.uk

The SBSA also provides Technical Handbooks for domestic and non-domestic developments which can be downloaded from the SBSA website:

www.sbsa.gov.uk/tech_handbooks/tbooks2007.htm

The Building Research Establishment is able to provide information on SBEM and SAP 2005.

Building Research Establishment (BRE) Scotland
Scottish Enterprise Technology Park
East Kilbride
Glasgow G75 0RZ
Telephone: 01355 576 200
Email: eastkilbride@bre.co.uk
Website: www.bre.co.uk

SBEM software can be downloaded free of charge at:
www.ncm.bre.co.uk

The SAP 2005 manual and list of approved software is available at:
www.projects.bre.co.uk/sap2005

The Chartered Institution of Building Services Engineers is also able to provide useful information including the *CIBSE Applications Manual AM11: Building Energy and Environmental Modelling* which contains methodologies for predicting energy requirements for all building types.

Chartered Institution of Building Services Engineers (CIBSE)
222 Balham High Road
Balham
London SW12 9BS
Telephone: 020 8675 5211
Website: www.cibse.org

Back to contents page

Section 10: Further Information

10.1 Scottish Borders Council Planning Department

All sections, including the Planning Policy, Building Standards, Countryside and Heritage, and Landscape Architects teams can be contacted at:

Planning and Economic Development
Scottish Borders Council Headquarters
Newtown St Boswells
Melrose TD6 0SA
01835 825060
Web: www.scotborders.gov.uk

Area Planning Contacts

The Development Control service operates from four area offices, all of which administer the service within their respective parts of the Borders.

Galashiels Area Office
Albert Place
Galashiels TD1 3DL
01896 662705

Duns Area Office
Newtown Street
Duns TD11 3DT
01361 886105

Hawick Area Office
Town Hall
High Street
Hawick TD9 9EF
01450 364705

Peebles Area Office
Rosetta Road
Peebles EH45 8HQ
01721 726305

Copies of Scottish Borders Structure Plan and Finalised Local Plan are available for inspection at Council Headquarters, the Council's four Area Offices and all Public Libraries throughout the Borders.

All of the above sections can be contacted by email: ped@scotborders.gov.uk

10.2 Organisations providing advice and information

Energy Saving Trust

Downloadable factsheets on many renewable energy technologies, including information on set-up and running requirements, and costs are available from the Energy Saving Trust (EST) at: www.est.org.uk/myhome/generating/types

The EST also provides downloadable publications on a variety of renewable energy and energy efficiency topics through their website at: www.est.org.uk/housingbuildings/publications.

These include:

- Energy efficient refurbishment of existing housing
- Building your own energy efficient home
- New and renewable energy technologies for existing housing
- Community Heating – a guide.

Energy Efficiency Advice Centre

Energy Efficiency Advice Centres (EEAC) provide households and small businesses with advice on cost-effective energy efficiency measures, contact:

Energy Efficiency and Advice Centre
Changeworks
36 Newhaven Road
Edinburgh EH6 5PY
Telephone: 0800 512 012

Carbon Trust
The Carbon Trust provides information and advice to businesses and the public sector to cut carbon emissions and develop low carbon technologies, including the provision of energy efficiency advice and audits, contact:

The Carbon Trust in Scotland
The Technology Centre
Scottish Enterprise Technology Park
East Kilbride G75 0QF
Telephone: 01355 581810
www.carbontrust.co.uk/energy

Advice for farmers
Factsheets and information for farmers in the Scottish Borders can be found at:

www.scotborders.gov.uk/life/businessresources/ruraldevelopment/17717.html

www.scotborders.gov.uk/life/businessresources/ruraldevelopment/index.html

Or by contacting:
NFUS Rural Centre
West Mains
Ingliston
Midlothian EH28 8LT
Telephone 0131 472 4000
Website www.nfus.org.uk

Borders Machinery Ring
Galamoor House
Netherdale Industrial Estate
Galashiels TD1 3EY
Telephone 01896 758 091
Website www.ringleader.co.uk

10.3 National planning policy

Scottish Executive
Links to all National Planning Policy Guidelines (NPPG) and Planning Advice Notes (PAN) can be found in the Planning section of the Scottish Executive's website: www.scotland.gov.uk/Topics/Planning, or by contacting the Scottish Executive Development Department on 08457 741741 (UK local rate).

Scottish Executive Development Department
Planning Division
2-H Victoria Quay
Edinburgh EH6 6QQ

Other sources of national policy and advice are available from Historic Scotland, the Scottish Environment Protection Agency and the Scottish Executive.

10.4 Local planning policy

Scottish Borders Council

Scottish Borders Structure Plan and the Finalised Scottish Borders Local Plan are available for inspection at Council Headquarters, all Areas Offices and public libraries. Contact:

Plans and Research Team
Planning and Economic Development
Scottish Borders Council
Council Headquarters
Newtown St Boswells
Melrose TD6 0SA
Telephone: 01835 825060
Website: www.scotborders.gov.uk

10.5 Listed Buildings and the Historic Environment

Historic Scotland

Historic Scotland Head Office
Longmore House
Salisbury Place
Edinburgh, EH9 1SH
Telephone 0131 668 8600

Memorandum of Guidance on Listed Building and Conservation Areas
www.historic-scotland.gov.uk

Information on listed buildings is available from, Historic Scotland
www.historic-scotland.gov.uk/listedbuildings.

Information on the location of scheduled monuments, listed buildings and other known archaeological sites is also available on www.pastmap.org.uk.

Scottish Borders Council

Scottish Borders Council Headquarters
Newtown St Boswells
Melrose TD6 0SA
Telephone; 01835 825060

Information on conservation areas is available from Scottish Borders Council
www.scotborders.gov.uk/life/environment/buildtheritage/2676.html

10.6 Environmental Regulation

Scottish Environment Protection Agency

Galashiels Office
Burnbrae
Mossilee Road
Galashiels, TD1 1NF
Telephone: 01896 754797

SEPA Pollution Prevention Guidelines (PPGs)
www.sepa.org.uk/guidance/ppg

Water Framework Directive
www.sepa.org.uk/wfd

Controlled Activities Regulations
www.sepa.org.uk/pdf/wfd/regimes/car_practical_guide.pdf

Scottish Executive
Scottish Executive Environment and Rural Affairs Department
Pentland House
47 Robb's Loan
Edinburgh EH14 1TY
Telephone: 08457 741 741

Water Environment and Water Service (Scotland) Act 2003
www.scotland.gov.uk/Topics/Environment/Water/17316/9582

10.7 Borehole information

British Geological Society

The British Geological Society (BGS) holds the national records for boreholes and wells. The availability of borehole and well information can be determined from a computerised index, accessible on line as the Borehole Ordering Facility:

www.bgs.ac.uk/boreholes/home.html

Or contact the BGS Scotland office:
Borehole Records Enquiries (North)
British Geological Survey
Murchison House,
West Mains Road,
Edinburgh EH9 3LA
Telephone 0131 650 0282

10.8 Grants and funding

Information on grants and sources of funding for both renewable technologies and energy efficiency measures is available from a variety of website including:

The Scottish Executive	www.scottishexecutive.gov.uk
Scottish Community and Householder Renewables Initiative (SCHRI)	www.est.org.uk/schri
Low Carbon Buildings Programme	www.lowcarbonbuildings.org
Energy Efficiency Advice Centre	www.changeworks.org.uk
Department of Trade and Industry	www.dti.gov.uk

10.9 Renewable Energy Trade Associations

Scottish Renewables Forum
Central Chambers
93 Hope Street
Glasgow G2 6LD
Tel: 0141 222 7920
Email: info@scottishrenewables.com
Web: www.scottishrenewables.com

Renewable Energy Association (REA)
17 Waterloo Place
London SW1Y 4AR
Telephone: 020 7747 1830
Web: www.r-p-a.org.uk

Solar Trade Association
The National Energy Centre
Davy Avenue
Knowlhill
Milton Keynes MK5 8NG
Telephone: 01908 442290
Web: www.greenenergy.org.uk/sta

British Wind Energy Association
Renewable Energy House
1 Aztec Row, Berners Road
London, N1 0PW, UK
Telephone: 020 7689 1960
Email: info@bwea.com
Website: www.bwea.com

British Hydropower Association
Unit 12 Riverside Park
Station Rd
Wimborne
Dorset, BH21 1QU
Telephone: 01202 880333
Website: www.british-hydro.org

Combined Heat and Power Association
Grosvenor Gardens House
35/37 Grosvenor Gardens
London SW1W 0BS
Telephone: 020 7828 4077
Email: info@chpa.co.uk
Website: www.chpa.co.uk

Glossary

Renewable energy	Energy which has been derived from inexhaustible sources such as the sun, wind, water and plant material.
Conventional / traditional energy generation	Production of electricity and heat by use of fossil fuels (coal, oil and gas) or nuclear power.
Micro-renewables	Renewable energy generation at a small scale eg: householder or community.
Micro-generation	Small scale energy generation through any means including but not limited to renewable energy.
Low and zero carbon technologies (LZCT)	Systems for generating energy which do not rely on fossil fuels which have high carbon emissions.
Fossil fuels	Coal, oil, and gas.
National grid	The national electricity distribution system.
Wind-fetch	The distance over which wind blows.
Shadow flicker	Occurs when the sun passes behind the hub of a wind turbine and casts a shadow over neighbouring properties.
Run-of-river	Little or no impoundment of river water takes place; instead the natural river flow is used to produce energy.
Penstock	A sluice, gate or intake structure that controls water flow or an enclosed pipe that delivers water to turbines.
Greenhouse gases	Gases which naturally blanket the earth to keep it around 33 degrees Celsius warmer than it would otherwise be.
Climate change	The rise in global temperatures due to an increase in greenhouse gases which has been attributed largely to human activity resulting from the use of fossil fuels to generate energy.
Sustainable urban drainage systems	An approach to drainage which seeks to decrease the amount and speed of surface runoff, or diverts it for other purposes (eg: ponds and wetlands) so reducing the amount of runoff into mains sewers. SUDs can also improve the quality of runoff, preventing pollutants from entering the drainage system.