West Lothian Council

Planning Services
Development Planning & Environment

SG supplementary GUIDANCE

SUPPLEMENTARY GUIDANCE (SG)

Renewables and Low Carbon Energy Development (Excluding Wind Energy)

Adopted 15 July 2021

Contents

		Page
one	Introduction	3
two	Purpose and scope of the Guidance	5
three	Background • *Climate Change* • *Reducing Demand and Achieving Better Energy Efficiency*	7
four	Legislative and Planning Policy Context	11
five	Assessing Renewable Energy Proposals	14
six	Renewable and Low Carbon Energy Options • *Photovoltaic Panels* • *Solar Water (Thermal)* • *Field-Scale Solar Photovoltaics* • *Hydro Energy* • *Ground / Water Source Heat Pumps* • *Air Source Heat Pumps*	29
seven	Supporting Information (to accompany a planning application)	61
eight	Other Consents and Licences	66
-	Helpful web links	68
-	Glossary	69
Annex A	SDP Policy 10 / LDP Policies NRG 1/ NRG 1a / NRG 2 / NRG 4	75
Annex B	The Energy Hierarchy	78
Annex C	Pre-Application and Planning Process: Summary Flowchart	79
Annex D	Permitted Development Guidance for Domestic Properties	80

one

Introduction

1.1 This Supplementary Guidance (SG) has been prepared under Part 2 of the Town and Country Planning (Scotland) Act 1997, specifically Section 22 as amended by the Planning etc. (Scotland) Act 2006 and the Town and Country Planning (Development Planning) (Scotland) Regulations 2008 and forms part of the West Lothian Local Development Plan 2018 (LDP) which was adopted by the council on 4 September 2018.

1.2 The guidance has had regard to and is compliant with all relevant national planning policies and guidance, policies which are set out in the Strategic Development Plan and policies of the LDP in relation to renewable energy.

1.3 It is important to be aware that this Supplementary Guidance does not make, replace or amend existing Local Development Plan policy and nor does compliance with this guidance remove the need to comply with policies in other sections of the Local Development Plan. This guidance should be read in conjunction with the LDP.

1.4 Supplementary Guidance has been subject to full public consultation and has been considered by the Scottish Government prior to its adoption. It has statutory weight and is a material consideration in the determination of planning applications and appeals by virtue of Section 25 of the Town and Country Planning (Scotland) Act 1997 and it forms part of the development plan.

1.5 This Supplementary Guidance is one of a series which provides further guidance to developers, their agents and communities on the application and interpretation of key LDP policies, in this instance Policies NRG 1a (Low and Zero Carbon Generating Technology), NRG 4 (Other Renewable Energy Technologies) and which both require to be seen within the overarching context of Policy NRG 1 (Climate Change and Sustainability). Collectively, these policies seek to support renewable energy development where any potentially negative impacts can be satisfactorily addressed.

1.6 The full programme of proposed supplementary and planning guidance is set out in Appendix 4 of the LDP. All Supplementary Guidance and Planning Guidance which has been prepared to date can be viewed on the *council's website.*

1.7 The council encourages developers to consider the opportunity for incorporating renewable energy projects in all new developments. Small scale renewable energy schemes utilising technologies such as solar photovoltaic panels, hydro-electric, biomass heating, small scale wind turbines, and combined heat and power schemes can be incorporated into both new and some existing developments.

1.8 Some forms of micro-generation development have been given the status of 'permitted development' under the *Town and Country Planning (General Permitted Development) (Scotland) Order 1992 as amended* (subject to certain exceptions set out in the legislation) and therefore do not require to be the subject of an application for planning permission. A 'quick read' summary is provided as Annex D to this Supplementary Guidance.

1.9 Proposals may however still need be the subject of separate applications for Listed Building Consent / Conservation Area Consent, Scheduled Monument Consent, Prior Approval (agricultural) and Building Warrant. Works which may affect protected species of animals, including birds and plants, may also require to be the subject of protected species licensing (administered by NatureScot). It is also the case that permitted development rights do not apply to those developments that require to be the subject of Environmental Impact Assessment (EIA) or where the development is likely to have a significant effect on a European protected site.

1.10 It is therefore always advisable to verify the requirement for planning permission prior to commissioning or implementing any works. You can check the required permissions and other important information by visiting the *council's website*. Further information is set out in Scottish Government Circular 1/2012 *Guidance on Householder Permitted Development Rights* and Circular 2/2011 *Domestic Microgeneration.*

1.11 It is also the case that you are able to make an application for a 'Certificate of Lawfulness for Proposed Development' if you wish to establish conclusively that a proposed use of land, or operational development is lawful and does not require planning permission, and/or if implemented, will not run the risk of future enforcement action by the council as local planning authority. It should however be noted that this process is subject to a fee equivalent to 50% of the applicable planning application fee. More information can be found on the *council website*.

1.12 If you know you need planning permission and want to find out whether it is likely to be supported you can also make use of the council's *chargeable* pre-application enquiry service, details of which can be accessed from the web page *here.*

1.13 However, even where planning permission is not required this does not dispense with the need to approach the subject with thoughtfulness and sensitivity for the environment and adherence to this supplementary guidance is advised.

two

Purpose and Scope of the Guidance

2.1 It is widely recognised that atmospheric carbon dioxide (CO_2) can be naturally soaked up by trees and peat bogs and that these offer a significant nature-based solution to tackling climate change. However, CO_2 emissions can also be reduced by designing new buildings or retro-fitting existing buildings to be energy efficient and so reduce energy demand; ensuring that energy supply systems are efficient (so less energy is lost); and generating energy using low or zero carbon technologies.

2.2 This Supplementary Guidance is designed to help manage the process of transitioning to more renewable and low carbon energy generation as a means of mitigating the detrimental social, economic and environmental impacts of climate change and contributing to the Scottish Government's renewable energy and emissions reduction targets. Achieving the balance between the need to decarbonise energy supply and maintaining the unique character of West Lothian is the challenge of the planning system and a focus of this Supplementary Guidance.

2.3 It is intended to assist a wide range of parties, including householders, developers and other parties engaged in the planning process and who will all be encouraged to develop proposals for renewable and low carbon energy schemes in compliance with the guidance as appropriate. All information submitted with a planning application should be proportionate to the proposed development, as agreed with the council's Development Management team. At the same time the guidance will support officers and elected members to make informed decisions on proposals relating to renewable energy developments and help to ensure that planning policy is applied in a fair and transparent manner.

2.4 This guidance is intended to apply to all renewable energy technologies. Such technologies can be used at different scales ranging from those which contribute to the national grid, to micro-generation schemes which serve one property. Renewable resources can also be used to supply Combined Heat and Power Schemes (CHP), including district heating schemes, to serve groups of properties, including housing developments. It provides an overview of renewable technologies; advice and guidance on the key planning issues raised by such developments and details on the type of information that may be requested in processing a planning application.

2.5 The guidance seeks to facilitate consistent interpretation and application of planning policy and ensure the benefits of renewable energy development are balanced against economic, social and amenity impacts on communities as well as the environmental impacts which include biodiversity and preserving the visual landscape. It sets out the general principles for a range of renewable technologies including Solar (PV), Solar thermal, ground, air and water source heating, hydro-electric, biomass, combined heat and power (CHP) and anaerobic digestion (AD).

2.6 Developers and landowners seeking to submit planning applications for renewable energy development are encouraged to refer to this guidance at an early stage in the design process and are encouraged to make use of the council's pre-application enquiry service in order that any site-specific requirements are identified. Pre-application discussions can assist in assessing the levels of supporting information that is required to be submitted with any planning application and the potential effects that should be considered, including cumulative effects on known constraints. Details of this service can be accessed on the *council's website*. Please note however that this is a chargeable service.

2.7 With the notable exception of Wind Energy (this is addressed in separate guidance entitled '*Wind Energy Development*'), this supplementary guidance focuses on the main renewable technologies) for which there is most potential in the medium to longer term, namely:

- Solar/ (photovoltaic and thermal)
- Ground, air and water source heating Hydro-Electric Power
- Biomass
- Energy from waste
- Anaerobic digestion
- Combined heat and power (CHP)

2.8 The guidance does not direct development to specific locations, but instead sets out the general nature of each technology, the policy background, and the relevant criteria for assessing each technology including where appropriate ecology, the historic environment, landscape and other environmental considerations.

2.9 For the avoidance of doubt all previous Supplementary Planning Guidance (SPG) with regard to renewable energy (and prepared in the context of the West Lothian Local Plan, 2009) is superseded by this new Supplementary Guidance.

2.10 Renewable energy generation facilities and the framework that supports them is however continually evolving, influenced by emerging national energy policy and also by technological advancement. For these reasons it is important that the council keeps the guidance under review to ensure that it keeps pace with such changes and is at the same time responsive to the cumulative scale and nature of renewable energy developments in West Lothian and adjoining local authority areas.

Climate Change

3.1 There is increasing public awareness that climate change is the most serious threat the world faces because it threatens the basic elements of life: access to water, health and food production. The majority of climate scientists agree that climate-warming trends over the past century has been brought about by human activity, and many of the leading scientific organizations worldwide have issued public statements endorsing this position.

3.2 Climate change is mainly caused by an increase in the amount of greenhouse gases, especially carbon dioxide (CO_2) in the atmosphere. If emissions continue to rise at the present rate, the global average surface temperature will rise between two and six degrees by the end of this century due to the amplification of the greenhouse effect. In many parts of the world changes in precipitation will lead to more severe droughts and wildfires and in others an increased risk of flooding.

3.3 The effects of climate change are arguably already with us in Scotland, exemplified by rising temperatures and more frequent and severe storms and impacting on many aspects of society, including health, agriculture, buildings, water resources, energy demands and coastal erosion. Such incidents are predicted to increase over time and will inevitably have an increasingly detrimental impact if nothing is done to address the underlying causes.

3.4 West Lothian Council supports decarbonisation and the movement towards a low carbon future through supporting green energy, renewable energy technologies, heat networks and less use and more sustainable forms of transport. Indeed, Part 4 of the Climate Change (Scotland) Act 2009 recognises that the public sector has a crucial leadership role in the delivery of Scotland's climate change ambitions and explicitly requires that a public body must, in exercising its functions, act in the way best calculated to contribute to the delivery of emissions reduction targets (known as 'mitigation'), in the way best calculated to help deliver any statutory climate change adaptation programme, and in a way that it considers is most sustainable.

3.5 In 2019 the First Minister asserted that Scotland needed to act in order to address the climate emergency and West Lothian Council were quick to respond to and endorse the call for affirmative action and declared its own climate emergency. The transition to low carbon forms of electricity generation is a key part of that process, with a statutory target to reach zero greenhouse gas emissions by 2045. This is a clear and timely recognition of the threat that climate change poses and signals an intent to take urgent practical action.

3.6 In January 2020 the Infrastructure Commission for Scotland (ICS) presented Scottish Government with a 30-year infrastructure strategy *Key Findings Report - A Blueprint for Scotland* with an emphasis on delivering an inclusive, net zero carbon economy. It set out eight overarching themes and 23 specific recommendations for Scottish Government to consider including the acceleration of the decarbonisation of heat and transport and for future infrastructure decisions to be based on delivery of an inclusive net zero carbon economy.

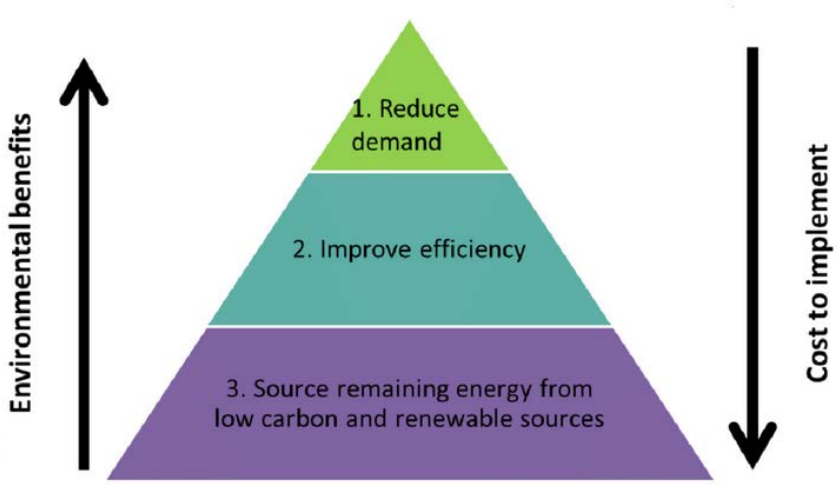

Figure 1: The Energy Hierarchy

Reducing Demand and Achieving Better Energy Efficiency

3.7 The Energy Hierarchy (Figure 1) sets out the principle that all developments, whether large or small (including householder and business improvements) should seek to reduce energy demand, and improve energy efficiency, before considering how the energy required should be generated. It then places priority on renewable and low carbon forms of energy generation before resorting to conventional energy sources. All new development should have regard to the energy hierarchy.

3.8 As a society we need to reduce the greenhouse gases we produce through changing the way we produce and use energy. Each of us can make different choices that can help reduce emissions or build resilience to the impacts of climate change. Our homes are a major source of energy demand and there are a number of measures around the home which you can install to reduce its carbon footprint. These include insulation of roofs and walls, replacement boilers, draught proofing and using more efficient light and other appliances. Generating renewable energy can also help make energy supply more secure, reduce the carbon footprint and also energy bills over the longer term.

3.9 The need to reduce demand and increase options for energy efficiency needs to apply to all development proposals, from larger residential and mixed-use developments, to applications for planning and other consents relating to households and individual businesses.

3.10 There are two forms of energy efficiency – passive and active measures – which can be used together to reduce energy demand and increase efficient energy use in all new developments.

Passive	Active
Passive measures include design features, such as architectural and building fabric selection, that inherently reduce the building energy requirement, and facilitate post-occupancy behaviour change. The following measures should be considered:	Active energy efficiency measures are associated with the energy efficiency of the equipment used within a building or development such as lighting or heating. These are not linked to scale and should be ubiquitous to all new development. The following measures should be considered:

• orientation of buildings on a site or plot to maximise opportunities for passive solar gain (generally considered to be within 30° of south); • design the plot layout and building location to facilitate air movement and enhance natural ventilation; • enlarging window areas to maximise the use of natural daylight; • orientation of buildings to reduce the level of uncontrolled shading from overshadowing buildings and green infrastructure; • optimising the U-Values of the external fabric to enable a reduction in energy loss, e.g. through providing additional insulation; • green infrastructure allocated such that it supports energy demand reduction through summer shading or winter wind breaks. This also includes shading of car parking spaces to reduce the use of in-car air conditioning; and • green open spaces to provide evaporative cooling at night, reducing any heat island effects.	• highly efficient boilers; • controls to optimise heat output and compensate for heating variations; • zonal control of heating to supply different parts of a building via a building management system; • Time and thermostat control of hot water; • variable speed drives fitted to those pumps and fans that will benefit from speed control; • high efficiency lighting; • installation of electricity check meters; • include daylight and passive infra-red motion detection systems to lighting to common areas in order to ensure they are only operated when required; • ensuring white goods, where supplied, are suitably rated or alternatively, information is provided on selecting energy rated appliances; and • built green infrastructure, such as green roofs and green walls, can reduce energy use by insulating and cooling buildings, as well as contributing to external temperature regulation and water management.

These lists of passive and active measures are not exhaustive and will need to be considered in more detail by developers, not least as technology developments in this area are progressing quickly.

3.11 A key role of the planning system is to respond to the challenges of climate change and to help Scotland move towards a low carbon future with part of the solution being the promotion and adoption of renewable and low carbon energy options such as wind, solar, hydro-electric, low carbon heating technologies and energy storage.

3.12. Urban green and blue spaces have the potential to be ground and water heat sources for much larger areas. In particular, heat pump technology can support the heat demands of buildings sited in and around greenspaces and bodies of water and the potential to support and boost Scotland's low carbon heat transition. A research project *Green Heat in Green Spaces* is being undertaken by Greenspace Scotland and is a strategic approach to assessing the low carbon heat potential of urban greenspace, exploring how urban landscapes can be transformed to support a low carbon future, and West Lothian Council is one of several public sector partners who have engaged with this initiative.

3.13 It is important to recognise that low carbon energy is different to renewable energy. While renewables deliver zero carbon energy, low carbon energy typically involves highly efficient use of fossil fuels.

3.14 Renewable energy technologies are held to play an important role in this agenda, by helping to reduce reliance on traditional fossil fuels, help cut emissions and facilitate the transition to zero a carbon future. The challenge for the planning system is to do whatever it can to support and encourage renewable energy developments in the most appropriate locations and with minimal environmental and visual impact.

3.15 Renewable energy is generated from natural sources which is either unlimited or which can be replenished without harming the environment such as wind, solar, wave, hydro-electric and energy from plant material. This also includes low carbon energy which is energy derived from non-renewable sources but the design of the system produces far less carbon emissions than contemporary methods.

3.16 In Scotland renewables are already the single largest contributor to electricity generation. Wind energy and hydro-electric energy are currently the most productive of the renewable resources but it is considered that the others will increase their share over time.

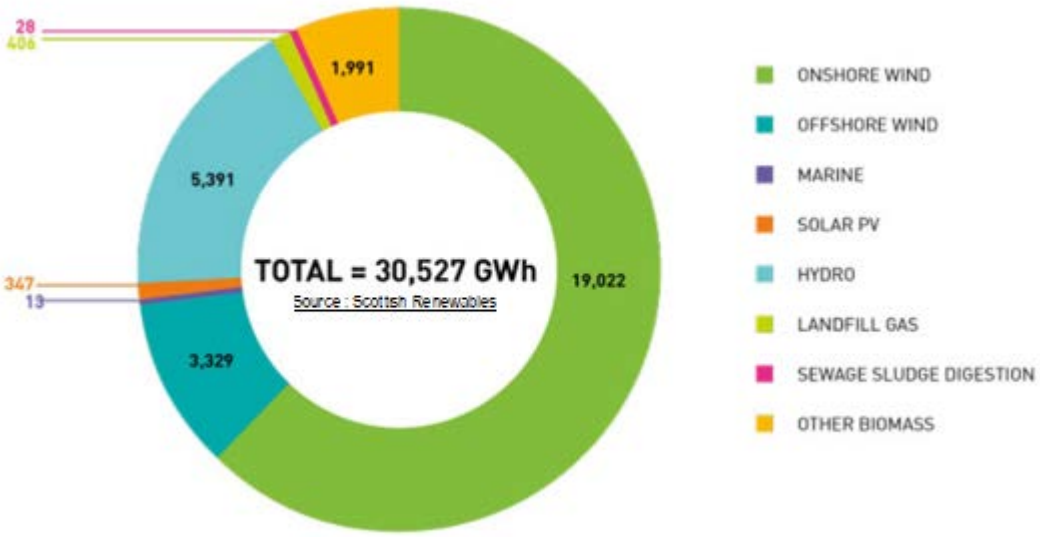

Figure 2: Electricity output by technology (Scotland, 2019)

3.17 Planning permission will ordinarily be required for renewable energy developments (save for some domestic micro-renewable schemes (see para 5.14) and their regulation is undertaken by a number of organisations, principally the local planning authority (in this instance West Lothian Council), Scottish Environmental Protection Agency (SEPA), and the Scottish Government.

3.18 As a local planning authority West Lothian Council is charged with determining hydro-electric, wind and biomass energy proposals up to 50 megawatts (MW) and all heat-only biomass proposals. Above this threshold the council is a statutory consultee and it is the *Scottish Governments' Energy Consent Unit* which is responsible for determining applications under Section 36 of the Electricity Act 1989. A summary of the main regulatory regimes is outlined in Table 1.

Table 1: Main Regulatory Regimes for Renewable Energy Generation

West Lothian Council	Scottish Government Energy Consents Unit	SEPA Controlled Activity Regulations (CAR) and Pollution Prevention and Control (PPC)	NatureScot	Scottish Forestry
Determination				
< 50 MW generating capacity	> 50MW generating capacity	Water abstraction and river engineering works (CAR) Waste management	Licenses for protected species and SSSI consent where appropriate	Felling licences and associated environmental impact assessments

NB: Other approvals including Building Warrants, Listed Building Consent, Conservation Area Consent, Scheduled Monument Consent and / or environmental licences may also be required.

4.1 Adherence to this Supplementary Guidance helps the council play its part in delivering:

- The Paris Climate Change Agreement (2016)
- The Scottish Government Climate Change Plan (2018-2032)
- Scottish Energy Strategy (2017)
- The Climate Change (Scotland) Act 2009
- The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019
- Scottish Planning Policy 2014 (SPP) which requires the planning system to support the development of a diverse range of electricity generation from renewable and low carbon energy technologies
- SDP Policy 10 (Sustainable Energy Technologies) which sets a framework for the encouragement of renewable energy technologies
- LDP Policy NRG 1 (Climate Change & Sustainability) which expects development proposals to have regard to a comprehensive series of sustainability principles;
- LDP Policy NRG 1a (Low and Zero Carbon Generating Technology) which requires developments for new buildings to demonstrate how carbon emission reductions will be met by renewable and low carbon energy and;
- LDP Policy NRG 4 (Other Renewable Energy Technologies) which, subject to specific caveats, supports a wide range of renewable and low carbon energy generation initiatives.

4.2 While the LDP also includes policies supporting solar energy (NRG 2), wind energy development (NRG 3), and the creation of community heat energy networks (NRG 5), these are addressed in separate guidance. The requirements of LDP policies are set out in more detail below.

Scottish Energy Strategy: the future of energy in Scotland

4.3 Scotland's first Energy Strategy will strengthen the development of local energy, protect and empower consumers and support Scotland's climate change ambitions while tackling poor energy provision. The strategy sets out two new energy targets for the Scottish Energy system by 2030. These are:

- The equivalent of 50% of the energy for Scotland's heat, transport and electricity consumption to be supplied from renewable sources.
- An increase by 30% in the productivity of energy use across the Scottish economy.

4.4 Built around the six energy priorities, this Strategy will guide the decisions that the Scottish Government, working with partner organisations, needs to make over the coming decades. The Strategy can be viewed on the following link - The Future of Energy in Scotland.

The Climate Change (Scotland) Act 2009 (as amended)

4.5 The Climate Change (Scotland) Act 2009, as amended by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019, sets legally-binding targets to reduce Scotland's emissions of all greenhouse gases to net-zero by 2045 at the latest.

4.6 It sets interim targets for reductions of at least 56% by 2020, 75% by 2030, 90% by 2040 and is key to delivering the Government's climate change programme. The need to mitigate the causes of climate change and the need to adapt to its short and long-term impacts should be taken account of in all decisions within the planning process.

Scottish Energy Strategy (2017)

4.7 The Scottish Government is committed to increasing Scotland's renewable energy output. In December 2017, it published its strategic vision for Scotland's future energy system – *The Future of Energy in Scotland: Scottish Energy Strategy.* This is a long-term strategy for the next thirty years and adopts challenging renewable energy targets built around three main principles - a whole-system view - an inclusive energy transition - a smarter local energy model.

4.8 The Scottish Government's Energy Strategy targets are expected to be met from a range of renewable energy sources, including on and off shore wind, but also hydro-electric, solar, biomass and geothermal.

4.9 The Scottish Government's most recent energy/emissions targets were published in February 2018 as the Climate Change Plan*: third report on proposals and policies 2018 - 2032 (CCP, 2018).* It sets out how Scotland can deliver its target of 66% emissions reductions, relative to the baseline (i.e. 2010), for the period 2018–2032. There are three targets which are of relevance:

- aim for 100% of electricity demand to be met by renewables by 2020;
- seek to increase woodland cover from around 18% to 20% by 2032; and
- seek restoration of 40% (250,000 hectares) of Scotland's peatland by 2030.

National Planning Framework 3 (NPF3)

4.10 The Scottish Government's *National Planning Framework 3 (NPF3)* was published in June 2014 and is the long-term spatial expression of the Government Economic Strategy. It includes a number of national initiatives, developments and targets and supports economic growth that is compatible with the sustainability principles of protecting the landscape and the environment. NPF3 promotes a transition to a low carbon economy, is supportive of renewable sources of heat energy and recovery of waste heat and recognises the importance of the planning system in delivering these targets.

Scottish Planning Policy (SPP) 2014

4.11 *Scottish Planning Policy* seeks to ensure the full potential for renewable energy generation is achieved whilst at the same time giving due regard to environmental, community and cumulative impacts.

4.12 Paragraph 154 of SPP explicitly requires local planning authorities through Local Development Plans to:

- support the development of a diverse range of electricity generation from renewable energy technologies - including the expansion of renewable energy generation capacity; and
- steer development to appropriate locations and to advise on the issues that will be taken account of when specific proposals are being assessed.

4.13 SPP does not however single out any sustainable types to have extra weighting over others and states that the planning system should "achieve the right development in the right place: it is not to allow development at any cost".

4.14 Paragraph 169 of SPP identifies recognised material considerations to be addressed by Development Management with regards to energy infrastructure developments and these considerations are expanded upon in chapter 8 of this Supplementary Guidance.

Strategic Development Plan for Edinburgh and South East Scotland 2013 (SDP)

4.15 Policy 10 (Sustainable Energy Technologies) of the *Strategic Development Plan for Edinburgh and South East Scotland* is a high level policy which sets out and promotes renewable energy, more decentralised patterns of energy generation and supply and the potential for developing heat networks. It identifies delivery targets to be achieved while recognising the need to support sustainability principles of protecting the landscape and the environment.

4.16 SDP Policy is set out in Annex 1 of this Supplementary Guidance.

West Lothian Local Development Plan (LDP)

4.17 The *West Lothian Local Development Plan* was adopted in September 2018. The overarching policy context for renewable energy is Policy NRG 1 Climate Change and Sustainability, and to meet its obligations under the legislation and national policy context set out above, it commits to a reduction of greenhouse gas emissions through a wide range of measures designed to mitigate and adapt to climate change and it explicitly supports the Scottish Government's Climate Change Adaptation Programme.

4.18 Policy NRG 1a reinforces this by requiring proposals for all new buildings (some exceptions apply) to demonstrate that at least 10% of the current carbon emission reduction set by Scottish Building Standards will be met through the installation and operation of low and zero-carbon generating technologies and that a statement demonstrating compliance with this requirement is provided with the planning application.

4.19 Policy NRG 2 make specific practical demands on developers by requiring that all new residential, commercial and industrial buildings are designed to facilitate solar gain, with a proportion of roofs of new houses being orientated at a specific direction and at an appropriate angle. Additionally, commercial properties require to have roof areas and roof structure capable of accommodating photovoltaic cells for generating electricity (not water heating).

4.20 Policy NRG 4 (Other Renewable Energy Technologies) is more specifically focused and is broadly supportive of proposals for renewable energy schemes provided that there are no unacceptable significant adverse impacts or effects which cannot be satisfactorily mitigated on the built, historic and natural environment or on local communities.

4.21 Policies NRG1, NRG1a, NRG 2 and NRG 4 are set out in Annex 1 of this Supplementary Guidance.

5.1 There are many factors which require to be taken account of and assessed when considering the implications of proposals for renewable energy developments and these are listed in full in paragraph 169 of SPP 2014.

5.2 Considerations will vary relative to the scale of the proposal and area characteristics but some of the main requirements developers / landowners will need to consider when formulating their proposals are set out in this section of the guidance. While many of the considerations are shared across all forms of renewable energy development some are quite specific to a particular form of renewable energy and this has been highlighted where appropriate.

5.3 Notwithstanding, it remains the case that renewable energy projects are assessed on their merits against development plan policies and any relevant 'material considerations' which may include environmental, economic and social effects of each project. Therefore, the following should be regarded as a guide and is not necessarily a definitive list.

Agricultural Land

- While SPP emphasises the need for the continued protection of prime agricultural land (James Hutton Institute classes, 1, 2 and 3.1) or land of lesser quality that is locally important from development, it does nevertheless cite as an exception development for the generation of energy from a renewable source where this accords with other policy objectives and where there is secure provision for restoration to return the land to its former status.

- Notwithstanding, installations are deemed more appropriately located on previously-developed land or less productive land rather than greenfield sites and where sites are proposed in rural areas developers should always seek to avoid prime agricultural land, highly prominent locations and areas designated as 'Special Landscape Areas (SLAs).

- Where applications are however made in respect of renewable energy developments affecting such locations they must be accompanied by a statement explaining and justifying the selection of the site. Generally, taking prime agricultural land permanently out of full agricultural use will not normally be supported unless clear justification on the benefits a solar farm development can be demonstrated. In particular, applicants will be required to:
    - Provide clear justification on the benefits a development would have; to demonstrate why the land should be taken out of full agriculture use;
    - Explain why the development must be located on the site and not on land of a lesser agricultural classification;
    - Provide information on the impact of the proposal on the areas supply of farm land of that classification. Also consider the cumulative impact of the proposed development alongside other large-scale solar PV developments on the supply of agricultural land of that classification across West Lothian. If this is to diversify an existing farm (or part of it), provide information on the viability of the farm to continue to function as an agricultural unit with the solar farm in situ.

- To help mitigate against potential adverse effects of renewable energy development schemes can have on agricultural land, steps should be taken at the construction phase to enhance the reversibility of the development and should be evidenced within a planning application. Possible considerations are:
    - the use of removable mats as access tracks
    - the use of ground screws to secure PV panels
    - avoidance of soil compaction and contamination

- In the case of solar farm development, the residual agricultural land can still provide some benefit as low intensity grazing. This provides a low cost means of managing grassland and enables the land to remain agriculturally productive. Where low intensity grazing is an option, developers should engage the services of a professional ecologist to ensure an effective grazing regime for the site that would be best suited to the area's characteristics and the biodiversity objectives for the development.

Air Quality, Emissions & Odours

- Air pollution results from the introduction of a range of substances into the atmosphere from a wide variety of sources. It can cause both short term and long-term effects on health, but also on the wider environment.

- Renewal energy developments must have no significant adverse effects on air quality, particularly inside and adjacent to Air Quality Management Areas (AQMAs). Developers should consult with the council's Development Management team to establish whether a proposed development is inside or adjacent to an AQMA.

- The impact from renewable energy developments on air quality will be fully assessed and if necessary mitigation measures will require to be identified and agreed in consultation with the with the council's Environmental Health service.

- Development will not be supported where it is not possible to mitigate the adverse effects of that development on air quality effectively or where development proposals cause unacceptable air quality or dust impacts, or would result in sensitive uses, which give rise to air pollution concerns or the granting of planning permission would conflict with, or render unworkable, elements of the council's *Air Quality Action Plans. Planning Guidance 'Air Quality'* provides comprehensive advice and information.

- Where a development is likely to affect air quality, developers should identify and provide details of potential mitigation measures and should make provision for developer contributions or planning obligations to mitigate the development's individual or cumulative impacts upon air quality.

- For the largest developments an Environmental Impact Assessment (EIA) may also be required under the EIA regulations. In that case, a detailed study of the effects of a development on air quality would be necessary unless it has been screened out at the scoping stage of the EIA.

- Proposals to generate energy from waste or anaerobic digestion plants may create odour issues. In developing their proposals applicants and their agents should consider the potential sources of odour and fumes arising from their development and, if necessary, amend their proposal and/or establish procedures to adequately control odour and fume emissions. As part of this assessment it is also important to identify sensitive receptors in the vicinity of the proposal (such as residential properties, schools, hospitals) and consider what measures can be put in place to prevent or limit their exposure to odour and/or fume emissions.

- If unacceptable odours and fumes cannot be prevented by means of effective ducting or control measures, or if ducting cannot be installed without significant detriment to visual amenity, it is likely that planning permission will not be granted.

- Proposals for large commercial or industrial installations that have the potential to emit pollution may be regulated under the Pollution Prevention & Control (PPC) regime and will normally require an air quality assessment as part of the permit application. To avoid duplication of effort the same Air Quality Assessment (AQA) could be used to help determine the impact of the development in terms of air quality for a planning application.

- The biogas produced as a result of the anaerobic digestion process is odorous if allowed to vent directly to the atmosphere however under normal operating conditions this can and should be prevented by the gas holder which acts to regulate the flow of biogas to the CHP engine.

- When considering planning applications allied to biomass development, the Development Management team will collaborate with the council's Environmental Health service to make an informed judgement on the impact of biomass combustion on air quality. If this assessment indicates that any individual boiler, or group of boilers in a specific area, has the potential to contribute to exceeding the PM10 objectives, it is likely that planning permission will not be granted.

Aviation

- The safety of aircraft is of significant importance in the assessment and determination of applications for renewable energy development and the impacts of proposals must be satisfactorily addressed and demonstrated to the satisfaction of the council and the relevant technical authorities. Of particular relevance is likely to be proposals for solar farm development and the attendant phenomenon of glint and glare' adversely affecting pilots.

- The entire administrative area of West Lothian is embraced by the 'Edinburgh Airport Airspace Area' and therefore applications for some renewable energy developments will require consultation with the airport operator, Edinburgh Airport Limited, who are directly responsible for safeguarding its airspace. Developers are also expected to engage directly with the other relevant aviation authorities NATS En Route (NERL) at the early stages of assessing the feasibility of proposals.

- Other guidance related to development and aviation is set out in Scottish Planning *Circular 2/2003 Safeguarding of Aerodromes, Technical Sites and Military Explosives Storage Areas*. This identifies the need for safeguarding Edinburgh airport and the council will decline to determine an application until it is in receipt of consultation responses from Edinburgh Airport, NATS En Route (NERL) and any other relevant aviation consultees. Any proposal that receives an objection from one of the aviation organisations will not be supported by the council until such a time that the objection is withdrawn.

- The council will consult with the Ministry of Defence (MOD), Civil Aviation Authority (CAA) and National Air Traffic Services (NATS) on applications for solar farms and those incorporating tracking systems and proposals which are subsequently deemed to have an adverse effect on aircraft navigation (military or civilian) and other radar installations used for health and safety applications will not be supported.

Communities

- Communities can be affected both positively and negatively by renewable and low carbon energy technologies. While 'major' and 'national developments' are by default required to be the subject of *Pre-Application Consultation (PAC)* with relevant communities and affected parties, the council is keen to encourage developers planning to invest in all new renewable or low carbon energy scheme (irrespective of the size, location or nature to carry out an engagement exercise with the local community at an early stage and prior to submitting their planning applications.

- The aim of the process should be to encourage discussion before a formal application is made so that any benefits from collaboration can be explored from the outset and included within the development. Consultation can help ensure issues are identified, understood and addressed, and so help shape local solutions, leading to greater confidence and also fewer delays in the decision-making process.

  Such consultation could take the form of public meetings / exhibitions and mail shots to residents living near to an application site. This would provide an opportunity to try and address any concerns raised by the local community prior to submission of the application. Renewable energy schemes are more likely to be supported by the council where wider environmental, economic, social and community benefits directly related to the scheme outweigh any potential adverse impacts. Early community engagement provides an opportunity to explore the possibilities for achieving such benefits.

- Further potential benefit comes from physically attaching the local community to a new renewable energy scheme. For instance, by supplying the local community with energy as well as a new development, the size and value of the energy market goes up which may enable a more cost-effective scale of technology to be used. In addition, technology such as combined heat and power (CHP) may become viable. This approach has the potential to benefit all parties.

- Local communities have the potential to become key players in the energy market in a number of ways. Communities represent energy markets which can be potentially valuable. Land assets with potential value for energy generation projects are often available within the community. More importantly, communities can also benefit from the social and economic benefits that come from retaining the value of energy generation within the local economy. The benefit of local and community ownership of renewables is recognised by Scottish Government as nationally significant with benefits including community sustainability, energy security, and the alleviation of fuel poverty. Further advice and information is contained in the Scottish Government publication *Shared Ownership of Onshore Renewable Energy Developments 2019*.

- Developers of large-scale renewable energy projects will be encouraged to provide Community Benefits outside the planning process. Community benefit payments are voluntary financial contributions provided by a developer. They offer a unique opportunity for communities but they are not a material consideration in the determination of a planning application unless as per Scottish Planning Policy, they can be demonstrated to contribute towards a net economic impact including community socio-economic benefits such as employment, associated business and supply chain opportunities.

  Scottish Planning Policy (SPP) however states that where a proposal is acceptable in land use planning terms and consent is being granted, local authorities may wish to engage in negotiations to secure community benefits in line with the Scottish Government's *Good Practice Principles for Community Benefits from Onshore Renewable Energy Developments*. Whilst this is intended primarily for onshore wind, the principles of good practice can be applied to other technologies. It is not unreasonable for developers to provide community benefits to help off-set any potential negative impacts of their development and to ensure the wider community benefits from the renewable energy being generated from their area. The aforementioned guidance recommends a community benefit package for onshore wind developments with a value to the equivalent of at least £5,000 per installed megawatt per annum, index-linked for the operational lifetime of the project and it is suggested that this provides a good benchmark for other onshore renewable energy technologies to aspire to. Discussions on contributions should commence as early as possible in the development process to provide a degree of certainty to all parties. At the same time, however, these discussions must not be construed as the council, as Planning Authority, pre-determining the application. As stated above, any contributions are not material considerations in the assessment of the proposed renewable energy development.

- Groups such as the Energy Savings Trust or the Carbon Trust can support and advise on community involvement in developing renewable energy and benefitting from it.

Contributions to Renewable Energy Generation Targets

- SPP and NPF 3 seek a transition to a low carbon economy and recognise the importance of the planning system in delivering the Scottish Government's Energy Strategy targets. These are challenging and ambitious with the goal currently being to achieve the equivalent of 50% of the energy for Scotland's heat, transport and electricity consumption to be supplied from renewable sources by 2030.

  Applications for renewable energy developments over 45kWth (heat) or 50kWe (electric) capacity should be accompanied by a statement which details:

  - the electrical and or heat generating capacity of the proposed development (expressed in megawatts/kilowatts);
  - the expected annual generating output (expressed in megawatts/kilowatts);
  - the number of households which could be powered or heated by the electricity generated by the proposed renewable energy development (annually);
  - fuel used/and source (where relevant);
  - fuel and/or generation technology being replaced or displaced; and
  - the potential contribution the proposal will make to (national) renewable energy targets;

Cumulative Impact Assessment

- The potential impacts of a proposed development cannot be viewed in isolation but must be considered in addition to impacts already arising from existing or planned development.

- A cumulative impact assessment is an appraisal of the proposal in relation to similar developments in the surrounding area which could, when viewed incrementally, potentially detract from the character of an area. SPP 2014 recognises that in some areas the cumulative impact of existing and consented energy development may limit the capacity for further development. The most significant impacts which the council will wish to consider relate to those of a landscape and visual nature, those allied to natural heritage (including species and habitats) and noise.

Decommissioning & Restoration

- Decommissioning proposals for low carbon energy schemes must be planned for. Applications for renewable energy should include details of a scheme for decommissioning, site restoration and aftercare, to ensure that when the development reaches the end of its designed lifespan, or it is deemed no longer to be required, the site is restored to an acceptable standard. This should make specific provision for the removal of buildings and off-site disposal of extant plant and apparatus where appropriate. The council may in some instances require an application to be supported by a financial guarantee to ensure that decommissioning, restoration and aftercare costs can be met in full. Where mitigation measures are proposed and agreed, these may also be subject to the application of conditions or legal agreement.

- Conventional waste management licensing requirements as appropriate require to be observed by developers.

Ecology & the Natural Environment

- The impacts from renewable energy developments on West Lothian's natural environment and ecology require to be fully assessed and if appropriate, mitigation measures require to be identified. Proposals must accord with an extensive range of relevant natural environment policies (prefixed ENV) in the LDP.

- European Sites and European Protected Species are identified through the *Conservation (Natural Habitats, &c.) Regulations 1994* (as amended for Scotland) which make provision for the implementation of the EU Habitats Directive as it applies to designated sites and protected species in Scotland. Current European Sites and European Protected Species and degrees of protection can be found on the *NatureScot* website. Development proposals are required to demonstrate that they will not cause unacceptable impacts on protected species or measures to mitigate such impact or to enhance habitat of protected species e.g. timing of works; - habitat management plans; and - enhanced existing and degraded habitats, and provided interpretation and educational opportunity.

- Proposals will be required to demonstrate that any significant effects on biodiversity, habitats, local nature conservation designations, European sites, birds and protected species can be substantially overcome by siting, design or other mitigation. Developer should have regard to the council's Planning Guidance (PG) *Planning for Nature - Development Management and Wildlife* which provides advice on key habitats and protected species in West Lothian, survey methods and timing, good design and mitigation measures and licensing requirements.

- Applications for renewable energy development may, where appropriate, require to be accompanied by a Phase 1 Habitat Survey and or a *Habitat Management Plan (HMP).* In terms of the latter, where specific species/habitats are affected, it should set out the means of land management that will secure biodiversity enhancement.

- Planning permission for renewable energy projects in sites with national/regional designations for natural or built heritage interests will only be supported where it can be demonstrated that the objectives of the designation will not be compromised by the development, or are clearly outweighed by the environmental, economic and social benefits of the proposal.

- It is recognised that some renewable energy developments may have negative ecological impacts which can result in the loss of habitat and the disturbance and fragmentation of plant and animal species and the ecological impacts of all proposed renewable energy developments will be a key determining factor when considering the need for an *Environmental Impact Assessment* (EIA). The council is statutorily required to consult with *NatureScot* on proposals that require an EIA and/ or could affect sites with a statutory nature conservation designation. All other consultations are discretionary.

- Generally developments should be located away from identified sites of ecological importance. Both the construction and the operation phases of development can cause adverse effects on the ecology of an area and both require to be considered and there are a variety of mitigation methods which can be employed to reduce the impact upon these sensitive areas.

During the construction phase of development these can include:

- retaining existing habitat features
- avoid construction during breeding seasons of relevant species
- translocation of sensitive species if appropriate

Possible mitigation methods during the operation of development include:

- incorporating 'wildlife highways'
- avoiding excessive security lighting
- enhancing biodiversity where appropriate.

Opportunities for enhancement should be identified through the preparation of a *Habitat Management Plan.*

- In order to mitigate the impact caused by site infrastructure, buffer protection zones should be established for identified sensitive habitats and species on the application site to allow infrastructure to be situated away from sensitive areas, for example to avoid linear features such as hedgerows that are used by bats for commuting and foraging. Furthermore, species specific measures can also be taken to minimise the potential ecological impacts.

- The RSPB produce bird sensitivity mapping. This, however, provides only a broad indication of sensitivity and there may be local variations within each category of sensitivity, which will only become apparent after detailed surveys have been undertaken.

- Where there may be significant cumulative impacts on ecological and/or ornithological interests, developers will be required to undertake a cumulative impact assessment.

- All types of renewable energy development must accord with the specific policy guidance for protected species set out in LDP Policy ENV 20.

- Developers should seek to minimise any loss of habitat by using existing entrances to the site and refraining from removing hedgerows where possible. Furthermore, developers are encouraged to consider strengthening existing hedges through planting gaps using suitable species appropriate to the locality.

- All planning applications for renewable energy development should seek to identify opportunities to promote wildlife gains through a series of ecological enhancements.

- Solar farm development presents a particular opportunity to enhance habitats, for example, the inclusion of hedgerows to the boundaries of developments creates nesting and foraging areas and a means for wildlife to move between habitats. Proposals should make provision for buffer strips between the solar panels and the boundaries of the site. Buffer strips should aim to be 7 to 10 metres wide to ensure the best benefit to biodiversity on a site. These buffer strips are best left uncut for 2 to 3 years to allow the habitat to develop. Post development, effective management of the site is vital to ensure the success of biodiversity enhancements.

- The development of a Biomass facility can also result in potential adverse impact upon ecology within the proposed area through the loss of habitat, disturbance and fragmentation of species caused by the construction and operation of the plant. Furthermore, due to the noise, airborne and waterborne emissions caused by the operation of the plant can also disturb local habitats and species and will need to be considered as part of the application process.

- Most of the impacts caused by the construction and operation of a biomass facility can be appropriately mitigated through implementing the following actions:

  - locating plant and ancillary buildings away from sensitive habitats
  - exclusion fencing and translocation programmes
  - covering excavation works
  - providing escape ramps for wildlife
  - use of speed limits on site
  - undertaking clearance work outside of breeding season (March-August)
  - protecting watercourses and maintaining hydrological regimes

On the rare occasion where other factors may be judged to over-ride compliance with the aforementioned environmental assessment criteria, and the council elects to grant planning permission, the council will ordinarily require developers to make alternate and proportionate provision for biodiversity offsetting. This will be secured by planning conditions and/or a legal agreement.

Economy

- Scottish Planning Policy (2014) makes it clear that net economic impact is a material consideration in the determination of planning applications for renewable energy applications.

- Proposals for renewable energy (other than for micro-renewables) should therefore be accompanied by a socio-economic statement, proportionate to the scale of the development, and detailing the benefits that are expected to arise from the project for the surrounding communities and the wider West Lothian economy. This should reference direct job creation associated with the construction and operation of the project, indirect job creation and supply chain opportunities for local businesses, wider benefits to the local economy relating to any recreational/ public access features the proposal may include and economic implications for decommissioning of the facility.

- Proposals will be assessed on their individual merits, taking into consideration the relevant environmental, economic and social effects of each project. Renewables can also provide economic benefit through providing off-grid or cheaper, sustainable, heat and energy, alleviating fuel poverty, or creating socioeconomic benefits as a result of community or shared ownership. The Scottish Government had developed guidance on assessing net economic benefit as part of the planning process *Draft Advice on Net Economic Benefit and Planning (2016)* and the council will have regard to this when considering development proposals.

Energy Storage

- If the energy sector is to maximise environmental, economic and social benefits then renewable energy generation needs to be linked to energy storage. In the draft *Scottish Energy Strategy* energy storage is identified as one of the key factors that underpins transition to a largely decarbonised energy system.

- As part of the consideration of low carbon proposals the council will have regard to any opportunities identified for energy storage and the overall benefits that they may provide towards meeting national energy objectives. Energy storage is a key element to increasing the flexibility of the energy system to promote decarbonisation. Linking storage to renewable energy sources is encouraged to help promote local use, address grid capacity issues and balance supply and demand. Applications for all low carbon energy generation development should identify whether any energy storage facility is proposed.

Environmental Impact Assessment

- It is unlikely that proposals for a micro-generation development will require a formal Environmental Impact Assessment (EIA) unless there are particular site-specific concerns. This is at the discretion of the Planning Authority. Developers of all other projects may however be required to conduct a formal EIA process.

- The council will require those applications for renewable energy developments which fall within the scope of the Environmental Impact Assessment legislation to be accompanied by an *Environmental Report* i.e. the document containing the compiled information gathered during the EIA process.

- Environmental Impact Assessment (EIA) is a mechanism for drawing together, in a systematic way, a quantitative analysis and qualitative assessment of a proposals environmental effect. It is designed to prevent, reduce or offset the detrimental environmental impacts development can create and also allows an opportunity for proposals to enhance positive outcomes the development could have on the environment. The requirement for EIAs derives from the EU directive 2011/92/EU. In Scotland, the Directive is translated into specific legal obligations by the *Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017.*

- It is anticipated that some renewable energy proposals, depending on their scale or location, will fall within either Schedule 1 or Schedule 2 of the Regulations with the significance being that Schedule 1 proposals are those which by law must have an Environmental Impact Assessment undertaken.

Schedule 2 proposals are those which are deemed to pose significant harm to the environment by virtue of the nature, size and location of the proposal and subsequently affords the council the discretion to require a developer to submit an Environmental Impact Assessment. Where a landowner / developer is unsure whether an EIA applies, they are encouraged to request a screening opinion from the council and it will determine whether an EIA is required for the proposed development.

- Where it is concluded that an EIA is required, applicants are encouraged to request a pre-application scoping opinion. While there is no obligation for an applicant to consult with the council on the content of the EIA it is nevertheless strongly recommended that an applicant does so. A scoping opinion enables the council to identify relevant environmental issues, constraints or concerns and this can be of considerable assistance to applicants when assembling the supporting information that is to be provided with the planning application. Pre-application engagement with statutory authorities and the community should take place at the earliest opportunity to ensure that potentially sensitive receptors are identified, and that any impacts can be successfully mitigated.

- Links to EIA legislation, guidance and advice, including Circular 1/2017: The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 can be found on the *Scottish Government website*.

Forestry & Woodland

- The retention of woodland uniquely contributes to addressing climate change and also serves to enhance the character, ecology and amenity of a substantive part of West Lothian which remains at the heart of the Central Scotland Green Network (CSGN) initiative. The effects a proposed development will have on forestry and woodlands and the consequences that woodland removal might have on the area therefore requires to be fully assessed, and, where appropriate, mitigation measures identified. Proposals must accord with LDP Policy ENV 9 which identifies a general presumption against development adversely affecting woodlands unless there is a proven locational need and where a sustainable environmental gain through replacement and additional tree planting.

- The Scottish Government Policy on *The Control of Woodland Removal, Scottish Forest Strategy* includes a presumption in favour of protecting woodland resources and woodland removal should only be allowed where it would achieve significant and clearly defined additional public benefits. Compensatory planting, using suitable species appropriate to the locality and which reflects the existing characteristics of the landscape, is generally expected where woodland is removed and will be a material consideration when assessing proposals.

- Any renewable energy proposal that includes woodland removal should be discussed at an early stage with Scottish Forestry and take account of the advice in the aforementioned Scottish Government's Control of Woodland Removal Policy, Scottish Forest Strategy.

- All trees to be removed should be surveyed for bats, birds, red squirrels, and any other protected species. Bats are a European Protected Species and a Licence will be required to remove a tree with a bat roost.

Habitats Regulations Appraisal

- A Habitats Regulation Appraisal (HRA) is also required where a proposal is located within a SAC or SPA, or has the potential to have an adverse effect on site Integrity of one (or more) of these designated sites. In Scotland, SACs and SPAs are given legal protection by the Habitats Regulations.

- Under the Habitats Regulations, the council must consider whether any plan or project will have a 'likely significant effect' on a European site. These form a network of protected areas that stretch across Europe and embrace Special Areas of Conservation (SACs) and Special Protection Areas (SPAs). An appropriate assessment is also required for potential SPAs, candidate SACs and listed RAMSAR Sites (i.e. wetland sites of international importance designated under the RAMSAR Convention). In West Lothian are: two SACs - Blawthorn Moss (to the north of Blackridge) and Craigengar (Pentland Hills) – one SPA – Firth of Forth – and one RAMSAR site –also Firth of Forth.

- A competent authority must not authorise a plan or project unless it can show beyond reasonable scientific doubt – using appropriate assessment – that the plan or project will not adversely affect the integrity of such sites.

- Where a HRA is considered to be required, the council must undertake a screening test and if this concludes that the potential impact may undermine the conservation objectives for any feature of a European site this triggers an Appropriate Assessment. Both stages of the HRA need to consider the proposal alone and in-combination with other plans or projects.

- This assessment is carried out by the council, however, the applicant must supply the information required to undertake the evaluation. Any assessment must precede the planning decision and where the outcome of the Appropriate Assessment cannot rule out a potential adverse effect, and no alternative solutions can be identified, then the project can only then proceed if there are reasons of over-riding public interest and if the necessary compensatory measures can be secured. As *NatureScot* is the conservation body for Scotland it would play an integral role in any HRA and would need to be consulted on all applications which would require one.

Historic Environment & Built Heritage

- The planning system has an important role to play in maintaining and enhancing the distinctive and high-quality historic environmental assets widely distributed across West Lothian. Low carbon energy proposals must therefore be designed to minimise impacts, both direct and indirect on:
    - Listed Buildings
    - Conservation Areas
    - Scheduled Monuments
    - Gardens and Designed Landscapes.
    - Historic Battlefields.
    - Archaeological sites
- Renewable energy developments have the potential for direct and or direct impacts on the historic and built heritage of West Lothian and should be fully assessed and, if appropriate, mitigation measures require to be identified.

- Proposals must accord with the policy principles of SPP 2014 relevant to the historic environment (para 137) and policies ENV 23 to ENV 33 (inclusive) of the adopted West Lothian LDP.

- Applications in respect of renewable energy developments must identify the cultural and historic assets that might be affected by the development. This can be achieved by:
    - consulting the Historic Environment Scotland National Record of the Historic Environment to locate and confirm known archaeological sites, monuments and buildings
    - consulting with West of Scotland Archaeology Service (WoSAS) which has an on-line search facility by seeking information on designed landscapes which can be found in the Historic Environment Scotland's Inventory of Gardens and Designed Landscapes;
    - by identifying if the site lies within a conservation area;

- Applications in respect of renewable energy developments must:
    - consider the potential for direct impacts on the historic environment assets from components of the application such as access tracks;
    - consider the potential for impacts of the setting of the historic environment assets by identifying the setting of assets within the vicinity of the proposal and assessing the potential impact of the development on these settings;
    - consider the potential for cumulative impact on historic environmental assets; and
    - consider the opportunities for improving the accessibility of historical assets and their interpretation.

- Where necessary the council may direct that an *Archaeological Survey* should be undertaken and submitted with a planning application. In that event, a written scheme of investigation will be negotiated and agreed between the council's archaeological advisors, West of Scotland archaeology Service (WoSAS), and the applicant. Any structural or buried features of historic or archaeological importance would also have to be recorded before works commenced on site in order to provide a public record of any finite and fragile elements of the historic environment.

- In relation to sensitive historic environments such as conservation areas, listed buildings, historic landscapes and gardens and scheduled monuments proposed schemes which are above the micro scale are unlikely to be permitted within or in close proximity to these designations due to the impact such development can have on the historic setting of these areas. Applicants should seek to locate development away from these designations and their settings to ensure the historic fabric is preserved.

- Where necessary, trial trenching and an archaeological watching brief may require to be undertaken prior to and during the construction phase of proposed schemes. Where nationally important archaeological remains and their settings are likely to be impacted, there should be a presumption in favour of their preservation in situ. Where the remains are of lesser importance the council needs to weigh the relative importance of the archaeological features against the need for the proposed development potentially with the need for archaeological mitigation if appropriate.

- For sites where solar arrays are proposed, connection routes to the national grid may also impact on archaeological resource and require mitigation; supplying detail of these early stage ensures informed mitigation. As noted, for sites with non-statutory designations, archaeological mitigation work may be required both pre and post determination.

Hydrology

- Renewable energy developments and their associated works have the potential to impact upon watercourses, open bodies of water and groundwater. The consequences for hydrology, the water environment and flood risk must be fully assessed and if appropriate, mitigation measures identified. Specifically, proposals must accord with LDP policies EMG 1, EMG 2 and EMG 3.

- It is a specific requirement that the surface water runoff associated with any renewable energy development will be collected, treated, attenuated and discharged using sustainable urban drainage (SUDs) techniques.

- Flooding and the potential impacts on the natural and built environment are material considerations to be taken account of in the development planning process. The council requires developers to adopt a precautionary approach to the management of flood risk and ensure that development is safe from the effects of flooding and will not result in an increase in flood risk elsewhere. It is also expected that measures to mitigate the effects of flooding and the impact of development on the water environment are sustainable and maximise social, economic and environmental benefits.

- Where a site lies within a known flood risk area a planning application must be accompanied by a *Flood Risk Assessment (FRA)* which has been prepared by a suitably qualified and experienced hydrologist or chartered civil engineer and early discussion with the council's flood-risk management team is encouraged. Where appropriate a *Drainage Impact Assessment (DIA)* may also require to be submitted.

- Prospective applicants are directed to *SEPAs website* which includes links to an online interactive flood map and other technical guidance for addressing and managing flood risk. Developer should also have regard to the council's Supplementary Guidance (SG) on the subject of *Flooding and Drainage*.

- *The European Water Framework Directive* (which was transposed into Scots law through the *Water Environment & Water Services (Scotland) Act 2003* sets out arrangements for the protection of the water environment in Scotland and changes how new connections to the public water and sewerage infrastructure are to be funded. It seeks to maintain and enhance the ecological status of aquatic ecosystems, the protection of groundwater and water quality, the promotion of sustainable water use, reducing water pollution and the mitigation of floods and droughts. These issues may be a constraint to certain renewable energy developments in terms of their site location, layout and design.

- The responsibility for the control of water quality, water abstraction, discharges into the water environment and any other physical works related to a water course such as impoundments and engineering works lies with SEPA under the *Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended).* Therefore, applicants will also need to establish with SEPA what permits are required at the earliest opportunity. A twin-tracking process is recommended to save time and to help inform planning decision making as the council will need to be certain there will be no significant adverse impacts on the water environment. It should be noted that development cannot commence until an *Environmental Management Plan* has been submitted and agreed by SEPA to ensure any potential risk to ground water and surface water is mitigated. Guidance for applicants on supporting information requirements for hydropower applications can be found on the *SEPA website*.

- Anaerobic digestion facilities have the potential to cause indirect pollution to watercourses if the correct containment systems are not in place. Suitable arrangements should therefore be made to minimise the risk of dirty water entering watercourses of groundwater.

- Biomass schemes may also require a CAR licence if water is required for the plan operation.

- Generally, new developments need to minimise the potential flood risk and surface water run-off through:

  • minimising the area of impermeable surfaces
  • reinstating vegetation where possible
  • providing storage and attenuation ponds in line with sustainable drainage techniques (SuDs)
  • using appropriate mechanisms to maintain existing hydrological regimes

Landscape & Visual Impacts

- Renewable energy proposals should have no unacceptable significant adverse effects on landscape designations, landscape character and/or visual impact.

- Applications for renewable energy may, where appropriate, be required to be accompanied by a *Landscape and Visual Impact Assessment (LVIA)* proportionate to the scale of the development and where applicable, compliant with current guidelines issued by the Landscape Institute and the Institute of Environmental Management and Assessment.

- Applications for renewable energy may, where appropriate, be required to be accompanied by a *Design and Access Statement (DAS)* which explains how the landscape and visual considerations have been taken account of in the design of the scheme. The DAS should be informed by the aforementioned LVIA and in some instances a *Cumulative Landscape and Visual Impact Assessment (CLVIA)*. These assessments should employ tools such as photomontages and assess the wider landscape and visual impact of the proposed development.

- With regards to the CLVIA, the assessment may need to look beyond the immediate study area identified in the LVIA. Although only effects that occur within the LVIA study area are assessed these assessments need to consider the consequence of other developments located outside of the study area but their identified impact area is within the proposed developments LVIA study area. Therefore, the search area for operational, consented and planned developments will always be larger than the study area in which the effects occur. The greater scale of development the more extensive the required search area.

- The significance of landscape and visual impacts will depend on site specific considerations such as the character of the existing landscape; the proximity of the proposal to designated landscapes); the site setting (including the proximity of listed buildings, scheduled monuments and/or conservation areas); the presence of existing built structures of similar scale and massing; and the impact upon critical public views.

- In all cases the character and scale of a proposal should be appropriate to its location and should respect existing landscape character and setting. Careful site selection and appropriate orientation of proposed plant and buildings can help to minimise any potential adverse visual impact.

- LVIAs should consider a number of locational options in order to assess whether the best landscape fit for the development has been achieved.

- It should be noted that the impacts of development not only relate to the renewable energy equipment alone but the various ancillary infrastructure related to the development such as new or widened access roads. The potential impact of a proposal upon sensitive landscapes will also be a key consideration in determining the need for an Environmental Impact Assessment.

- West Lothian benefits from having large areas of high-quality landscape, which have been designated within the LDP. These include several Special Landscape Areas (SLAs) at a local level which must be considered in any application. LDP Policy ENV 1 is explicitly clear that within the Special Landscape Areas shown on the proposals map there is a presumption against development which would undermine the landscape and visual qualities for which the areas were designated. Therefore, it is essential that the siting, design and layout of large- scale renewable energy developments in these locations is sensitively addressed.

- The scale, massing and height of new plant and buildings should be compatible with that of the surrounding buildings and structures.

- The design colour and external finish of new buildings and or plant should complement those of existing neighbouring buildings and structures.

- Partial excavation and burial of elements of plant and other site profiling and engineering measures to reduce the visual impact of new development should be considered.

- Choice of materials and routes, size and construction method of linear works can have significant impacts on the landscape and natural environment. Construction and subsequent restoration of trenches and pipeline routes can also impact on soils, natural heritage and the landscape. Submissions should therefore demonstrate the best routes and construction methods have been used.

- The reuse and repurposing of existing buildings should be considered to help reduce the requirement for new structures where practicable.

- In the case of solar farms, the assessment should include the solar array, and all associated infrastructure, security fencing and lighting.

- The application should include an assessment of the potential for the solar PV panels, frames and supports to cause glint and glare. Further guidance is contained in NatureScot publication *Natural Heritage Considerations for Solar Photovoltaic Installations.*

- The design and location of solar farm developments requires particularly careful consideration so as not to have a cumulative effect, blurring landscape character boundaries and leading to extensive areas of PV panels covering large areas of land and being detrimental to the landscape characteristics of a rural area.

- Suggested mitigation to avoid adverse impacts upon landscape and visual amenity include the incorporation of existing landscape features within the development or using new planting to help screen the development and thereby reducing its visibility within the landscape. However, new planting will need to avoid potential shading of proposed PV panels. Furthermore, screen planting can change the sense of enclosure within the landscape; therefore, careful planning at the design stage is necessary to ensure new planting reflects the existing characteristics of the landscape.

- Large biomass facilities can be overly industrial in character and will typically include feedstock reception tanks bio-digester vessels, CHP plant and buildings; digestate storage tank(s) as well as ancillary development and can result in detrimental landscape and visual impacts to the surrounding area if they are not considered fully. The siting and design of these plants is therefore particularly important. Large biomass plants should preferably be situated in an area which reflects their industrial character, ideally an existing industrial site.

- Where CHP plant is proposed, new electricity lines to connect electricity to the National Grid may be required and will have a visual impact both on and off the site. Information on grid connection works, including the location of transformers and indicative routing for transmission lines should be provided with the planning application.

- To enable a proposed biomass plant to better integrate with its surroundings, developers should employ materials and adopt colours which reflect the surrounding landscape and which sympathetically respect the setting.

Noise

- Noise can be influenced by a number of factors including plant design, local topography and land cover and prevailing climatic conditions.

- Applications for renewable energy may, where appropriate, be required to be accompanied by a site-specific *Noise Impact Assessment (NIA).*

- The applicant shall undertake an NIA to determine the impact of noise from the proposed development on nearby dwellings and any noise sensitive premises having regard to the Scottish Government's Planning Advice Note 1/2011 *Planning and Noise* and the council Supplementary Guidance (SG) *Planning and Noise*. PAN 1/2011, defines noise-sensitive properties as housing, hospitals, educational establishments and offices. It also advises that in rural areas consideration should be given to the impact of noise on livestock, especially poultry units and on areas with special designations such as National Scenic Areas and nature conservation areas including Natura 2000 Sites and Sites of Special Scientific Interest involving wildlife.

- Careful consideration as to the siting and layout of renewable energy proposals is important to minimise any increase in ambient noise levels and maintain them at acceptable levels.

- The most effective way to mitigate noise pollution is to ensure that it is located away from noise sensitive development such as housing. Where this is not possible the operational noise levels must satisfy the specific requirements of the council's Environmental Health service.

- Applications should include information regarding proposed noise attenuation measures (e.g. the use of sound insulating materials, fencing / bunding etc).

- Where noise limits have been identified these will ordinarily be incorporated as conditions of a planning permission.

- Biomass plants have the potential to create substantial noise pollution due mainly to the combustion process and additional traffic noise generated by HGV deliveries. A thoughtful site layout is imperative to reducing the potential noise pollution caused by a proposed plant. For example, locating loud equipment away from existing sensitive uses near the proposed site will help to minimise noise pollution to existing neighbouring occupiers and uses. Furthermore, when constructing a Biomass plant, noise attenuation features should be used in the walls and roof of the plant to reduce the potential noise 'break-out'. Where appropriate, planning conditions may be used to further limit the impacts created from noise pollution through restricting the operational hours of the plant to reasonable working hours in the day.

Peat & Carbon Rich Soils

- Development which is within or adjacent to ecologically significant areas protected in the adopted LDP (identified in policies ENV 18, ENV 19 and ENV 20) and development likely to have an adverse effect on peatland and/or carbon rich soils will not be supported.

- Elsewhere development likely to have an adverse effect on peatland and/or carbon rich soils, will only be permitted in areas suffering historic, significant damage through human action and where conservation value is low and restoration is impossible. Where peat and other carbon rich soils may be affected by proposals, an assessment of the developments potential effects on CO_2 emissions will be required and informed by an appropriately detailed peat survey and management plan. *Online guidance* on peat survey requirements has been prepared by Scottish Government, NatureScot and SEPA. Any disturbance or excavation should be minimised and suitable mitigation measures should be implemented to abate carbon emissions.

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Pipelines

- A number of pipelines pass through West Lothian. Appropriate stand-off distances between these and proposals for low carbon energy schemes will be determined in consultation with the operator and the Health and Safety Executive. Pre-application advice for parties proposing to develop a site which lies near to a major hazard site or a major accident hazard pipeline can be obtained from the Health and Safety Executive's *Planning Advice Web App* which sets out its Planning Advice for Developments near Hazardous Installations (PADHI).

Public Access

- The impact from renewable energy developments on core paths, wider access network routes crossing land to facilitate, promote and manage public access rights across West Lothian should be fully assessed and, if appropriate, mitigation measures identified. Information relating to access can be found on the *council's website.*

- The visual impact of renewable energy developments from core paths and strategic routes will also be an important consideration and should be included as part of any assessment.

- *The Land Reform (Scotland) Act 2003* creates a statutory right of non-motorised access to most land and inland water in Scotland for the purpose of recreation and passage. There are, however, certain exceptions to this right on grounds of safety, security and privacy. This should be recognised by developers and appropriate public access provision should be incorporated in proposals and an *Access Management Plan* may, where appropriate, require to be prepared to address the development and future management of a site for recreational access use.

- Mitigation and enhancement measures such as consequential improvements to the core paths network or the installation of interpretation boards or visitor facilities that give benefit to user's routes should be considered by developers of renewable energy schemes.

Residential Amenity

- There is a requirement for applicants to demonstrate that proposals for renewal energy development will not give rise to any unacceptable impacts on the residential amenity, including visual and noise impact, on individual residential properties.

- While there is no provision within the planning system which gives an individual the right to a particular view, the impact on the amenity of residential dwellings must be considered. When assessing the potential for visual impact, careful consideration should be given to the relationship between the proposed development and the main views associated with nearby residential dwellings in order to prevent unacceptable overbearing impact on the residential amenity of these dwellings.

- Adverse noise impacts are most effectively eliminated through ensuring renewable energy proposals are sufficiently distances from residential properties.

Tourism & Recreation

- Rural tourism associated with landscape, culture and active recreation are increasingly important to rural economies and it is therefore important that the likely impact of renewable energy developments on tourists, visitors to recreation and countryside access facilities, road and path users should be fully assessed, and if appropriate, mitigation measures identified.

- Views from key tourist routes, visitor experiences and areas utilised for common recreational pursuits must not be adversely affected by renewal energy development. Where necessary, applications may be required to be accompanied by a *Tourist Impact Statement* giving details of the likely impacts of the development on the local tourist industry and the methods that can be used to minimise any costs (e.g. by screening) and maximise any benefits (e.g. access arrangements) the precise content of a statement will understandably be dependent upon the specific circumstances of the proposal and should therefore be agreed with the Development Management case officer.

Traffic, Transport & Access

- The construction and operation of small-scale renewable energy proposals is unlikely to give rise to significant transport or traffic impacts. However satisfactory vehicular access is essential for all forms of renewable energy development during both the construction phase and the ongoing operation of the facility.

- Road and traffic impact relative to proposals for larger projects e.g. centralised farm-based anaerobic digestion plant and Combined Heat and Power installation require to be clearly identified in the application submission. These typically generate additional vehicle movements and may include farm tankers, bulk haulage vehicles and/or waste collection vehicles. In such instances a travel plan for lorry movements may be required. This should provide information on frequency of deliveries, size of the lorries and justification for the location of the plant.

- There is an overarching need to ensure that the local road network is capable of accommodating the type and number of vehicle movements that the proposal is expected to generate. In order to avoid or mitigate against any adverse impacts, the council may specify the use of a particular route or routes or require routes to be improved. Where the road network cannot accommodate the predicted number of vehicle movements without adverse traffic or road safety impacts, it is likely that planning permission will not be granted.

- Applications for renewable energy may, where appropriate, be required to be accompanied by a *Transport Assessment (TA)* that is proportionate to the scale of the development and scoping of such an assessment must be agreed in advance with the council's Roads & Transportation Manager.

- The impact from renewable energy developments on road traffic and trunk roads will be fully assessed and if necessary mitigation measures will require to be identified and agreed in consultation with the with the council's Roads and Transportation Manager (and also Transport Scotland if trunk roads are affected).

- Typically, a TA should include a programme of works including junction requirements, phases of development, volume and frequency of vehicles, impact on road network, surveys (including swept path analysis) and a travel plan. Where appropriate, the Assessment should also demonstrate the likely impacts of the development on the trunk road network where mitigation measures may be required.

- Access to a site from the local road network must not compromise road safety, residential amenity or cause significant permanent damage to the environment. New access arrangements should be designed in accordance with published standards and advice should be sought from the council's Roads and Transportation Manager as required.

- Proposals should incorporate adequate parking, manoeuvring and circulation spaces within the site for operational, employee and visitor vehicles in accordance with published standards.

- Where appropriate, pre and post construction road surveys will be required to be completed that cover damage to public roads by construction traffic. A bond or guarantee may be required to cover the cost associated with this damage.

- Where appropriate, an appraisal of the ecological and landscape/visual impacts associated with road construction/upgrading will be required from the developer.

- In the case of solar farms, the siting and design of solar farms should take account of the effect of glint and glare on the road transport network and include appropriate mitigation measures, where required.

- Biomass plants need fuels to generate energy and also create subsequent by-products which may need to be transported from the site. These traffic movements to and from the site during the plant's operation need to be fully detailed and considered.

6.1 Renewable energy is energy from a source that is either unlimited or which can be renewed without harming the environment. Included in this mix is low carbon energy which is energy from a non-renewable source but where the design of the system produced far less carbon emission than a traditional energy system.

6.2 Renewable energy systems can offer householders a sustainable solution to reducing their energy dependency and carbon footprint. These can range from small solar hot water panels placed on the roof to supplement the heating system to a wind turbine to supplement some of the electricity demand.

6.3 Renewable energy systems can offer a sustainable, low carbon solution to energy problems in many kinds of community situations. A typical community renewable project might be installing solar water heating panels on a school roof or the replacement of an old oil-fired boiler with a wood pellet boiler in a village hall. Larger projects could see community ownership of a small number of wind turbines or a shared heating system serving a number of houses.

6.4 Renewable energy systems can offer businesses a sustainable solution to reducing their energy dependency and carbon footprint. These can range from solar hot water panels placed on the roof to supplement properties heating system, a wind turbine to supplement some of the electricity demand or shared heating scheme between different business premises.

6.5 Table 2 sets out the options for renewable and low carbon energy generation which are considered in this section. The UK Government also classifies energy from the biological elements of waste as a renewable technology, although energy from waste occupies a low ranking within the waste hierarchy coming after reduce, re-use and recycle.

Table 2: Renewable Energy Technologies

Technology	Inputs	Outputs
Photovoltaics (PV)	Sunlight	Electricity
Solar Water Heating	Sunlight	Heat
Hydro	Natural water flow	Electricity
Biomass	Wood, straw, energy crops (grasses, wood, etc.) dry biological waste	Heat and/or Electricity
Anaerobic Digestion (AD)	Wet organic wastes, crops by-products, energy crops	Electricity and/or Heat

6.6 Even though the combustion of renewable fuels produces carbon dioxide, this activity displaces the use of fossil fuels. The carbon removed from the atmosphere to create renewable fuels is effectively recycled back into the atmosphere when it is burnt on a short time cycle. As this 'recycled' carbon displaces fossil carbon that is 'new' to the atmosphere, it leads to a reduction in overall carbon emissions.

Development Scale Issues

6.7 The scale at which low carbon and renewable technologies can operate is important when making decisions about which technology is appropriate for a particular development. Some technologies only offer outputs in the kW range whilst others can generate at MW scale. Table 3 shows how renewable and low carbon technologies perform in terms of scale:

Table 3: The Scale of Energy Generation from Renewable or Low Carbon Technologies

Small scale technology (kW)	Large scale technology (MW)
Photovoltaics (PV) (electric only)	Biomass* Heating (heat only)
Solar Water Heating (heat only)	Biomass CHP (electricity and heat)
Heat pumps (heat only)	Anaerobic Digestion* (electricity and heat)
Hydro (electricity only)	Energy from waste (electricity and heat)
Fuel cells (electricity and heat)	Gas CHP* (electricity and heat)

Notes - *Can also operate at kW levels. Clearly, it is possible to aggregate small scale technology to deliver larger outputs. One example is PV where 6m^2 of cells on a typical domestic roof generates about 1KW of electricity. Some developers have aggregated many hectares of these cells together into Solar PV Farms.

6.8 In general, larger developments will create larger demand for energy and therefore the potential to select renewable or low carbon technologies that can operate at a larger scale.

6.9 In particular, larger employment developments can have more opportunity to integrate energy generation with any industrial processes within the building. This will impact on technology selection. Larger footprint developments can create more space for energy generation schemes, again allowing a greater technology choice.

6.10 Larger residential and mixed-use developments can offer more opportunities for larger scale technology and even centralised energy generation options. These can have cost advantages over smaller scale schemes. They also offer the opportunity to consider whether on or off-site solutions could be linked with other surrounding developments to achieve greater economies of scale and greater benefits beyond the development itself.

Household and Small-Scale Renewable Energy

6.11 Micro-generation is commonly regarded as the production of heat (less than 45 kW capacity) and/or electricity (less than 50kW capacity) from low or zero carbon energy sources. In addition to the carbon benefits, increased use of micro-renewables plays an important part in diversifying our energy mix and ensuring security of energy supply. It can allow energy to be produced and consumed locally, help alleviate fuel poverty (especially in off-gas network areas) and play a part in meeting renewable energy targets.

6.12 The generation of heat and/or electricity from micro-renewables provides an attractive alternative to more traditional methods of heating and powering homes by oil and gas and helps to reduce dependence on these carbon high fossil fuels.

1 Solar Photovoltaic (PV) Panels

6.13 There are many types of solar photovoltaic panels with different characteristics (crystalline cells, thin-film, hybrid), but they generally consist of one or two layers of semi-conducting material, normally packaged together into panels or other modular forms. PV panels capture solar radiation from the sun and convert it into electrical energy and is useful for supporting both domestic and non-residential uses and supporting or supplementing other low carbon technology such as heat pumps.

6.14 Panels are best mounted on a south facing roof or on angle brackets on a flat roof. PV modules have no moving parts and so once they are installed correctly they are generally considered low maintenance.

Figure 3: Solar Panels

Figure 4: Solar Roof Tiles

6.15 For best performance, solar PV panels should face between southeast and southwest to maximise the hours of sunlight they will receive during the day. East or west installations can also provide good performance and can be used for a building with a roof or wall that faces within 90 degrees of south.

6.16 In the UK it is recommended that panels should be mounted at an angle of about 30° to 40° from the horizontal, although this may not always be achievable in retrofitting situations where the existing roof pitch will largely dictate matters.

6.17 While solar cells do not require constant direct sunlight to produce energy the amount of energy is also diminished by overcast weather and/or if the array is shaded It is therefore necessary to avoid situations where any structures/trees might cast a shadow on the cells. Another important practical consideration to be aware of is the roof load bearing capacity.

6.18 There are different types of solar panels available. Some have a similar appearance to traditional roof coverings and are, on the whole, least intrusive and best suited to covering a large expanse of a roof, whereas conventional flat plate collectors that often appear similar to roof lights are generally employed to cover a smaller area of the roof, particularly where they are installed on traditional tiled roofs. Solar PV panels are less likely to be visible on valley roofs, double pitched roofs, roofs contained within parapets, low pitched roofs, flat roofs and platformed roofs. For particularly conspicuous roof locations consideration should also be afforded to free standing solar arrays within garden ground.

6.19 Electrical grid connection requires approval from the distribution network operator (DNO). Until 1 April 2019 Feed in Tariffs (FITs) were available for this technology to encourage anyone who had installed one of the compliant technology types up to a capacity of 5MW, or 2kW for CHP.

6.20 The FIT provided an income from the generation of energy and any export of energy and this was attributed with successfully growing take up. It remains to be seen what effect the withdrawal of this subsidy regime has had and what effect the introduction of its replacement, the Smart Export Guarantee (SEG) has been. Solar panels will always be a long-term investment and the initial solar panel costs can seem high, however the price of solar is now cheaper than previous years. Electricity and gas bills will only ever go up so a solar panel system for homes and business will help insulate owners from these rising costs that are completely outside their control.

6.21 The UK's solar market is dominated by small-scale PV systems which comprise more than 90% of the one million plus total installations. There is significant scope for solar/PV development across the West Lothian Council area within both urban and rural settings and particularly since many free standing and roof mounted installations can be installed without the express need for planning permission (although it excludes installations in conservation areas and associated with listed buildings).

2 Solar Water (Thermal)

6.22 As with photovoltaics, solar water energy generation systems, also known as solar thermal heating, utilises the sun's solar radiation. However, instead of converting it to electrical energy, SHW utilises the solar radiation to heat water.

6.23 Solar water systems comprise three main components:

- Solar collectors – which collect the sun's rays so that when the light shines on the panel it preheats water for use in sinks, showers and other hot water applications. Solar collectors are usually placed on the roof of a building, but can also be wall mounted or stand-alone (free standing) structures.
- Hot water cylinder/tank – to store the water that is heated up during the day and supplies it for use later
- Plumbing system – piping to move fluid around the system

6.24 SHW systems can either be closed or open. In a closed system, the heat transfer fluid is heated at the collector or plate and then is transferred to a hot water tank. In an open system the water is directly heated at the collector or plate. Solar thermal units have no moving parts and so once they are installed they should require minimal maintenance.

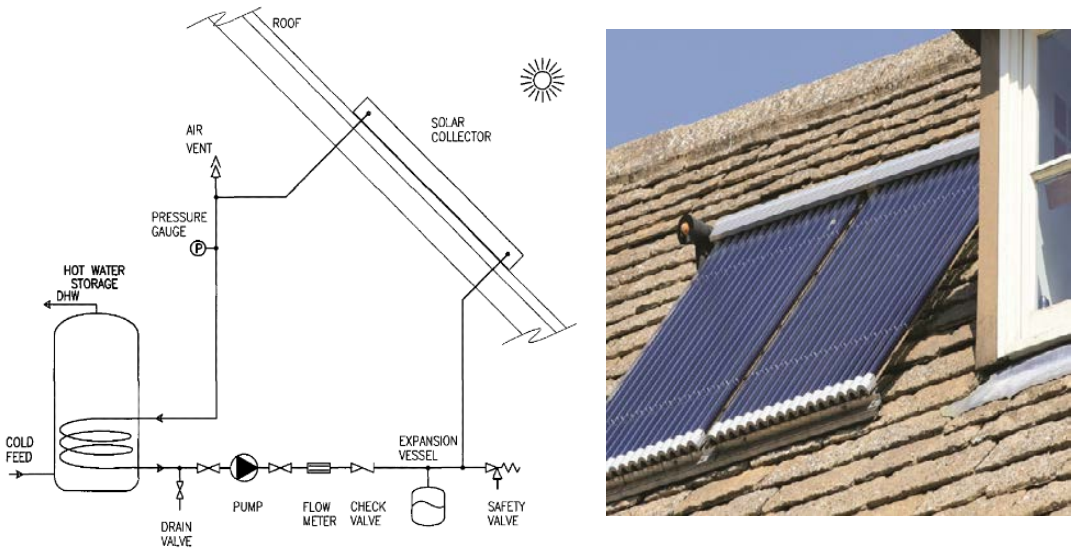


Figure 5: Solar Water Heating System

6.25 Solar water is designed to be integrated into a building's existing domestic hot water system. Solar panels/collectors should be sited between the southeast and southwest and for domestic use an area of 2 to 4 square metres is suggested. Issues such as which direction the building faces, the roof aspect and roof load bearing capacity and whether any structures/trees would cast a shadow on the system are important considerations. The UK Government currently offers a financial incentive through the "Renewable Heat Incentive" scheme for installing this technology although this scheme is set to close on 31 March 2021.

6.26 There are economic, social and environmental impacts that should be considered when installing solar water equipment. Some of these impacts arise during the installation and construction phases, and there are a number of ways in which the design, location and installation of solar thermal can minimise these impacts. To assist developers, a series of checklists have been prepared setting out which matters have to be addressed in applications for renewable energy development.

Solar Water (Thermal) Impacts Checklist

Issue	Impact	Ways to Minimise Impact
Landscape & Visual	Visual impacts of solar PV systems on roof tops	▪ Sensitive design and siting of panels to minimise visual impacts. ▪ Integrate into existing building design features. ▪ If possible, panels should be installed on unobtrusive areas of a roof, such as the inner slopes of a roof valley, or where a flat roof is obscured by a parapet.
	Shading	▪ Care should be taken to make sure that the panels are not shaded for long periods of the day, as they will not function when overshadowed.

Historic Environment	Visual impacts and direct effects on designated and non-designated historic environment assets including listed buildings and scheduled monuments.	▪ Sensitive design (including colour and appearance) and siting of panels to minimise visual impacts on character and appearance of heritage features. ▪ Installation of solar panels should avoid cutting through structural timber if installed on a listed building. ▪ Panels need to be installed sensitively when located on lead roofs. ▪ Panels should be mounted over existing slates, rather than replacing the historic fabric with PV roof shingles, to protect the integrity of the building. ▪ Seek advice of a structural engineer before mounting solar units on the roof of a building, where there is any doubt regarding its structural integrity.

Other approvals

There may be other kinds of approval that you may need such as:

- Listed Building consent if a building is listed
- Conservation area consent if the development is in a conservation area
- Scheduled Monument consent if the development affects a scheduled monument
- Trees – Many trees are protected by tree preservation orders which mean you need the council's consent to prune or fell them
- Building Standards – New building work will often need to comply with Building Standards
- Wildlife – Some buildings may hold roosts of bats or provide a refuge for other protected species – these are given special protection. *Planning Guidance Planning for Nature - Development Management and Wildlife* provides comprehensive advice and information
- SEPA licences – Please check with SEPA whether it regulates/licenses any aspect of a proposal

Information requirements for selected technologies to be submitted with planning applications

Solar	• Description of the technology • Capacity i.e. number of panels or tubes, total area • Estimated energy generation (kWh/yr) • Elevations to show proposed location • Orientation/roof pitch • Roof plans and detail of roof mounting arrangements and methods of fixing, if applicable • Potential shading from trees and other buildings • Visual impact assessment • Landscape Character Assessment • Biodiversity impacts

For additional information please refer to:
Energy Saving Trust
Solar Photovoltaic Panels

3 Hydro-Electric Energy

6.27 The technology for harnessing waterpower is long established. Hydro-electric power systems make use of water flowing from a higher to a lower level to drive a turbine connected to an electrical generator, with the amount of energy generated proportional to the volume of water and the vertical distance it falls. In principle, the faster the water is flowing and the bigger the drop, the more electricity that will be generated, A similar amount of energy can be produced from a small volume of water falling over a long vertical distance (high head), as from a larger amount of water falling a much shorter vertical distance (low head). It can then be connected to the main electricity grid or be part of a stand-alone (off-grid) power system.

6.28 The majority of hydro-electric schemes are 'run-of-river which means that they don't need large dams to store water and where water is physically diverted via a low weir into a pipe (penstock) to drive a turbine before being discharged back to the same water course. Many small-scale hydro-electric schemes can operate on a low head of water (20m or less) and use 'Archimedes' screw' principle turbines as illustrated below.

Figure 6: An 'Archimedes' screw' diversion

6.29 Alternatively, the 'impoundment' method can be used whereby a dam or dams are used to hold water back and create a hydraulic head from which electricity can be generated. A variation on this is known as 'pumped storage' (PSH). This type of scheme is capable of being used in conjunction with more intermittent forms of renewable energy to smooth out the peaks and troughs by providing an element of energy storage. During periods of low demand, but when the prime resource is available, excess energy is used to pump water from a lower level to a higher-level reservoir. During periods when demand is high and the prime resource availability is low, the water from the higher reservoir is released via a turbine to the lower reservoir to generate electricity.

6.30 The typical elements of a hydropower scheme are:

- a water source with a reasonably constant supply;
- sufficient flow and depth of water at the point at which water is taken from the watercourse, and this is achieved by building a low weir (typically around 2 metres high) across the watercourse. This is called the 'intake';
- an inlet pipeline (penstock) to connect and direct the water;

- turbine generating equipment and housing structure;
- a 'tailrace' to return water to the watercourse; and
- electricity transmission equipment linking to the electricity network or an individual's premises.

6.31 The use of water to generate electricity, whether a small stream or a large river, can provide a reliable and efficient source of electricity for both residential and non-residential developments. Hydro systems can run day and night and in any weather conditions so long as there is a consistent flow of water through the turbine. Hydropower is therefore a very predictable and reliable source of energy and once installed a system can operate for many years.

6.32 Some of the key benefits of hydropower include its high capacity factor, which can be greater than 50% compared to 10% for solar and 30% for wind, and quite significantly, generating hydro-electric power has the additional bonus of not producing any waste.

6.33 Hydro-electric power schemes can be a variety of scales and are very site specific, reliant entirely on having a suitable watercourse and classified by the output power which they produce. The table below shows the most widely recognised definition of categories and also indicates the number of 'average' UK homes electrical energy needs met to help see the scale of schemes.

Table 4: Types of Hydro-Electric Power Schemes

Hydro Category	Power Range	Typical No of Homes Powered
Pico	0 kW - 5 kW	0 - 5
Micro	5 kW - 100 kW	5 - 100
Mini	100 kW	100 – 1,000
Small	1 MW - 10 MW	1,000 – 10,000
Medium	10 MW - 100 MW	10,000 – 100,000
Large	> 100 MW	> 100,000

6.34 In Scotland there are a number of so called 'pico-hydro' turbines, generally taking the form of 'run-of-river' projects and generating under 5kW of electricity and which are economically and environmentally viable and particularly well adapted to serving a small number of properties. However, even smaller turbines of 200 - 300 W are capable of powering individual homes (possibly for use with batteries).

6.35 The definitions of hydro-electric power schemes are, however, not what they might at first suggest. Micro and mini-hydro is the collective term used for installations with a generating capacity up to 100 kW installed capacity that can supply reliable generation for small communities and potentially capable of producing enough electricity for up to a thousand 'average' UK homes and often with surplus electricity being fed directly to the National Grid.

6.36 While the council considers that the potential for larger hydro-electric schemes is limited in West Lothian, owing largely to geography and spatial land use, there are held to be significant opportunities for the smaller schemes with an output of less than 100kW to serve domestic, agricultural and perhaps some commercial operations. Generally, the council is supportive of hydro-electric developments that are in the right location and where there would be appropriate mitigation of any negative impact on access, visual amenity and landscape (including transmission lines) and natural landscape and built heritage designations.

6.37 The council may be able to assist in identifying sites for possible micro-hydro development – for example, historic sites of water mills, weirs and lochs now in disrepair. The criteria used to identify possible sites must however be consistent with the criteria required by SEPA as set out in its *guidance for developers of run-of-river hydropower schemes.*

6.38 Should larger scale hydro-electric power schemes be proposed consideration would have to be given to any adverse visual impacts on the wider environment and schemes which would generate over 5,000kW or which were located in a sensitive landscape would likely require to be the subject of an Environmental Impact Assessment (EIA) and a separate Energy Consent application.

6.39 The main environmental impacts of any hydro-electric power systems, regardless of scale, will be on the natural and water environment including disruption of water flows, flood risk, disturbance to fish and other aquatic species, habitats and amenity, together with other incidental engineering consequences including loss of landscaping and trees. All of these issues will be material considerations in the determination of any planning application.

6.40 As indicated above, proposals may require to be the subject of an Environmental Impact Assessment (EIA) but Flood Risk and Landscape and Visual Impact Assessments (LVIA) may also be requested.

6.41 Where water is taken from a stream or river for hydro purposes an abstraction licence is required. Installations of this nature are subject to a Controlled Activity Regulations (CAR) licence from SEPA. SEPA explicitly requires developers of hydro schemes to include mitigation to protect the water environment and this applies equally to micro or pico-hydro as well as larger scale hydro power energy schemes. It is therefore strongly recommended that applicants contact SEPA at the earliest opportunity to discuss site specific requirements, establish whether the scheme is licensable, and, where practicable, progress both applications concurrently.

6.42 While the majority of smaller micro-renewable schemes are unlikely to have significant impacts on the natural environment owing to their scale and especially where they are located in built up areas, there will be instances where they could have a negative impact on protected areas and some species which are protected by law. They can also have a significant cumulative impact across a water body or a particular water catchment area and for that reason planning for and mitigating against any such impacts may require the council to liaise and consult with SEPA and to have regard to advice given by *NatureScot*, particularly in relation to habitats and species.

6.43 There are other economic, social and environmental impacts that should be considered when considering installing hydro-electric power schemes. Some of these impacts arise during the installation and construction phases, and there are a number of ways in which the design, location and installation of hydropower can minimise these impacts.

Hydro-Electric Energy Impacts Checklist

Issue	Impact	Ways to Minimise Impact
Landscape & Visual	The impact on the character of the landscape and changes in the visual appearance of river embankments and natural features including waterfalls	▪ Incorporate screen planting and purposefully design built elements to be as discrete as possible and in keeping with local landscape features. ▪ Bury pipelines and restore pipeline routes post construction. ▪ Ensure colour and materials of built elements are in keeping with local landscape features.
Ecology	Impact on biodiversity Disturbance to trees Impact on European Protected species	▪ Avoid construction during seasonal fish migration. ▪ Install turbines that can oxygenate river water to benefit fish population. ▪ Incorporate fish passes and screens. ▪ Protect water quality, restore habitat edges adjacent to water course and contain works to minimise disturbance footprint.
Hydrology	Increase in noise levels at nearby residences during operation	▪ Implement good pollution prevention practices based on SEPA guidelines. ▪ Minimise area of impermeable surface, reinstate vegetation where possible and use appropriate culverts and drains to match existing hydrological regimes.
Noise	Increase in noise levels at nearby residences during operation	▪ Design of turbine house to incorporate acoustic insulation materials.
Historic Environment	Visual impacts and direct effects on designated and non-designated historic environment assets including listed buildings and scheduled monuments.	▪ Siting of turbine houses where they will be least obtrusive and where they will be hidden by the contours of the land or blend into natural and existing man-made features. ▪ Design turbine housing with local building materials, and incorporate appropriate screen planting. ▪ Bring existing disused buildings back into use. ▪ Bury pipeline, or use black coloured piping, and restore pipeline route after construction.

Other approvals

There may be other kinds of approval that you may need such as:

- Listed Building consent if a building is listed
- Conservation area consent if the development is in a conservation area
- Scheduled Monument consent if the development affects a scheduled monument
- Trees – Many trees are protected by tree preservation orders which mean you need the council's consent to prune or fell them
- Building Standards – New building work will often need to comply with Building Standards

- Wildlife – Some buildings may hold roosts of bats or provide a refuge for other protected species – these are given special protection. *Planning Guidance Planning for Nature - Development Management and Wildlife* provides comprehensive advice and information
- SEPA licences – Please check with SEPA whether it regulates/licenses any aspect of a proposal
- EIA screening

Information requirements for selected technologies to be submitted with planning applications

Hydro-Electric	• Description of technology and fuel supply • Capacity – plant specification • Estimated energy generation (kWh/yr) • Design of the scheme including all buildings and structures and storage facilities; • Details of vehicle access to and from the site and estimated vehicle movements • Landscaping and visual impact of scheme • Landscaping proposals • Biodiversity impacts including effect on watercourse and its ecology • Details of flooding impacts and mitigation measures • Water abstraction details • Evidence of consultation with appropriate bodies such as NatureScot / SEPA • Details of all pipelines and transmission lines

For additional information please refer to:

NatureScot

Hydroelectric schemes and the natural heritage

SEPA

Guidance Note 18 Planning guidance on hydropower developments

Guidance for developers of run-of river hydropower schemes

Scottish Government

Online guidance for hydro developments

4 Ground Source Heat Pumps (GSHP) / Water/Source Heat Pumps (WSHP)

6.44 The average ground temperature just below the surface in the UK is between 8ºC and 13ºC and this temperature remains constant throughout the year. Ground source heat pumps (GSHP) are a means of tapping into and utilising this resource and work on much the same principle as a refrigerator, but in reverse.

6.45 Ground source heat pumps (GSHP) make use of the heat energy stored in the ground surrounding (or even underneath) buildings. Heat is taken out of the ground at a certain temperature and passed through a heat exchanger to release it into a building at a higher temperature to provide space heating as well as pre-heated domestic hot water. Heat pumps ground loops can be laid in the ground or in water such as rivers, lakes or ponds.

6.46 Water source heat pumps (WSHP) extract heat from large bodies of water or rivers (with a reasonably high flow volume in order to minimise any resulting changes in water temperature). As with GSHPs, despite the relatively low temperatures of the water source, heat can be extracted from it in a heat exchanger to feed a low-temperature central heating system. An abstraction license from SEPA is normally required.

6.47 Heat pumps are best used for under floor heating systems as they produce heat at a lower temperature than a standard boiler. It is now a proven, cost-effective, safe and environmentally friendly alternative to fossil fuels that is cost-effective for certain commercial and domestic applications, particularly where mains gas is not available.

6.48 Ground source heat pumps may not however be suitable in every situation. Firstly, the building plot will need sufficient land available for installation of the ground works. A large space is required for the pipes to be buried underground either in a trench or a borehole. In order to access the thermal energy, coils or loops of special grade pipe need to be buried in the ground. Horizontal trenches are a cheaper option and generally used where there is sufficient space. Where there is not enough land, vertical boreholes can be used and these normally require to go down at least 60 metres and are the more expensive option. They will however provide higher efficiencies since the temperature of the earth is higher at greater depths and less power is needed to pump the fluid around the circuit. The length and size of ground loops is designed to match the heating needs of the property.

6.49 The ground above where heat pipes are installed can be used for open space or covered over with hard materials. 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 could be laid beneath green spaces.

6.50 Such works are also dependent on the underlying geology of the site being suitable in the first place and there may also be ecological and archaeological considerations to take account of. The excavation works should have no impacts on any water course or impede access to public land and care needs to be taken to ensure that any undergrounded pipework is free from the threat of any future development.

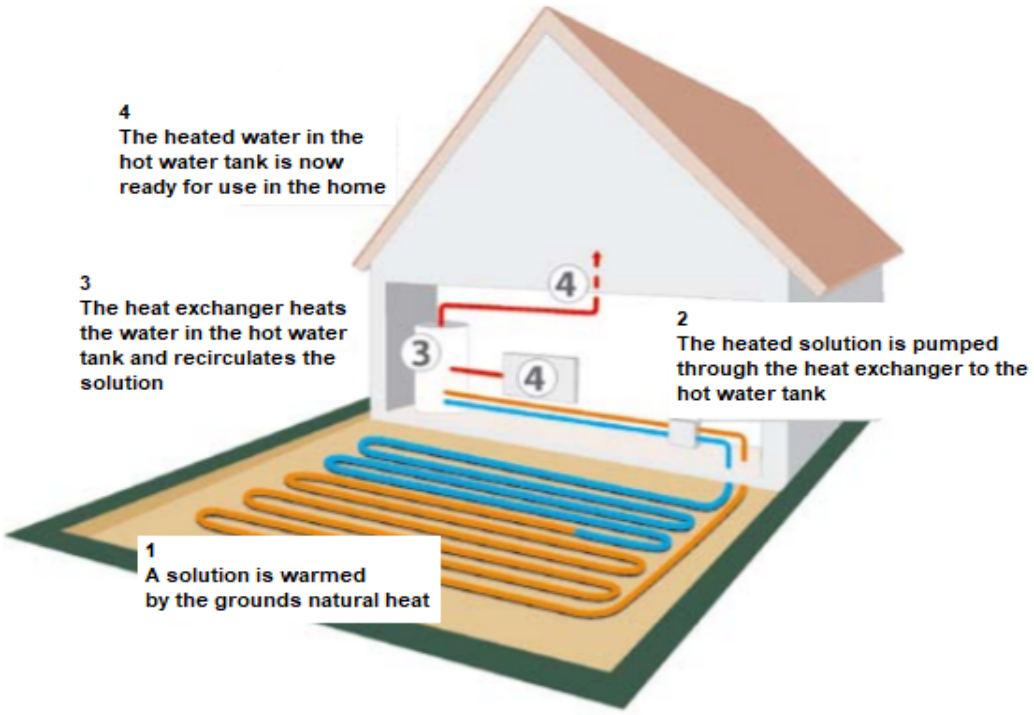


Figure 7: A typical ground heat pump installation

6. 51 Although all the heat delivered by heat pumps comes from renewable energy (stored solar energy), a supply of electricity is required to pump the system, which may or may not come from renewable sources. While heat pumps will need electricity to run, they will usually have a much lower carbon footprint than other heating systems.

6.52 The installation of a ground source heat pump or a water source heat pump on domestic premises is usually considered to be permitted development, not needing an application for planning permission. If you live in a listed building or a conservation area, close or in close proximity to a scheduled monument, you should however contact the council to confirm this relative to specific circumstances.

5 Air Source Heat Pump (ASHP)

6.53 Electric air source heat pumps are a low carbon heating option. They use the difference in outdoor and indoor air temperatures to cool and heat a building. Air source heat pumps extract the ambient heat in outside air and use a fan to draw air over coils that extract energy. This energy is then transferred to a home or building and used as part of a heating supply. These systems can be used both in new development or retrofitted with equal effect.

6.54 They can be used where the ground conditions and limited space preclude the use of ground source heat pumps although they are less efficient in comparison and likely to be more variable because air temperatures fluctuate both daily and seasonally. Nevertheless, even when the outside temperature drops, air source heat pumps can still produce 2-3 times as much energy as they use to run. The air source heat pump does have advantages in terms of lower installation costs and the fact that no ground loop negates the need for trenching.

6.55 Air source heat pumps can be used for a wide variety of applications such as cooling for lofts, restaurant kitchens and hotel plant rooms where the hot water can easily be used for other applications. They can provide hot water using waste heat in the air. By using waste heat, they can also remove heat from an area where it is not needed.

Figure 8: An Air Source Heat Pump

6.56 Air source heat pumps can be located in the roof space or on the side of an external wall of a building or on the ground. They are similar in appearance to air conditioning boxes and are not unduly intrusive in a contemporary residential or commercial setting. They may not however be appropriate for locating on any conspicuous elevations of listed buildings, scheduled monuments or building in conservation areas.

6.57 There are economic, social and environmental impacts that should be considered when installing heat pumps. Some of these impacts arise during the installation and construction phases, and there are a number of ways in which the design, location and installation of heat pumps can minimise these impacts.

Heat Pumps Impacts Checklist

Issue	Impact	Ways to Minimise Impact	GSHP	ASHP	WSHP
Landscape & Visual	Visual impacts on character of surrounding area	▪ Design (including colour and appearance) and siting of outdoor pump unit to minimise visual impacts.		✓	
Ecology	Impact on biodiversity Disturbance to trees	▪ Appropriate siting ▪ Be aware of legislation protecting certain species/ designated sites.	✓		✓
Hydrology	Pollution of groundwater from leakage of additive chemicals used in heat pump system	▪ Seek advice of SEPA	✓		✓
	Abstraction of water Disturbance of watercourses from excavation	▪ Seek advice of SEPA			✓
Traffic, Transport & Access	Access for drilling or excavation machinery	▪ Ensure safe access for machinery.	✓		
Noise	Increase in noise levels at nearby residences during operation	▪ Design scheme to incorporate anti-vibration mountings and acoustic insulation of heat pump / outdoor pump. ▪ Appropriate siting to reduce impact.	✓	✓	✓
Geology	Borehole heat pumps may have an impact on local geology	▪ Undertake geotechnical investigations. ▪ Seek advice from SEPA and NatureScot	✓		

Historic Environment	Direct impacts during construction on any unknown archaeological features Visual impacts of outdoor pump on the setting of historic environment	▪ Undertake assessment of the archaeological potential of the site prior to commencement of construction work. ▪ Undertake trial trenching or archaeological watching brief during construction within sensitive sites ▪ Sensitive siting, high level of design quality, appropriate materials and colour treatment will be required. Where possible, external units should be installed where they will have the least visual impact such as to the rear of a property	✓	✓	
Building Design	Structural impact on property (including neighbours) from excavations/boreholes	▪ Assess impact ▪ Siting of system	✓		✓

Other approvals

There may be other kinds of approval that you may need such as:

- Listed Building consent if a building is listed
- Conservation area consent if the development is in a conservation area
- Scheduled Monument consent if the development affects a scheduled monument
- Trees – Many trees are protected by tree preservation orders which mean you need the council's consent to prune or fell them
- Building Standards – New building work will often need to comply with Building Standards
- Wildlife – Some buildings may hold roosts of bats or provide a refuge for other protected species – these are given special protection. *Planning Guidance Planning for Nature - Development Management and Wildlife* provides comprehensive advice and information
- SEPA licences – Please check with SEPA whether it regulates/licenses any aspect of a proposal

Information requirements for selected technologies to be submitted with planning applications

Water / Ground Source Heat Pump	• Description of technology • Capacity-for heating and cooling (kW) • Estimated energy generation (kWh/yr) • Number and location of boreholes/trenches • Location of pipe work • Connection details to the building • Plan showing tree locations and their potential rooting zones • Archaeological assessment, where applicable • Evidence of consultation with appropriate bodies such as SEPA, as regards potential groundwater protection, and NatureScot as regards potential ecological issues

	• Noise report (should be available from the manufacturer)
Air Source Heat Pump	• Description of technology e.g. air-to air, air-to water system • Capacity-for heating and cooling (kW) • Estimated energy generation (kWh/yr) • Elevations to show location and design • Visual impact assessment • Noise report (should be available from the manufacturer) to also include localized background noise

For additional information please refer to:
Energy Saving Trust
Ground Source Heat Pumps
Air Source Heat Pumps

Large Scale Renewable Energy Developments

6.58 Large scale renewable energy developments are defined in national policy as ranging from 50kW to 10MW. Those developments which generate more than 10MW are also considered under different consent regimes (see Table 1 above).

6 Field-scale solar PV installations (Solar Farms)

6.59 Sometimes referred to as solar parks or solar farms these represent an almost industrial application of solar photovoltaic (PV) panels to generate electricity but at scale, usually to feed into the grid. To produce a viable amount of energy from solar schemes it is estimated that approximately 2.5 to 3ha of land is required on average to produce 1MW of energy.

Figure 9: A 'Solar Farm'

6.60 Solar farms comprise a series of free-standing solar photovoltaics which are usually mounted on frames or 'tables' that are anchored to the ground. The height and angle of the panels will be guided by the surrounding landform and orientation of the site.

6.61 A 'glint and glare' assessment may be required to assess the impact on nearby residential properties, road traffic and aviation. This is likely to be a particularly important consideration for proposals that include tracking devices, where the orientation of the panels moves to reach the optimum level of rays.

6.62 Installations are more appropriately located on previously-developed land rather than greenfield sites. Where sites are proposed in rural areas they should avoid prime agricultural land, highly prominent locations and areas designated as 'Special Landscape Areas (SLAs). In such situations they can however have dual purpose usage with animals grazing between rows and help to support biodiversity.

6.63 Solar farms represent time-limited, reversible land use and can provide an increased, diversified and reliable source of income for landowners and farmers.

6.64 Developments which produce in excess of 50kW require planning permission and can have a substantially greater impact, firstly in terms of physical land take but also visually due to the requirement for transformers, inverters and perimeter fencing.

6.65 Proposals for larger solar farms (over 0.5ha or in a sensitive landscape area) are also likely to require to be the subject of an Environmental Impact Assessment (EIA) and Landscape and Visual Impact Assessments (LVIA) may also be required. Applications must also provide for the decommissioning, restoration and aftercare at the end of the permission. Conditions, requiring a restoration bond or other approved mechanisms to be put in place, may be imposed on any permission granted.

6.66 'Floating' solar PV involves PV panels floating on artificial reservoirs anchored by weights with the electricity infrastructure such as informers and inverters on nearby land. Installations of this nature require a separate Controlled Activity Regulations (CAR) licence from SEPA.

6.67 Proposals will require to be the subject of consultation with National Air Traffic Services, the Civil Aviation Authority and airport operators to identify any potential adverse impacts. Edinburgh Airport Safeguarding Zone extends into the West Lothian Council area and development and this may have a constraining effect on such development.

6.68 There are economic, social and environmental impacts that should be considered when installing solar PV. Some of these impacts arise during the installation and construction phases, and there are a number of ways in which the design, location and installation of solar PV can minimise these impacts.

Solar electric (PV) Impacts Checklist

Issue	Impact	Ways to Minimise Impact
Landscape & Visual	Visual impacts of solar PV systems on the landform and landscape character and setting	▪ Sensitive design and siting of panels to minimise visual impacts. ▪ Integrate into existing building design features.
	Shading	▪ Care should be taken to make sure that the panels are not shaded for long periods of the day, as they will not function when overshadowed.

Biodiversity	▪ Loss of habitat ▪ Collision risk for birds and bats ▪ Displacement of animals	▪ Evaluate the environmental condition and sensitivity of underlying / adjacent habitat ▪ Mitigate and provide environmental Enhancements
Access	Infringement of statutory rights of responsible access as provided for by the Land Reform (Scotland) Act 2003.	▪ Arrangements for access provision and management should be set out in a site-specific Access Management Plan which could include provision for signposted alternative temporary routes.
Historic Environment	Visual impacts of Solar PV systems and direct effects on designated and non-designated historic environment assets including listed buildings and scheduled monuments, and of direct effects on designated and undesignated archaeology, including buried archaeology.	▪ Sensitive design (including colour and appearance) and siting of panels to minimise visual impacts on character and appearance of heritage features. ▪ Installation of solar panels should avoid cutting through structural timber if installed on a listed building. ▪ Panels need to be installed sensitively when located on lead roofs. ▪ Panels should be mounted over existing slates, rather than replacing the historic fabric with PV roof shingles, to protect the integrity of the building. ▪ Seek advice of a structural engineer before mounting solar units on the roof of a building, where there is any doubt regarding its structural integrity.

Other approvals

There may be other kinds of approval that you may need such as:

- Listed Building consent if a building is listed
- Conservation area consent if the development is in a conservation area
- Scheduled Monument consent if the development affects a scheduled monument
- Trees – Many trees are protected by tree preservation orders which mean you need the council's consent to prune or fell them
- Building Standards – New building work will often need to comply with Building Standards
- Wildlife – Some buildings may hold roosts of bats or provide a refuge for other protected species – these are given special protection. *Planning Guidance Planning for Nature - Development Management and Wildlife* provides comprehensive advice and information
- SEPA licences – Please check with SEPA whether it regulates/licenses any aspect of a proposal

Information requirements for selected technologies to be submitted with planning applications

Photovoltaics (PV)	• Description of technology • Capacity-electrical output (kWp) • Estimated energy generation (kWh/yr) • Design of the arrays • Elevations to show proposed location • Orientation • Traffic assessment. • Noise Impact Assessment

	• Potential shading from trees and other buildings • Visual impact assessment • Landscape Character • Biodiversity impacts • EIA screening

For additional information please refer to:

Building Research Establishment National Solar Centre

Planning Guidance for the development of large-scale ground mounted solar PV systems

Civil Aviation Authority (CAA)

Policy and guidance document CAP 764

7 Biomass

6.69 Energy from biomass is produced from organic matter. Biomass is the broad term relating to heat and potentially electricity generation which is derived from combusting materials of biological origin such as plant and animal matter. Biomass is a renewable technology.

Figure 10: Biomass plant

6.70 Larger biomass installations comprise of the following key components:

- Fuel delivery and storage area
- Storage facilities
- Stoves / Boilers – to provide heating and hot water to the building
- Heat storage tank
- Flue / ash extraction
- Connecting pipework

6.71 Biomass heating technology can be stored to provide heat to a variety of buildings of all sizes through the use of individual boilers or using district heating networks (DHNs). More recently Biomass technology has been used to generate electricity and within combined heat and power (CHP) plants due to the low carbon emissions it produces.

6.72 The main types of Biomass used in the UK are sourced from wood-fuel, energy crops, wood waste, agricultural residues and other biodegradable matter contained within municipal solid waste (MSW). Short Rotation Coppice (SRC) is the most appropriate means of producing a sustainable supply of wood for chipping and/or producing pellets; wood chips and pellets being the sources of wood fuel that best lend themselves to automatically fed (rather than hand fed) biomass boilers.

6.73 Biomass proposals can be suitably located within or outside of urban areas, but the selected location should be closely referenced with key areas of heat demand shown on Scotland's Heat Map or specifically identified users of heat. Biomass schemes are invariably located close to a source of biomass. At a smaller-scale, biomass (and CHP which is discussed later) can be an efficient way to heat a single unit, or a number of units as part of a district heating scheme. Small/community scale biomass energy plants are virtually all designed as heat plants for domestic and small commercial use. These may comprise of standalone stoves used as room heaters or boilers.

6.74 Unlike the previous forms of renewable energy production, Biomass does produce carbon emissions which are released when the energy is generated. However, it is still considered a sustainable fuel due to carbon balancing where the CO_2 released when energy is generated from biomass is balanced by the CO_2 absorbed during the biological matters growth. Where carbon balancing is not effective the CO_2 emissions produced per unit of energy are still much lower than those produced through fossil fuels.

6.75 Biomass can provide an alternative to oil for off-grid homes and businesses such as hotels and horticulture, provided any air quality concerns are addressed.

6.76 Like other forms of energy production biomass comes in a range of different sizes. Table 5 sets out the typical scales used for biomass energy plants, as defined in the UK government non-domestic Renewable Heat Incentive (RHI) scheme.

Table 5: Typical Scales of Biomass Energy Plants

Scale	Typical Capacity	Description
Small	< 200 kW	Small-scale applications below a few hundred kilowatts are virtually all designed as heat plant for domestic and small commercial use. They may comprise of standalone stoves or boilers. Restricted Permitted Development Rights are available for domestic and non-domestic use but do not apply in Air Quality Management Areas.

Medium	200 kW – 1MW	This range is used largely for the production of heat, covering a wide spread of applications including individual buildings and larger developments serving multiple buildings, particularly in an agricultural and industrial context. The use of biomass CHP for the production of both heat and electricity tends to fall into this category, although larger scale plants are encouraged to find ways to utilise any heat that is generated.
Large Large Biomass (>1 MW) are likely to require large buildings for biomass boilers, backup gas boilers; fuel storage and delivery mechanisms, heat delivery infrastructure and control building.	> 1 MW	Plants at this scale are used primarily for the production of electricity. Some types are also used in very large conventional power plants alongside coal – this is known as 'co-firing'. Large Biomass facilities are likely to require large buildings for biomass boilers, backup gas boilers; fuel storage and delivery mechanisms, heat delivery infrastructure and control building. Sites are best located in industrial or where the impacts of fuel delivery and noise can be accommodated. Consideration should also be given to the present and future heat needs of the surrounding area.

6.77 Significantly, domestic biomass boilers do not normally require planning permissions. The associated flues will only require permission if they are on the principle elevation of a property within a conservation area or if the height of the flue would be more than one metre above the highest part of the roof. The key considerations for assessing such proposals will be:

- potential to impact on communities and residential amenity
- the potential for any adverse impact on local air quality

6.78 Biomass heating developments at the small and medium scale generally provide heat for an individual or group of buildings and are usually capable of being located within a garage or other appropriate outbuilding to offer a base level of heating throughout the year. Biomass energy can be used to heat an individual house or flat using a stand-alone pellet stove to provide space heating in a room, or incorporate boilers connected to a central heating and hot water system.

6.79 Biomass heaters (and their storage buildings) should be positioned to minimise visual impact. Noise pollution generated by biomass boilers should be minimised to safeguard neighbouring properties' amenity through the use of noise attenuation measures such as sound absorbent cladding to outbuildings / garages or siting the generator away from nearby sensitive development (e.g. residential uses). Air quality should be maintained through the incorporation of proprietary pollution control systems.

6.80 Where commercial biomass boilers are proposed, proposals will generally be assessed with regard to the appropriateness of the site and the design of the biomass plant itself, seeking to avoid any adverse environmental and visual impacts. Additionally, proposals for biomass boilers will be subject to Environmental Health and Scottish Environment Protection Agency regulation in order to ensure that they do not have an adverse impact on air quality and public health.

6.81 Large scale biomass plants, which are not ancillary to wider development proposals, are primarily industrial in nature and such developments should therefore be directed to existing industrial areas. The key considerations for assessing these proposals will be:

- the potential impact on the amenity of the area, with specific reference to noise, odour and air quality;
- the visual impact of the proposal and its sensitivity to its setting;
- the ability of the proposals to minimise the level of pollutants, through careful siting and the use of best available technology.

6.82 There are economic, social and environmental impacts that should be considered when installing a small/community scale biomass plant. Some of these impacts arise during the installation and construction phases, and there are a number of ways in which the design, location and installation of a small/community scale biomass plant can minimise these impacts.

Biomass Impacts Checklist

Issue	Impact	Ways to Minimise Impact
Landscape & Visual	Visual impacts (e.g. impact of a flue fitted externally e.g. through roof if existing chimney cannot be adapted)	▪ Sensitive design (including colour and appearance) and siting of flue to minimise visual impact.
Noise	Increase in noise levels at nearby residences during operation (e.g. from deliveries, including loading and unloading, and plant operation noise	▪ Set noise limits at site boundaries or at sensitive receptors. ▪ Incorporate noise attenuation features (e.g. within roof and walls) to reduce noise break-out.
Ecology	Disturbance to bats from new flues in attics	▪ Appropriate and sensitive siting of the system.
Air Quality	Emissions from operational procedures (e.g. emissions from biomass fuel combustion) Odour deriving from the storage of fuel and the digestion process Emissions from construction and operation vehicles (e.g. dust generation during loading and unloading operations	▪ Incorporate proprietary air pollution control systems into scheme design. ▪ Appropriate siting of the facility. ▪ Site and plant management to minimise odour impacts. ▪ Switch off engines when not in use and minimise delivery movements.
Hydrology and water sources	Risk to local watercourses/ groundwater from operational procedures (e.g. pollution from spill of waste water)	▪ Ensure SEPA requirements are applied (e.g. all tanks and digesters are surrounded by containment bundling of either concrete or clay)

Traffic, Transport & Access	Increase in vehicle movements to and from the property during operation (e.g. transport of wood pellets, wood chips and wood logs)	▪ Ensure sufficient storage space for wood in scheme design to reduce delivery movements. ▪ Ensure safe access/turning for delivery vehicles.
Historic Environment	Visual impacts and direct effects on designated and non-designated historic environment assets including listed buildings and scheduled monuments.	▪ Sensitive design (including colour and appearance) and siting of flue to minimise visual impacts. ▪ Positioning new flues away from principal elevations. ▪ Make use of existing chimneys where possible. ▪ Ensure colour and materials of built elements are in keeping with local landscape features. ▪ Painting flues with a heat-resistant dark coloured paint with a matt finish. ▪ Bring existing disused buildings back into use.

Information requirements for selected technologies to be submitted with planning applications

Biomass fuelled electricity and heat generating plant	• Description of technology and fuel supply • Capacity – plant specification • Estimated energy generation (kWh/yr) • Floor plans and elevations showing the location and design of the plant, flue and storage facilities; • Details of vehicle access to and from the plant and estimated vehicle movements • Source of fuel supply, principal transport routes to and from the supply • Landscaping and visual impact of plant • Details of noise emissions • Details of air pollution/air quality impacts and mitigation measures • Details of sustainability of sourcing • Evidence of consultation with appropriate bodies such as NatureScot / SEPA

For additional information please refer to:
Energy Savings Trust
Biomass

8 Anaerobic Digestion (AD)

6.83 Anaerobic Digestion (AD) is the process of breaking down plant or animal matter such as farm slurry by microbial action in the absence of air (in an aerobic digester or 'bio-digester'). This produces a bio-gas with a high methane content which is very similar to natural gas and which can be burned in a boiler or Combined Heat and Power (CHP) plant to generate heat and/or electricity. It may also be cleaned and used as a bio-fuel (sometimes referred to as bio-methane) that may be introduced into the gas grid to provide heat and power; or condensed for use as a renewable fuel for transport. The residual digestate contains valuable plant nutrients such as nitrogen, phosphate and organic humus and can be spread on land as a bio-fertiliser in place of expensive artificial fertiliser.

6.84 Anaerobic digestion is used widely in the agricultural sector in the form of small on-farm digesters producing biogas to heat farmhouses and other farm buildings. Almost any biomass can be used as feedstock for an AD plant, including food waste; slurry and manure; plant residues, silage, and energy crops. As a result, materials that are currently going to landfill can be utilised; natural methane emissions are reduced and conventional fossil fuel generation, with its associated carbon emissions, can be displaced.

6.85 The benefits associated with AD include:

- a contribution toward meeting Government targets in relation to renewable energy and greenhouse gas emissions;
- a beneficial means of dealing with biomass wastes that would otherwise go to landfill;
- the opportunity to utilise natural resources to enhance security of energy supply; and
- support for jobs and businesses through the creation of an indigenous biomass supply chain.

6.86 An Anaerobic Digestion plant typically comprise of:

- a digester tank - buildings to house ancillary equipment such as a generator
- a biogas storage tank
- a flare stack (3-10m in height)
- associated pipework

6.87 AD plants vary in size in order to meet specific waste processing or energy generation requirements. At the smaller end of the scale, plants can be developed to treat agricultural waste from an individual farm through medium-sized centralised facilities dealing with wastes from several farms (potentially supplemented by crops such as maize grown specifically to feed the digester) to sizeable industrial AD plant handling large quantities of MSW.

Figure 11. An anaerobic digestion plant

6.88 Planning permission is necessary for most anaerobic digestion installations. While small scale digesters using only on-farm waste may constitute agricultural 'permitted development' they may nevertheless still require to be the subject of a 'prior notification' procedure. It is therefore strongly recommended that advice and confirmation is sought from the council's Development Management team at an early stage to formally confirm the position.

6.89 Agricultural or Farm-based can complement normal farm business activities by contributing to waste management and nutrient recycling activities on the farm. Farm based AD can also improve farm business efficiency and environmental sustainability at the level of an individual farm or group of farms by helping to offset operating costs. This is because AD offers an effective and sustainable method of processing agricultural wastes and other appropriate biomass material to generate renewable electricity and/or heat (using CHP) for agricultural purposes within the farm. This energy can be used to offset consumption from the Grid, thereby helping to reduce operating costs. AD plant can also offer an additional complementary source of income to farmers from the sale of renewable electricity back to the grid.

6.90 Farm-based AD plants may be 'on-farm' (where the feedstock is comprised entirely of organic residues or energy crops produced within the farm or they may accept feedstock material from a number of neighbouring farms as part of co-operative or community initiative. These proposals might be located on an individual farm or some other location (such as an industrial estate) close to the source of the waste.

6.91 In general, on-farm AD is only likely to be sustained by large farms which can produce enough feedstock year-round from within the farm unit for the economic operation of the plant. In practice it is anticipated that most proposals for farm-based AD will involve the import of a proportion of feedstock material onto the farm to complement the feedstock originating from within the unit.

6.92 Where this is the case it is important that the type, volume (in tonnes per annum) and source(s) of feedstock are clearly identified as part of the planning application. This is required in order to fully assess the transport/traffic implications of this movement and also consider other aspects such as the amenity impacts and the adequacy of existing or proposed feedstock storage provision.

6.93 At the larger end of the scale, centralised AD facilities can be developed to co-digest source separated municipal wastes with other wastes such as sewage sludge, agricultural residues and industrial organic wastes.

6.94 Proposals for larger scale CAD plants to process agricultural residues and which are operated on a commercial (or merchant) basis and intended to accept material from a wide area will generally not be suitable for farm-based locations. These proposals are likely to be more suitable in an industrial setting or in association with an existing industrial enterprise, such as a largescale food processing facility or industrial dairy.

6.95 Proposals for large AD plants may need an EIA and Licences from SEPA relating to waste management and the water environment are also likely to be required.

6.96 There are economic, social and environmental impacts that should be considered when installing an AD plant. Some of these impacts arise during the installation and construction phases, and there are a number of ways in which the design, location and installation of a small-scale AD plant can minimise these impacts.

Anaerobic Digestion (AD) Impacts Checklist

Issue	Impact	Ways to Minimise Impact
Landscape & Visual	Visual impacts (e.g. impact of a flue fitted externally e.g. through roof if existing chimney cannot be adapted)	▪ Sensitive design (including colour and appearance) and siting of flue to minimise visual impact.
Hydrology and water sources	Risk to local watercourses/ groundwater from operational procedures (e.g. pollution from spill of waste water)	▪ Ensure Environment Agency requirements are applied (e.g. all tanks and digesters are surrounded by containment bundling of either concrete or clay).
Noise	Increase in noise levels at nearby residences during operation (e.g. from deliveries, including loading and unloading, and plant operation noise	▪ Set noise limits at site boundaries or at sensitive receptors. ▪ Incorporate noise attenuation features (e.g. within roof and walls) to reduce noise break-out.
Air Quality	Odour deriving from the storage of feedstock and the digestion process (e.g. sorting, mixing and digestion); and emissions from construction and operation vehicles (e.g. dust generation during loading and unloading operations)	▪ Appropriate siting of the facility along with effective site and plant management to minimise odour impacts. ▪ Incorporate negative ventilation systems fitted with biofilters to control and contain odours within buildings. ▪ Switch off engines when not in use and minimise delivery movements. ▪ Implement best practice dust mitigation measures (e.g. Ensuring appropriate transport of materials, enclosure of stockpiles, restriction of vehicle speeds on site, use of wheel wash facilities etc).
Traffic, Transport & Access	Increase in vehicle movements to and from the property during operation (e.g. the delivery of feedstock	▪ Prepare Traffic Management Plan in conjunction with Transport Manager to determine most appropriate times and routes for HGV traffic. ▪ Ensure safe access/turning for delivery vehicles.
Historic Environment	Visual impacts of Anaerobic Digestion installations and direct effects on designated and non-designated historic environment assets including listed buildings and scheduled monuments and of direct effects on designated and undesignated archaeology, including buried archaeology.	▪ Sensitive design (including colour and appearance) and siting of flue to minimise visual impacts. ▪ Positioning new flues away from principal elevations. ▪ Make use of existing chimneys where possible. ▪ Paint flues with a heat resistant dark coloured paint with a matt finish. ▪ Bring existing disused buildings back into use.

Other approvals

There may be other kinds of approval that you may need such as:

- Listed Building consent if a building is listed
- Conservation area consent if the development is in a conservation area
- Scheduled Monument consent if the development affects a scheduled monument
- Trees – Many trees are protected by tree preservation orders which mean you need the council's consent to prune or fell them
- Building Standards – New building work will often need to comply with Building Standards
- Wildlife – Some buildings may hold roosts of bats or provide a refuge for other protected species – these are given special protection. *Planning Guidance Planning for Nature - Development Management and Wildlife* provides comprehensive advice and information
- SEPA licences – Please check with SEPA whether it regulates/licenses any aspect of a proposal

Information requirements for selected technologies to be submitted with planning applications

Anaerobic Digestion (AD)	• Description of technology and fuel supply • Capacity – plant specification • Estimated energy generation (kWh/yr) • Floor plans and elevations showing the location and design of the plant, flue and storage facilities; • Details of vehicle access to and from the plant and estimated vehicle movements • Source of fuel supply, principal transport routes to and from the supply • Landscaping and visual impact of plant • Details of noise emissions • Detail of disposal arrangements for digestate • Details of air pollution impacts and mitigation measures • Evidence of consultation with appropriate bodies such as NatureScot / SEPA • EIA screening

For additional information please refer to:
SEPA
Licensing of Anaerobic Digestion Plants
PPC Technical Guidance Note 38: Anaerobic Digestion
Odour Guidance (2010)

9 Combined Heat and Power (CHP)

6.97 Combined Heat and Power (CHP), also known as co-generation, is a term which refers to the process where the heat normally wasted and released into the atmosphere during power generation activities is captured and used to heat a building.

6.98 A CHP system is more energy efficient than conventional grid supply electricity and traditional heating boilers in so far as the waste energy is used to heat water, which can then be used to heat the spaces in buildings (radiators/ underfloor heating), heat water or enable a building to be cooled. Using a Combined Heat and Power (CHP) unit can give overall efficiencies in excess of 80%.

6.99 A typical CHP system comprises the following key components:

- Fuel delivery and storage facilities (if fuelled by biomass)
- Boiler/turbine
- Connecting pipework-
- Heat exchanger/heat recovery generator

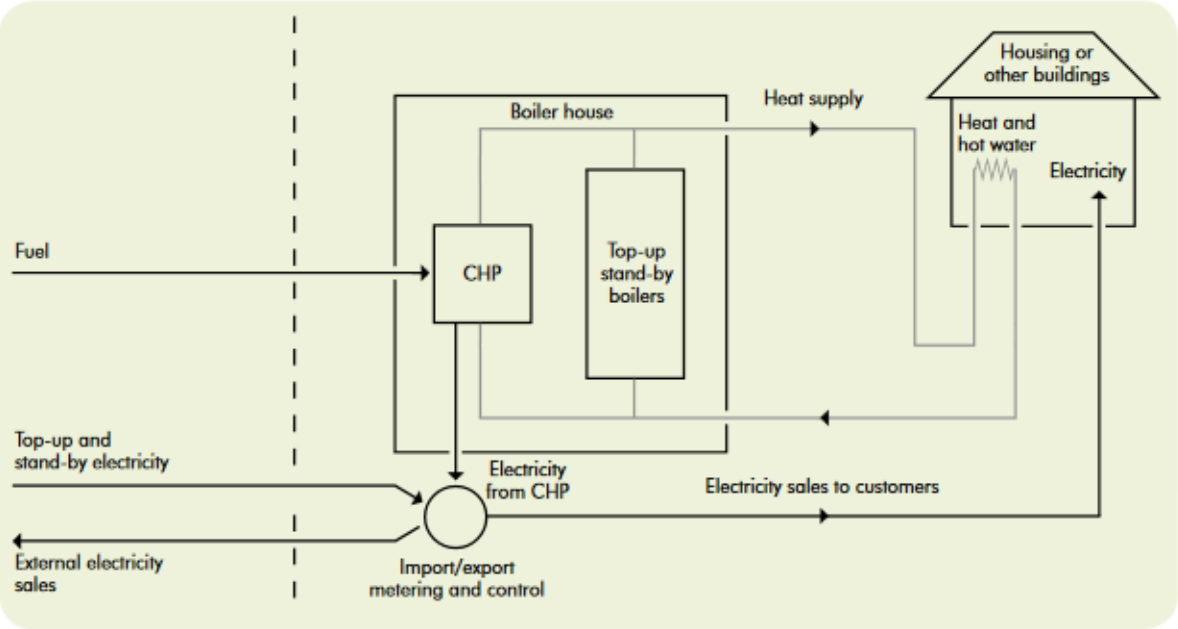


Figure 12: Typical CHP system

6.100 CHP units often burn natural gas or oil to generate both heat and power, in which case it is an efficient but not renewable technology. However, when a renewable fuel source is used, biofuel, CHP is considered a renewable energy technology.

6.101 CHP plants operate at a range of scales. Micro-CHP are more practical for domestic situations Small scale CHP plants are suited for community ownership, generating electricity locally, and supplying heat to surrounding houses and industrial buildings through district heating systems but to be economically viable they all need to be carefully sized in relation to the heat and power loads being supplied.

6.102 A CHP plant can either be designed to:

- Meet a specific heat load (heat-led), with the electricity produced being treated as a secondary benefit, or
- Design specifically for power generation (electricity-led), with the waste heat being the secondary benefit.

6.103 The correct sizing of a CHP system is vital and it is very important that before such as system is considered that a real use for the heat can be found at all times of power generation, if that system is to operate in the most efficient manner.

6.104 For the full benefit the system must serve a balanced thermal and electrical power load. CHP is most economic when there is a continuous heat demand, such as on industrial sites in continual operation, or through district heating systems in mixed-use community developments, such as offices, retail space and homes. In steam generating plants there is an inherent trade- off between heat and electricity; the more heat produced the less energy available for electricity generation. Use of low grade 'waste' heat from the generating process will only marginally affect electricity production whereas supplying high grade heat to an industrial process could result in a significant reduction in generating capacity.

6.105 As a decentralised generator CHP can contributes to the decarbonising of the power grid, and while many 'energy from waste' plants are built 'CHP ready' there is often a lack of 'heat customers', due to location or the relative cost of alternatives, meaning they operate in the less efficient electricity-only mode.

6.106 There are economic, social and environmental impacts that should be considered when installing CHP. Some of these impacts arise during the installation and construction phases, and there are a number of ways in which the design, location and installation of CHP can minimise these impacts.

Combined Heat and Power Impacts Checklist

Issue	Impact	Ways to Minimise Impact
Landscape & Visual	▪ Visual impacts on the landform and landscape character and setting of buildings and any ancillary flues and chimneys. ▪ Visual impact of the storage facility (Biomass CHP)	▪ A Landscape/Visual Impact Assessment should be undertaken for proposals of any substantial scale or massing. ▪ Development should be sensitively designed with careful consideration afforded to external materials and colour and the and siting of flues and chimneys.
Noise	Biomass CHP - Increase in noise levels at nearby residences during operation (e.g. from deliveries, including loading and unloading, and plant operation)	▪ Set noise limits at site boundaries or at sensitive receptors. ▪ Incorporate noise attenuation features (e.g. within roof and walls) to reduce noise break-out.
Air Quality	Biomass CHP - Emissions from construction and operation vehicles (e.g. dust generation during loading and unloading operations)	▪ Appropriate siting of the facility ▪ Site and plant management to minimise odour impacts. ▪ Switch off engines when not in use and minimise delivery movements. ▪ Implement best practice dust mitigation measures (e.g. Ensuring appropriate transport of materials, enclosure of stockpiles, restriction of vehicle speeds on site, use of wheel wash facilities etc).
Traffic, Transport & Access	For Biomass CHP - Minor increase in vehicle movements to and from the property during operation (e.g. the delivery of fuel)	▪ For Biomass CHP - Prepare Traffic Management Plan in conjunction with local transport authority to determine most appropriate times and routes for HGV traffic.

Historic Environment	Visual impacts and direct effects on designated and non-designated environment assets including listed buildings and scheduled monuments.	▪ Design (including colour and appearance) and siting of flue to minimise visual impacts. ▪ Potential design measures may include positioning new flues away from principal elevations, making use of existing chimneys where possible, or reducing the visual impact by painting flues with a heat-resistant dark coloured paint with a matt finish.

Other approvals

There may be other kinds of approval that you may need such as:

- Listed Building consent if a building is listed
- Conservation area consent if the development is in a conservation area
- Scheduled Monument consent if the development affects a scheduled monument
- Trees – Many trees are protected by tree preservation orders which mean you need the council's consent to prune or fell them
- Building Standards – New building work will often need to comply with Building Standards
- Wildlife – Some buildings may hold roosts of bats or provide a refuge for other protected species – these are given special protection. *Planning Guidance Planning for Nature - Development Management and Wildlife* provides comprehensive advice and information.
- SEPA licences – Please check with SEPA whether it regulates/licenses any aspect of a proposal

Information requirements for selected technologies to be submitted with planning applications

Combined Heat & Power (CHP)	• Description of technology including fuel type to be used • Capacity –plant specification, electrical output (kWe), heat output Wth) • Estimated energy generation (kWh/yr) for electricity and heat separately • Layout plan showing site size, boundary and location of infrastructure (e.g. location of boiler house, CHP units and boilers, storage area, pipe networks) • Floor plans and elevations • Details of connection to distribution network • Noise and visual impact assessment • Details of operation and management of installations • Where appropriate, source of fuel supply, principal transport routes to and from the supply • Details of vehicle access to and from the plant and estimated vehicle movements • Biodiversity impacts • EIA screening

For additional information please refer to:
Scottish Water
Combined Heat and Power Advice

Energy Recovery from Waste

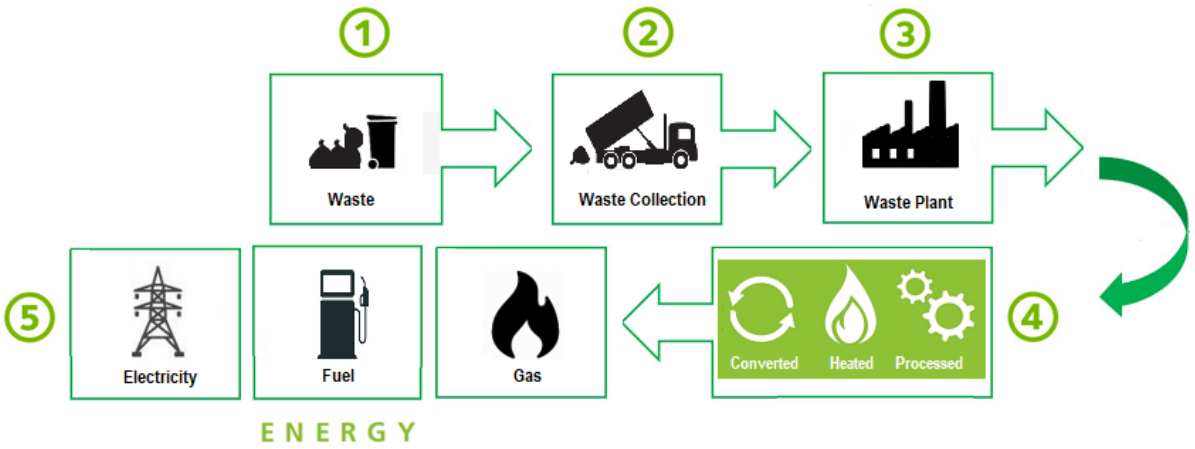


Figure 13: The Energy (recovery) from Waste Process

6.107 Historically, the main treatment route for waste in the UK has been landfill, primarily due to the availability of suitable sites created by past mineral extraction. In the mid 1990's the EU began to recognise the potential impact of waste management on climate change and introduced targets for the diversion of biodegradable waste from landfill. This helped drive the development of a new generation of energy from waste plants with energy generation in addition to waste management as a key part of their function and business model.

6.108 Energy (recovery) from-waste (EfW) is a term that describes a range of different processes and technologies used to generate a usable form of energy and which also reduce the solid volume of residual waste. This energy can be in the form of electricity, heating and/or cooling, or conversion of the waste into a fuel for future use e.g. transport fuels, or a combination of these forms.

6.109 When considering the relative environmental benefits of landfill and energy from waste, the most important factor is their potential contribution to climate change. Different amounts of greenhouse gases would be released if the same waste was burned or buried.

6.110 Energy from waste is ordinarily better than landfill, providing the residual waste being used has the right renewable content and is matched with a plant that is efficient enough at turning the waste to energy. The carbon offset of Energy from Waste plants will depend largely on the fuel source. These considerations should be at the heart of any proposal.

6.111 Energy from waste is not just about waste management.

- The energy it produces is a valuable domestic energy source contributing to energy security;
- As a partially renewable energy source it can also contribute to our renewable energy targets which are aimed at decarbonising energy generation; and
- It has the added advantage that it is non-intermittent, so it can complement other renewable energy sources such as wind or solar.

6.112 Most of the energy from waste is currently produced in the form of electricity. However, more and more plants are also looking to use the heat generated. This is known as combined heat and power CHP. More innovative technologies have the potential to also transform the waste into other energy products such as transport fuels or substitute natural gas.

6.113 The most common thermal treatment is incineration; less common are Advanced Thermal Treatments (ATT) such as *gasification* or *pyrolysis*. They each have their advantages and disadvantages, with no 'one size fits all' solution. The size and site of the plant will influence the type of technology that is appropriate.

6.114 A fundamental principal is that energy from waste schemes should only be used for materials that cannot be reused or recycled.

6.115 In practical terms facilities should be located close to waste streams and heat demand with particular consideration for landscape, air quality and transport impacts.

6.116 The nature of EfW demands that full consultation is undertaken with SEPA, the council's Environmental Health service and local communities. As both emissions and waste are regulated by SEPA, including air pollution control and disposal of associated residues, a PPC Permit to operate an EfW will be needed together with other regulatory requirements. An EIA Report may also be required.

For additional information please refer to:

Scottish Government Managing Waste Policy
http://www.scotland.gov.uk/Topics/Environment/waste-and-pollution/Waste-1

Scotland's Zero Waste Plan
http://scotland.gov.uk/Publications/2010/06/08092645/0

7.1 The SG focuses on the specific aspects of planning application that are relevant to renewable or low carbon energy technology and energy efficiency. The level of detail required in any planning application will however vary depending on the scale and nature of the development being proposed.

7.2 This section identifies what supporting information requires to be provided with a planning application for renewable energy development in order to enable the council to make an informed assessment of a proposal against this supplementary guidance and all relevant LDP policies. Pre-application contact with the Development Management team is strongly encouraged as it will help to ensure that the appropriate content and level of supporting information is understood and submitted from the outset and thereby helping to streamline the processing of the application.

7.3 West Lothian Council already provides a considerable amount of information about the planning application process generally, including the specific requirements for site maps, plans, other illustrations of proposed development and fees. This can be readily accessed from the *council's website.*

7.4 For more bespoke discussions about a particular proposal applicants can make use of the council's *chargeable* pre-application enquiry service, details of which can also be accessed from the web page by *clicking here.*

7.5 Applications to install renewable and low carbon technologies which are above the micro scale (more than 50kW) should be supported by the following evidence where relevant alongside the submission of a planning application and relevant plans:

Design and Access Statement (DAS)

7.6 This should be provided where the proposal would be categorized as a 'major' development, i.e. where the development would take place on a site having an area in excess of 1 hectare.

7.7 A DAS provides a framework for applicants to assess the design of the proposal and evaluates its context. It should explain how a proposed development is a suitable response to the site and its setting and demonstrate that it can be adequately accessed by prospective users.

Scale and Capacity Information

7.8 The electrical and heat generating capacity of the proposed development should be provided alongside the expected annual generating output and the potential energy return once installed. An indication of the potential contribution the proposal will make to national renewable energy targets is also required.

Landscape Visual Impact Assessment (LVIA)

7.9 LVIA is the technique used to assess the effects of change on the landscape so that negative landscape effects are avoided, reduced or offset. Where a development is likely to have negative impacts on landscape, LVIA usually also forms part of the environmental Assessment (discussed later).

7.10 The proposal requires to be assessed in terms of its surrounding landscape and its visual impact. It should identify the sensitivity of the area to the proposed development and the change it will give rise to. It should differentiate between the likely impact the proposal would have on the local and wider landscape character. The assessment should clearly assess the physical effects of the proposal on the landscape separately from the visual impact. The visual impact aspect of the assessment can be done using a variety of methodologies including the *Zones of Theoretical Visibility (ZTV)* technique or accurate photo-montages from a comprehensive range of viewpoints. Finally, the assessment must include details relating to any proposed or existing mitigation to identified visual impacts e.g. screening through the use of existing vegetation or new planting. Further guidance on the methodology can be found in the Landscape Institute publication *Guidelines for Landscape and Visual Impact Assessment (GLVIA) (3rd edition)*.

Historic Environment Assessment

7.11 SPP 2014 requires planning guidance to provide a framework for protecting and, where appropriate, enhancing all elements of the historic environment. Consequently, where proposals may have an impact on the historic environment, (such as scheduled monuments, listed buildings, conservation areas and archaeological sites a bespoke Historic Environment Assessment may require to be submitted. The scope of the assessment should be agreed in consultation with the council and Historic Environment Scotland and, as a helpful starting point, it would be appropriate to draw on viewpoints and receptors which may have previously been identified in the LVIA. The amount of information and analysis required should relate in scale to the possible impact on the historic environment.

Habitat & Ecological Assessment

7.12 High quality natural environments are vital to the creation of better places and it is important that new renewable energy development does not detract or diminish.

7.13 An initial Phase 1 Habitat Assessment may be sought, depending on the scale and location of the proposal. This will help identify any key species/habitats and allow a determination to be made as to whether any further investigation is required. However, Phase 1 surveys only provide a basic record of the semi-natural vegetation and wildlife habitat and because the data has often not been updated since it was originally surveyed it cannot be regarded as definitive. Phase 1 surveys may therefore require to be followed up by a Phase 2 survey that looks more closely at the ecology of the site and which may in turn be augmented by a Protected Species Survey.

7.14 Depending on the site and the different environmental circumstances, a Habitat Management Plan HMP) may also require to be submitted. A HMP may be included in a suite of mitigation measures proposed by the applicant as part of their submitted development proposal from the outset, or be required by a condition of planning consent. In either case, the HMP should set out how it will mitigate or compensate for the impacts caused by the development, or enhance the natural heritage interest of the area. A HMP also usually forms part of the environmental Assessment (discussed later).

7.15 NatureScot publication *Habitat Management Plans* provides helpful guidance on this subject. It should however be noted that NatureScot will only become involved in the development of an HMP where it is required to mitigate significant adverse impacts on designated sites or protected species.

Habitats Regulations Assessments (HRA)

7.16 HRAs are a means to determine whether a project would likely have significant impacts on the conservation objectives of European sites, designated for their European importance for nature conservation, which include Special Protection Areas (SPAs) and Special Areas of Conservation (SAC).

7.17 Where a HRA is considered to be required, the council must undertake a screening test known as a Test for Likely Significant Effect (TLSE). If the findings of the test indicate the potential impact may undermine the conservation objectives for any feature of a European site this triggers an Appropriate Assessment. Both stages of the HRA need to consider the proposal alone and in-combination with other plans or projects. This assessment is carried out by the council, however, the applicant must supply the information required to undertake the evaluation. Any assessment must precede the planning decision and where the outcome of the Appropriate Assessment cannot rule out a potential adverse effect, and no alternative solutions can be identified, then the project can only then proceed if there are imperative reasons of over-riding public interest and if the necessary compensatory measures can be secured.

Transport Assessment (TA)

7.18 For larger applications, a Transport Assessment may be required. This assessment should consider the impacts on the local / strategic road networks, core paths and cycle routes. It should also include any requirements for new or upgrading existing infrastructure required to facilitate construction and the ongoing maintenance of the proposal. A traffic management plan may also be required but this will be dependent on the scale of the development. All applications should however at the very least include a description of site access and parking, anticipated vehicle movements, frequency and volume of deliveries and any anticipated heavy loads. Scoping of the TA must be agreed in advance and in consultation with the council's Roads and Transportation Manager.

Hydrological Assessments

7.19 An assessment requires to be made of the possible changes to hydrology in the vicinity of the site and perhaps even further afield as a consequence of the proposed development. Information required as part of a planning application is likely to include:

- Water abstraction and circulation within the energy recovery system;
- Information on the current water quality and any proposed abstraction or discharge;
- Hydrology and drainage including abstractions, impoundments and watercourse engineering including crossings including details of surface water drainage
- Assess potential flood risks - a Flood Risk Assessment (FRA) may be required where appropriate
- A pollution prevention plan as part of the Construction Environmental Management Plan addressing SEPA Pollution Prevention Guidelines

- Specific requirements relating to the provision of SUDS, and wastewater drainage should be discussed with SEPA, Scottish Water, and the council - a Drainage Impact Assessment (DIA) may be required where appropriate.

Energy Statement

7.20 Policy NRG1a of the adopted LDP requires a statement to be submitted with planning applications for all new buildings to demonstrate compliance that at least 10% of the current carbon emission reduction set by Scottish Building Standards will be met through the installation and operation of low and zero-carbon generating technologies.

Noise Impact Assessment (NIA)

7.21 There are two types of development for which Noise Impact Assessments will be required. These are:

- proposed noise generating development (NGD) (noise brought to people)
- proposed noise sensitive development (NSD) (people brought to noise)

7.22 Where noise is a material consideration in a planning application there will be a requirement to submit a Noise Impact Assessment. It is important that the applicant agrees the relevant noise assessment methodology and establish appropriate noise assessment criteria in advance and consultation with the council's Environmental Health service in order to maximise resource efficiency and avoid a delay in the planning process. The Environmental Health service will review the NIA and the conclusions will help to inform the determination of the application. *Supplementary Guidance (SG) Planning and Noise* provides comprehensive advice and information.

Air Quality Assessment (AQA)

7.23 Air quality may be required where the council considers that there may be a risk of an air quality impact on human health and amenity.

7.24 Applications for renewable energy may, where appropriate, be required to be accompanied by a*n Air Quality Assessment* (AQA). Depending upon the type of emissions produced a 'simple' or 'detailed' assessment will be required. A simple assessment is one relying on already published information and without quantification of impacts, in contrast to a detailed assessment that is completed with the aid of a predictive technique, such as a dispersion model. The scoping of an AQA must be agreed in advance with the council's Environmental Health service, having regard to the council's *Planning Guidance (PG) on Air Quality*.

Environmental Impact Assessment (EIA)

7.25 The purpose of an Environmental Impact Assessment is to protect the environment by ensuring that the council, when deciding whether to grant planning permission for a project which is likely to have significant effects on the environment, does so in the full knowledge of the likely significant effects, and takes this into account in the decision-making process.

7.26 EIAs are intended to prevent, reduce or offset the detrimental environmental impacts development can create and also allows an opportunity for proposals to enhance positive outcomes the development could have on the environment.

7.27 The regulations governing EIA, the *Town and Country Planning (Environmental Impact Assessment (Scotland) Regulations 2017*, are quite complex but Scottish Government *Circular 1/2017* is helpful in de-mystifying them. The website of *NatureScot* is also a recommended resource.

7.28 The regulations governing EIA explain where EIAs are mandatory and where they are at the discretion of the council as local planning authority and it is therefore important that early pre-application engagement with the council's Development Management team is established to confirm requirements and agree scoping.

NB: EU Exit does not affect the process of EIA or its underpinning legislation.

7.29 EIA includes the following broad stages:

Pre-application

- Screening - determines whether an EIA is required.
- Scoping - identifies the issues which must be addressed in the EIA Report.

Application

- EIA Report - assesses the likely significant effects of a project
- Consultation/public participation by Scottish Ministers - to gather views from stakeholders on the likely effects of the project.
- Determination – made by the Scottish Ministers having considered the environmental information, mitigation and consultation responses.

Post-consent

- Multi-stage consent / regulatory approval – will apply following consent.

eight

Other Consents and Licences

8.1 It is important to recognise that some developments will also require to be considered under other legislation such as noise, emissions, or pollution control which are not part of the planning process and there may therefore be other consents/ licences needed, depending on the particular renewable energy option being adopted. The most common are listed below but this list is not exhaustive and the responsibility lies with developers to ensure that they have secured all the necessary authorisations before commencing the implementation of a renewable energy development.

Listed Building Consent

Listed building consent is the mechanism by which planning authorities ensure that any changes to listed buildings are appropriate and sympathetic to their character. Its purpose is to protect what is a rare and unique resource. You must get listed building consent from West Lothian Council if you wish to demolish (all or part), alter or extend (internally or externally) a listed building.

Scheduled Monument Consent

Scheduled monument consent is the mechanism by which Historic Environment Scotland ensures that any changes to monuments of national importance are appropriate and sympathetic to their character. It helps to protect what is a rare and unique resource. You must apply for scheduled monument consent to Historic Environment Scotland (HES).

Conservation Area Consent

Conservation area consent controls the demolition of unlisted buildings in conservation areas. The consent process is similar to the listed building consent process. Similarly, you must get conservation area consent from West Lothian Council if you wish to demolish (all or part), alter or extend (internally or externally) a building in a conservation area.

Tree Works

If you are contemplating any works to protected trees / woodlands or need to find out whether a tree is protected, please contact the Development Management team for advice prior to undertaking any work. Trees are 'protected if they are the subject of a Tree Preservation Order, or are located within a conservation area or are protected by the conditions of a planning permission. If you wish to do any work to these trees you must submit a Tree Works application to the council. See the *council website*. Removal without consent may result in criminal charges.

Full planning permission for a development that expressly specifies tree felling in the application and identifies the affected trees on a plan and is approved will not require further consent to remove.

Other operations not directly related to the development such as felling for biomass fuel may require a licence from Forestry Scotland. Felling or planting may require a separate environmental impact assessment. See *Guidance on Felling* and *Environmental Impact Assessment*.

Building Warrant

It is not the responsibility of Building Standards (West Lothian Council) to determine whether a building warrant is required. This determination should be taken by the building owner and if required, in consultation with other building professionals.

NatureScot Licensing

Construction or operation of renewable energy has potential to affect European and national Protected species which may be an offence For all renewable schemes, licenses may be required from NatureScot for activities with a potential impact on protected species, for example European Protected Species (EPS) such as otters and bats. Mitigation for species submitted as part of a planning application can be used for licence applications to NatureScot. It is not possible to apply for a European Protected Species licence without having obtained planning consent. *NatureScot Guidance on Protected Areas and Species* and *NatureScot Guidance on SSSIs.*

SEPA Licensing

SEPA is responsible for the regulation of emissions to air, water and land under the *Pollution Prevention and Control (Scotland) Regulations 2012.* This is of particular relevance to hydro-power, heat technologies and activities using or disturbing forest or peat. Many of these activities require a permit. See *SEPA Guidance on Pollution Prevention and Control Proposals*.

Proposals which produce or utilise waste, including biomass, AD and Energy from Waste, may require a permit from SEPA under the *Waste Management Licensing (Scotland) Regulations 2011*. Also see *SEPA Guidance on Biomass*, *SEPA Guidance on Anaerobic Digestion* and *SEPA Guidance on Energy from Waste*.

Any activity that impacts on the water environment must abide by regulations and if necessary secure authorisation from SEPA to proceed under the *Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended)*. This may affect any site but is of particular relevance to hydro-power, water source heat pumps, and discharges, abstractions, and groundworks that have potential to affect water bodies, groundwater supplies or Ground Water Dependent Terrestrial Ecosystems. See *SEPA Guidance on Water CAR A Practical Guide.*

Waste Management

SEPA is Scotland's environmental regulator whose main role is to protect the environment. See *SEPA Guidance on Waste.*

Energy Grid Connections

All schemes will need to check the potential for connection to the National Grid, where electricity is to be produced, and all renewable energy projects connecting to the National Grid are subject to a separate consent process. The grid connection, should it require overhead elements, requires consent under 37 of the Electricity Act 1989, and deemed planning consent under section 57(2) of the Town and Country Planning (Scotland) Act 1997. Many projects will be directly connected to their local distribution network, operated by the Distribution Network Operator (DNO). It should be noted that grid connection consent should be sought by the relevant owner of the local distribution or transmission network.

Helpful web links

☐ Biomass Energy Centre
http://www.biomassenergycentre.org.uk

☐ British Hydropower Association
www.british-hydro.org

☐ Carbon Trust
http://www.carbontrust.com

☐ Community Energy Scotland
www.communityenergyscotland.org.uk

☐ Energy Saving Trust
http://www.energysavingtrust.org.uk

☐ Farming for a Better Climate
www.farmingforabetterclimate.org

☐ Renewable Energy Association (REA)
http://www.r-e-a.net

☐ RenewableUK
http://www.renewableuk.com

☐ SAC Consulting Renewables Team
http://www.sruc.ac.uk/renewables

☐ Scotland's Farm Advisory Service
https://www.fas.scot

☐ Scottish Forestry
https://forestry.gov.scot/

☐ Scottish Government
www.gov.scot/Topics/Business-Industry/Energy/Energy-sources/19185/

☐ NatureScot
https://www.nature.scot/

☐ Scottish Renewables
http://www.scottishrenewables.com

☐ SEPA
http://sepa.org.uk

☐ NatureScot Licensing enquiries:
https://www.nature.scot/professional-advice/safeguarding-protected-areas-and-species/licensing

☐ NatureScot Planning & Renewables Unit:
https://www.nature.scot/professional-advice/planning-and-development/planning-and-development-advice/planning-and-development-renewable-energy

☐ The Microgeneration Certification Scheme
http://www.microgenerationcertification.org/

The Scottish Government provides a *range of online planning advice* for renewables which provides a good starting point for developers and applicants in addition to this SG.

Glossary

Advanced Thermal Treatments (ATT)
Systems which incorporate emerging technologies which use heat to decompose waste in limited oxygen prior to energy extraction. These systems include pyrolysis and/or gasification processes.

Air Quality Assessment (AQA)
Is a technique for determining the relative contribution to ground level pollutant concentrations of specific current or future source emissions at receptor sites. The principal activities in AQA are air quality modelling and monitoring techniques.

Anaerobic Digestion (AD)
Describes a series of processes in which microorganisms break down biodegradable material in the absence of oxygen. It is used for industrial or domestic purposes to manage waste and/or to release energy. Much of the fermentation used industrially to produce food and drink products, as well as home fermentation, uses anaerobic digestion.

Array
A number of photovoltaic modules electrically connected to produce a single electrical output.

Biodiversity
The variability in living organisms and the ecological complexes of which they are part. This includes diversity within species, between species and of ecosystems (UN Convention on Biological Diversity, 1992).

Biofuels
Unlike other renewable energy sources, biomass can be converted directly into liquid fuels, called 'biofuels,' to help meet transportation fuel needs

Biomass
Biomass is the total dry organic matter or stored energy of plant matter. As a fuel it includes energy crops and sewage as well as forestry and agricultural residues.

Clean Growth
Clean growth is a way to achieve economic growth, using sustainable technology whilst reducing greenhouse gas emissions.

Climate Change Adaptation
The adjustment in economic, social or natural systems in response to actual or expected climatic change, to limit harmful consequences and exploit beneficial opportunities.

CO_2 Carbon Dioxide
The main greenhouse gas, formed by the combustion of all fossil fuels.

Combined Heat and Power (CHP)
The combined production of electricity and usable heat is known as Combined Heat and Power (CHP). Steam or hot water, which would otherwise be rejected when electricity alone is produced, is used for space or process heating.

Community heating
Community heating is the distribution of steam or hot water through a network of pipes to heat a large area of commercial, industrial or domestic buildings or for industrial processes. The steam or hot water is supplied from a central source such as a heat-only boiler or a combined heat and power plant.

Cumulative Impact
The additional changes caused by a proposed development in conjunction with other similar developments or as the combined effect of a set of developments, taken together.

Energy efficiency
This is about making the best or most efficient use of energy in order to achieve a given output of goods or services, and of comfort and convenience. This does not necessitate the use of less energy, in which respect it differs from the concept of energy conservation.

Energy (recovery) from waste (EfW)
Is the process of creating energy - usually in the form of electricity or heat but also potentially biofuels - from the thermal treatment of a waste source via technologies such as incineration, Anaerobic Digestion, Gasification or Pyrolysis.

European Sites
Nature conservation sites (e.g. Sites of Special Scientific Interest (SSSIs)) which are designated under the European Habitat or Birds Directives as Special Protection Areas (SPAs) or Special Areas for Conservation (SACs). Development affecting such sites is subject to special controls and may be called in by Scottish Ministers

Environmental Impact Assessment (EIA)
An Environmental Impact Assessment is a technique for drawing together, in a systematic way, expert quantitative analysis and qualitative assessment of a proposals environmental effect. The need for an EIA is determined under the Environmental Impact Assessment (Scotland) Regulations 2017 and divides into two schedules:-

Schedule 1 - development which by law must have an Environmental Assessment.
Schedule 2 - development which poses significant harm to the environment by virtue of the nature, size and location of the proposal requires an EA at the discretion of the local authority.

Environmental Statement (ES)
A document containing the compiled information gathered during the EIA process.

Feed-in Tariff (FIT)
The FIT scheme was a government programme designed to promote the uptake of renewable and low-carbon electricity generation technologies. It was launched in April 2010 and provided payments to owners of small-scale renewable generators at a fixed rate per unit of electricity produced. It was funded through levies on suppliers, which were passed on to consumers. It was discontinued in April 2019.

Fuel cell
A cell that acts like a constantly recharging battery, electrochemically combining hydrogen and oxygen to generate power. For hydrogen fuel cells, water and heat are the only by-products and there is no direct air pollution or noise emissions. They are suitable for a range of applications, including vehicles and buildings.

Gasification
A process that converts organic or fossil based carbonaceous materials at elevated temperatures with controlled amounts of oxygen into carbon monoxide, hydrogen, carbon dioxide and methane. It is a well-known technology, although its advanced use with a mixed waste feedstock has not been proven on a commercial scale.

Gigawatt (GW)
Is a unit of power equal to one billion watts

Grid
Matrix of an electrical distribution system, in the UK, the National Grid

Habitat Management Plan (HMP)
A HMP sets objectives for, and guides the establishment of landscape and associated biodiversity features on a development site, covering all important habitats and species. The HMP will also define the management and monitoring, required to maintain these features at a favourable conservation status.

Habitats Directive
Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora was adopted in 1992 and is commonly referred to as the Habitats Directive. As well as establishing European sites and setting out how they should be protected, the Directive has a number of wider implications, for example in respect of European Protected Species.

Habitats Regulations Appraisal (HRA)
Used to describe an assessment of the implications of the policies and proposals of the LDP on Special Protection Areas (SPAs) or Special Areas of Conservation (SACs) as required by Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive) as transposed into domestic law by the Conservation (Natural Habitats, &c.) Regulations 1994 as amended.

Head
The total vertical distance between the beginning of a hydro system diversion and the hydro turbine. The amount of power a turbine produces is proportional to the total available head.

Heating/Cooling network
A heating/cooling network is a system for distributing hot water, space heating and cooling from a centralised source

Historic Environment
Includes ancient monuments (scheduled and unscheduled), archaeological sites and landscapes, historic buildings (listed, unlisted and those within Conservation Areas), historic gardens and designed landscapes (both on the Inventory of Gardens and Designed Landscapes, and those not included on the inventory), and their context and setting.

Inventory of Gardens and Designed Landscapes
This is a list of nationally important gardens and designed landscapes of national artistic and/or historical significance in Scotland and is maintained and published by Historic Environment Scotland. The Inventory includes more than 300 sites.

Landscape Character Assessment (LCA)
Landscape Character Assessment provides a classification and description of the landscape. Between 1994 and 1999, NatureScot commissioned, in partnership with others, a series of 30 regional LCA studies. Together, these identified, mapped and described the landscape character of all of Scotland (mostly at a scale of 1:50,000).

Landscape and Visual Impact Assessment (LVIA)
A technique used to assess the effects of change on the landscape. LVIA is used to help design the proposed change as well as assess its effects, so that negative landscape effects are avoided, reduced or offset. Where a development is likely to have negative impacts on landscape, LVIA usually forms part of the environmental assessment. It can also be used as part of the appraisal of development proposals and planning applications.

Major Development
Major developments are those exceeding thresholds set by the Scottish Government. These are defined in the Town and Country Planning (Hierarchy of Development) (Scotland) Regulations 2009 and explained in more detail in Planning Circular 5 of 2009. In the context of renewable energy 'major applications include all developments in Schedule 1 of the EIA (Scotland) Regulations 2017, and all electricity generating developments over 20MW, or extensions resulting in a development over 20MW. Developers may request a pre-application screening option from the council where they are uncertain whether the proposal falls into National or Major category

Megawatt (MW)
Is a unit of power i.e. the rate of energy conversion. One megawatt is equal to one million watts.

Megawatt hour (MWh)
Is a unit of energy equal to 1,000 kilowatt hours of electricity used continuously for one hour.

Micro-renewables / Micro-generation
The generation, from low or zero carbon sources, of electricity of up to 50kW capacity and heat of up to 45kW capacity, as set by the Electricity Act 2004.

Pre-Application Consultation (PAC)
Public events are required to be held by prospective applicants prior to submission of applications for national developments and major developments, to enable local communities to be better informed about significant development proposals in their area. Prospective applicants must notify community councils (and other parties as agreed with the planning authority) and hold a minimum of one public event (to be advertised 7 days in advance in a local newspaper) at which members of the public can make comments. (Note – there is no requirement that views of those consulted are taken on board.) See *Scottish Government Circular 3/2013 Development Management Procedures.*

Penstock
A closed pipeline through which the water flows to a hydro turbine.

Permitted Development (PD)
Certain classes of development which do not require express planning permission through an application to the planning authority, because permission is automatically granted, as set out in the *Town and Country Planning (General Permitted Development) (Scotland) Order 1992,* as amended. Also known as Permitted Development Rights (PDR).

Phase 1 Habitat Survey
Provides a standardised system of classifying habitats in the UK and seeks to establish whether any of a given list of habitats are present on a site:

Photovoltaics (PV)
The direct conversion of solar radiation into electricity by the interaction of light with electrons in a semiconductor device or cell.

Pre-Application Consultation (PAC)
A developer must submit a Proposals of Application Notice (PAN) to the council at least 12 weeks before the application for planning permission is submitted. This must set out the extent of consultation that will be carried out, and must be agreed by the Council before the consultation begins.

Prime Agricultural Land
Agricultural land identified as being Class 1, 2 or 3.1 in the Land Capability Classification for agriculture developed by Macaulay Land Use Research Institute (now the James Hutton Institute).

Pumped storage
A facility designed to generate electric power during peak load periods with a hydroelectric plant using water pumped into a storage reservoir during off-peak periods.

Pyrolysis
Pyrolysis is a thermo-chemical decomposition of organic material at elevated temperatures in the absence of oxygen. Pyrolysis typically occurs under pressure and at operating temperatures above 430 °C (800 °F).

Renewable energy
Energy derived from a source that is continually replenished, such as wind/wave, solar, hydroelectric and energy from plant material, but not fossil fuels or nuclear energy. Although not strictly renewable, geothermal energy is generally included.

Sites of Special Scientific Interest (SSSI)
SSSIs represent the best of Scotland's natural heritage. They are 'special' for their plants, animals or habitats, their rocks or landforms, or a combination of these. SSSIs are designated by NatureScot under the provisions of the Nature Conservation Act (Scotland) Act 2004.

Smart Export Guarantee (SEG)
SEG is a scheme encouraging people to use renewable energy to power their homes. Effective from 1 January 2020, an SEG tariff provides eligible small-scale, low-carbon generators with payments for the electricity they export to the National Grid.

Special Areas of Conservation (SAC)
A European wide network of important sites containing rare or endangered species and habitats, (European sites) designated under the terms of the EC Directive on the Conservation of Natural Habitats and of Wild Flora and Fauna (The Habitats Directive).

Special Landscape Areas (SLAs)
Local designation for quality and value of landscape.

Special Protection Areas (SPA)
Designated under the terms of Directive 2009/147/EC of the European Parliament and of the Council of Europe on the conservation of rare, threatened or vulnerable wild birds. These areas are specifically protected for their ornithological importance.

Transport Assessment (TA)
A document detailing the traffic generated by a development and an analysis of key junctions to ensure that it operates efficiently.

U-value
Indicates how well a part of the building (i.e. roof, window, door, wall) keeps the heat inside the building. It measures the heat flow through those components. The higher the figure, the higher the heat loss. It is measured in terms of how many watts (W) of thermal energy is transported through a component of 1 square meter (m^2) at a temperature difference of 1 degree centigrade, i.e. W/m^2

ZTV
A Zone of Theoretical Visibility (ZTV), also known as a Zone of Visual Influence (ZVI), is a computer-generated tool to identify the likely (or theoretical) extent of visibility of a development. The elevation (or a set of elevations) of the development is tested against a 3D terrain model.

Acronyms

AD	Anaerobic Digestion
AQA	Air Quality Assessment
CAA	Civil Aviation Authority
CAR	Controlled Activities Regulations
CHP	Combined Heat & Power
EIA	Environmental Impact Assessment
ER	Environmental Report
FIT	Feed-in-Tariff
HES	Historic Environment Scotland
LCA	Landscape Character Assessment
LVIA	Landscape & Visual Impact Assessment
LZCGT	Low & Zero Carbon Generating Technology
NATS	National Air Traffic Services
PAC	Pre-Application Consultation
PAN	Planning Advice Note

PPC	Pollution Prevention & Control
PV	Photovoltaic
RSPB	Royal Society for the Protection of Birds
SEG	Smart Export Guarantee
SEPA	Scottish Environment Protection Agency
SLA	Special Landscape Area
SNH	Scottish Natural Heritage (now NatureScot)
SPP	Scottish Planning Policy 2014
SUDS	Sustainable Urban Drainage System
SW	Scottish Water
TA	Transport Assessment
ZTV	Zone of Theoretical Visibility

Annex A

SDP Policy 10

SUSTAINABLE ENERGY TECHNOLOGIES

The Strategic Development Plan seeks to promote sustainable energy sources. Local Development Plans will:

a. Support the future development and associated infrastructure requirements of Longannet and Cockenzie power stations in relation to their role as non-nuclear baseload capacity generators and the reuse of waste heat from these developments. Support Energy Park Fife at Methil and developments connected with offshore renewable energy at Leith and Rosyth; and

b. Set a framework for the encouragement of renewable energy proposals that aims to contribute towards achieving national targets for electricity and heat, taking into account relevant economic, social, environmental and transport considerations, to facilitate more decentralised patterns of energy generation and supply and to take account of the potential for developing heat networks.

LDP Policy NRG 1

POLICY NRG 1

Climate Change and Sustainability

The reduction of greenhouse gas emissions through a wide range of measures designed to mitigate and adapt to climate change is a strategic over-arching set of principles which will be promoted by having the statutory requirements of The Climate Change (Scotland) Act 2009 enforced in relation to:

- assisting in achieving the Scottish Government's renewable energy targets set out in the Act;
- assisting in achieving the Scottish Government's Climate Change Adaptation Programme (May 2014) to address identified impacts and build resilience for a climate ready natural environment, society, buildings and infrastructure networks;
- protecting and enhancing land uses that act as 'carbon sinks' (for example extending woodland cover and protecting valued peat lands);
- protecting the amenity of new and existing development including environmental quality;
- assisting the move to zero waste; and
- influencing reduction in environmental impacts of production and consumption, particularly energy efficiency and waste reduction.

Sustainable land use will be promoted through:

- assisting in achieving compliance with the long-term objectives of the Scottish Government's Land Use Strategy (2011): delivery of multiple benefits from land based businesses; responsible stewardship of natural resources and partnerships with nature; and better linkages of communities to the land;
- integrating land use with sustainable transport approaches through safeguarding and enhancing the network of sustainable forms of transport: walking and cycling, public transport, rail, park and ride and water-borne traffic;
- directing new developments to locations accessible by a choice of modes of transport and which specifically encourage walking, cycling, and public transport in preference to the private car; and
- encouraging more sustainable forms of transport and active travel.

Sustainable design and development will be promoted through:

- building in harmony with the site including optimising orientation and relationships to land contours, improvements to micro-climate, and utilising natural features;
- addressing sustainable energy approaches;
- facilitating designs for passive heating and cooling including natural ventilation and supportive landscape schemes;
- fostering and maintaining the site's biodiversity and maintaining and enhancing connections with local habitat networks;
- facilitating accessibility and adaptability;
- treating and conserving water on site in line with best practice and guidance on sustainable drainage;
- recycling of construction materials and minimising the use of non-renewable resources; and
- providing for waste minimisation and recycling incorporating high speed broadband connections and other digital technologies.

The council will expect development proposals to have regard to the above principles, and further detailed policy throughout the Local Development Plan for reducing climate change and increasing sustainability.

LDP Policy NRG 1a

POLICY NRG 1a — ***Low and Zero Carbon Generating Technology***

Proposals for all new buildings will be required to demonstrate that at least 10% of the current carbon emission reduction set by Scottish Building Standards will be met through the installation and operation of low and zero-carbon generating technologies. A statement will be required to be submitted demonstrating compliance with this requirement. The percentage will increase at the next review of the Local Development Plan

This requirement will not apply to:

- Alterations and extensions to buildings;
- Change of use or conservation of buildings
- Ancillary buildings that stand alone and cover less than 50 square metres
- Buildings which will not be heated or cooled, other than by heating provided solely for frost protection;
- Buildings which have an intended life of less than two years.

LDP Policy NRG 4

POLICY NRG 4 — ***Other Renewable Energy Technologies***

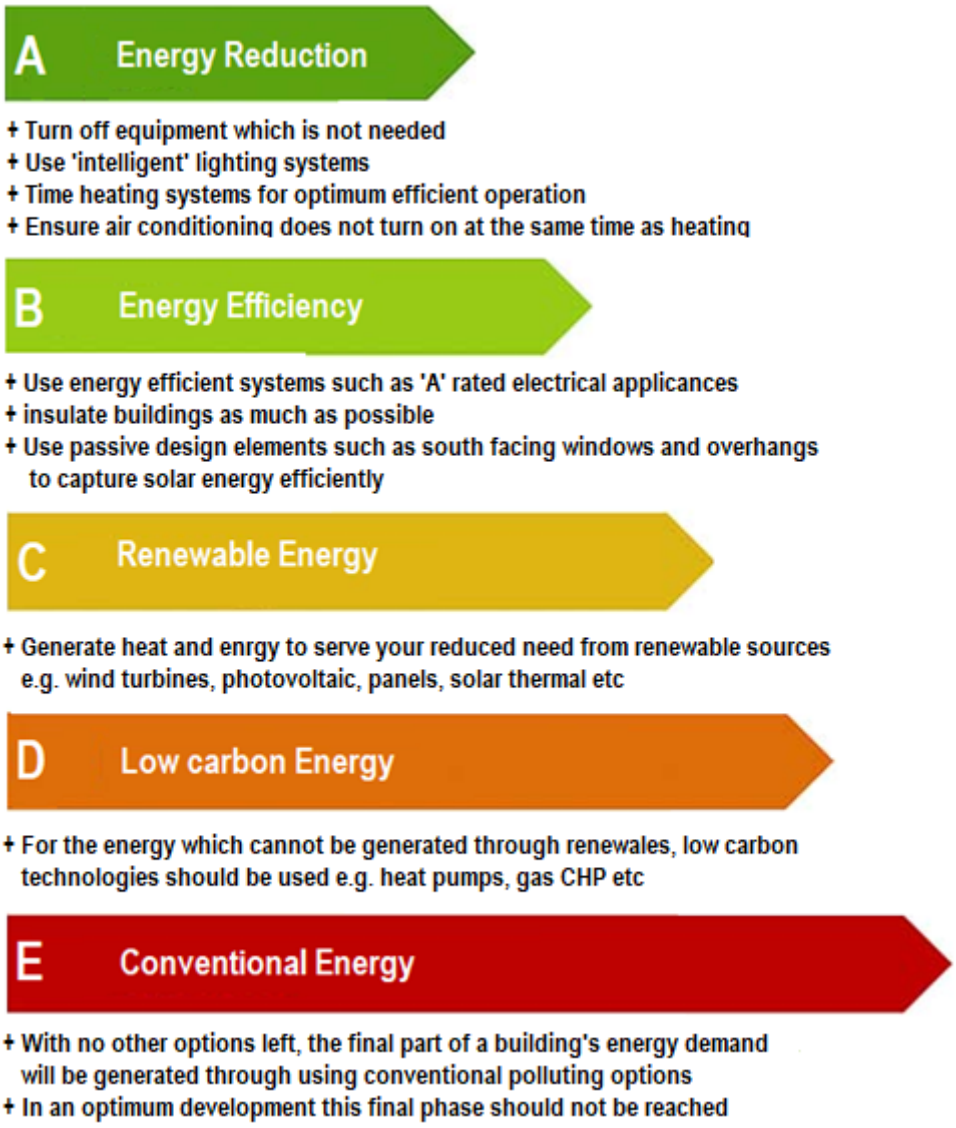
The council supports the development of other renewable energy schemes in principle provided that:

a. the proposal is environmentally acceptable;
b. the proposal accords with other policies set out in the Local Development Plan, specifically ENV 1, ENV 5, ENV 11 & EMG 1 relating to landscape character, carbon rich soils and the water environment; and
c. there would be no significant impacts on the natural and historic environment or on local communities.

The council will have particular regard to the precautionary principle when assessing renewable energy technology proposals where assets of national or international importance are located. Further supplementary guidance will be prepared.

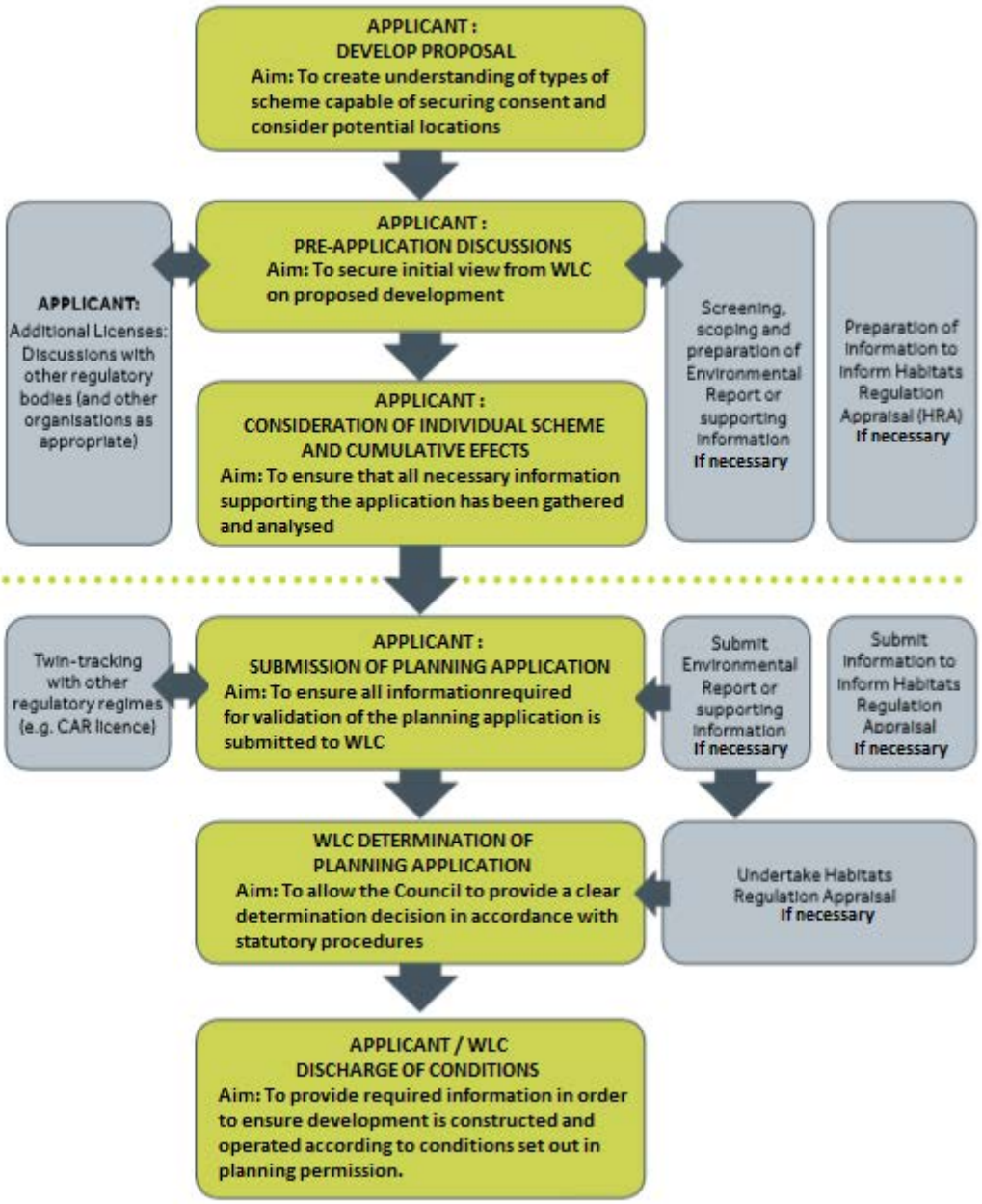
Annex B

The Energy Hierarchy



Annex C

Pre-application and Planning Application Process: Summary flowchart



Annex D

Permitted Development Guidance for Domestic Properties

Microgeneration Technology	What is Permitted without Needing Planning Permission
Wind turbines can be either freestanding on a mast or fixed to a building on a pole. Energy generation can be good if wind speeds are adequate, however they can be visually intrusive and there are concerns that some generate a degree of noise, vibration, light flicker and disturb television reception.	**Free-standing turbines** are not permitted development in a conservation area or in the curtilage of a listed building. Outside these locations, only one turbine per property is permitted and should be sited at least 100m from the curtilage of another dwelling. The installation must be: • sited to minimise its effect on the amenity of the area; • only be for domestic generation; and • removed when no longer needed. Whilst planning permission is not required in these instances you will still require to seek the prior approval of the council for the design and size of the proposed turbine)[2] **Turbines attached to a dwelling** will always require planning permission.
Solar electricity (PV) can either be fixed to a building (either the roof or a wall) or freestanding solar panels can be installed at or near ground level.	**Solar panels on dwellings** Are not permitted development in a conservation area or on a listed building. Outside these locations panels are permitted subject to them protruding no more than 1m from the surface of the wall, roof or chimney. **Free-standing solar panels** are not permitted development in a conservation area or within the curtilage of listed building. Outside these locations panels are not permitted forward of any principal elevation or side wall, where that elevation/wall fronts a road. Panels will only be permitted up to 3m above ground level and only where the area of ground covered by development takes up no more than half of the front or rear garden (excluding the ground area of the original house and any hard surface or deck)[3]

Microgeneration Technology	What is Permitted without Needing Planning Permission
Heat pumps collect low level heat from outside a building (from the ground, water or the air) and release it at a higher temperature inside the building	**Air-source heat pump** not permitted development in a conservation area if the pump is visible from a road, and not at on a listed building. Outside these areas only one installation per property, which should be sited at least 100m from the curtilage of another dwelling. The installation must be: ▪ sited to minimise its effect on the amenity of the area; ▪ for domestic generation; and ▪ be removed when no longer needed (even though planning permission is not needed in these instances, you will need to apply and get the prior approval of the council for the design and size of the proposed heat pump)[2] **Ground-source and water-source heat pumps** are permitted within the curtilage of a house or flat [1] **Combined heat and power system** in a conservation area, a flue is not permitted on the principal elevation of a property; and not on a listed building. Outside these areas permission is not needed for an external boiler flue providing that its height is no more than 1m above the highest part of the roof (excluding the chimney)[1]
Biomass Boilers Typically burn wood, usually in the form of pellets or chips. They are deemed carbon neutral because the carbon emitted during burning is the same as that absorbed during growth. There can be some concerns about the smoke/particles that they emit and the visual impact of the boiler and flue.	Boilers will largely be located inside a dwelling and consequently will not require planning permission. The flue is not permitted on the principal elevation of a property within a conservation area, a listed building or within an Air Quality Management Area (AQMA). Outside these areas permission is not needed for an external boiler flue providing that its height is no more than 1m above the highest part of the roof (excluding the chimney)[1]

Legislation notes:

1 The Town and Country Planning (General Permitted Development) (Domestic Micro-generation) (Scotland) Amendment Order 2009

2 The Town and Country Planning (General Permitted Development) (Domestic Micro-generation) (Scotland) Amendment Order 2010

3 The Town and Country Planning (General Permitted Development) (Domestic Micro-generation) (Scotland) Amendment Order 2011

(SG) Renewables and Low Carbon Energy Development (Excluding Wind Energy)

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