LOCAL DEVELOPMENT PLAN

# East Renfrewshire Local Development Plan

## Supplementary Planning Guidance: Energy Efficient Design

June 2015

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East Renfrewshire Council
Planning Property and Regeneration

# Supplementary Planning Guidance

## Energy Efficient Design

**June 2015**

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# 1. FOREWORD

## 1.1. Introduction

1.1.1. This Supplementary Planning Guidance has been prepared under Section 22 of the Planning etc. Scotland Act 2006 and forms part of the Local Development Plan.

1.1.2. This Guidance supplements Policy E2 Energy Efficiency of the Local Development Plan and provides advice on aspects of energy efficiency as it relates to the Development Plan. It is particularly focused on design and construction but also contains advice on energy efficient living.

1.1.3. Underpinning Scotland's ability to supply sufficient renewable electricity and heat to meet its targets in a cost effective way, is the principle of demand reduction. East Renfrewshire Council recognises the impact that location, siting, orientation, design, materials and insulation can have on the energy efficiency of buildings and this document provides guidance to homeowners, developers and businesses on how to achieve a higher level of energy efficiency and gain benefits through doing so.

1.1.4. Advice can be obtained from the Council on matters relating to energy efficiency and contact details can be found to the back of this document.

## 1.2. Policy and Legislative Context

1.2.1. The Scottish Government's commitment to energy efficiency and carbon reduction, and developing the renewables agenda as a major component of its policy, is established in the Climate Change (Scotland) Act 2009. This is a key commitment of the Scottish Government's agenda, and is a far reaching piece of environmental legislation from which other relevant policies and strategies have evolved.

1.2.2. The Act created a statutory framework for a reduction in greenhouse gas emissions in Scotland by setting an interim 42% reduction target for 2020, with the power to legislate for this to be varied based on expert advice, and an 80% reduction target for 2050.

1.2.3. The Climate Change (Scotland) Act 2009 Act also places an obligation on local authorities to ensure that all new buildings avoid a specified and rising proportion of greenhouse gas emissions by the use of low and zero carbon generating technologies.

1.2.4. Scottish Planning Policy (2014) recognises that increasing energy efficiency will have a significant role to play in lowering carbon emissions. It states that the planning system should:

- support the transformational change to a low carbon economy, consistent with national objectives and targets, including deriving:
    - 30% of overall energy demand from renewable sources by 2020;
    - 11% of heat demand from renewable sources by 2020; and
    - the equivalent of 100% of electricity demand from renewable sources by 2020;
- support the development of a diverse range of electricity generation from renewable energy technologies – including the expansion of renewable energy generation capacity – and the development of heat networks;
- guide development to appropriate locations and advise on the issues that will be taken into account when specific proposals are being assessed;
- help to reduce emissions and energy use in new buildings and from new infrastructure by enabling development at appropriate locations that contributes to:
    - Energy efficiency;
    - Heat recovery;
    - Efficient energy supply and storage;
    - Electricity and heat from renewable sources; and
    - Electricity and heat from non-renewable sources where greenhouse gas emissions can be significantly reduced.

## 1.3. Local Development Plan Policy

**Policy E2: Energy Efficiency**

All new buildings must be designed so that at least 10% of the carbon dioxide emissions reductions standard, set by Scottish Building Standards, is met by the installation and operation of low and zero carbon generating technologies. This percentage will increase to 15% by the beginning of 2015, and may be changed again during the lifetime of this plan following any reviews of Scottish Building Standards.

Other solutions will be considered where:

- an applicant is able to demonstrate that there are significant technical constraints in using on-site low and zero-carbon generating technologies; or
- where there is likely to be an adverse impact on the historic environment; or
- where development of the following types is proposed: extensions to existing buildings, buildings which have an intended life of less than two years, stand-alone ancillary buildings with an area of less than 50 sq.m, or buildings which will not be heated or cooled other than for the purposes of frost protection.

1.3.1. This Supplementary Planning Guidance is set out in distinct sections. Section 2 is aimed at householders and provides guidance on a range of works aimed at improving energy efficiency in buildings. Sections 3 and 4 offer guidance on site design and construction.

# 2. EXISTING BUILDINGS

## 2.1. Alterations to homes

2.1.1. Energy efficiency improvements should be considered when carrying out alterations to homes, including DIY. It is often more cost effective to do a number of things at once and some small changes could help save money on energy bills.

2.1.2. There are a number of steps that can be taken, ranging from physical improvements to cost saving habits.

2.1.3. The table below outlines key steps which can be taken by householders to improve the energy efficiency of their properties. More detailed information on each of the aspects below is set out in Section 3.

### Table 1: Methods of Improving Energy Efficiency

| Method | Principle |
|---|---|
| Insulation | Cavity wall, roof, loft, pipe and hot water tank insulation reduce heat loss and improve energy efficiency. |
| Draught proofing | Replacement windows and doors, secondary glazing, draught stripping around window and door frames. |
| Ventilation and air tightness | Ventilators and extractor fans to replace drafts with controlled filtration of air from and to property. |
| Improve your heating controls | Replace gas boiler with an A-rated high-efficiency condensing boiler to cut your home's carbon dioxide emissions.<br>Install individual room thermostats to help reduce fuel bills. |

2.1.4. Around 29% of energy consumed in Scotland is used in our homes for space and water heating, cooking, lighting and running electrical appliances. The steps below offer advice on how to reduce consumption on a day to day basis:

- Turn off appliances when not in use – Lights, televisions, laptops etc;
- Adjust thermostats – Automatically reduce the temperature when no one is in the house, and at night;
- Use energy efficient light bulbs – These consume 75% less electricity and last up to 10 times longer than the traditional light bulbs;
- Don't leave water running – Switch off running water when not needed i.e. when brushing teeth or cleaning, only turn the tap on when you need it;

- Only switch on appliances when full – Appliances such as dish washers, washing machines, tumbler driers etc should only be turned on when full;
- All domestic and commercial buildings in the UK available to buy or rent must have an Energy Performance Certificate. If you own a home, getting an energy performance survey done could help you identify ways to save money on your energy bills;
- Much like the multi-coloured sticker on new appliances, Energy Performance Certificates tell you how energy efficient a building is and give it a rating from A (very efficient) to G (inefficient): the lower the efficiency, the more the home will cost to run.

2.1.5. The Energy Saving Trust, East Renfrewshire Council and the Scottish Government websites identify further measures for improving energy efficiency in the home:
www.energysavingtrust.org.uk/scotland/In-your-home
www.eastrenfrewshire.gov.uk/saving-energy
www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards

# 3. SUSTAINABLE PLACEMAKING

## 3.1. Policy

3.1.1. Sustainable placemaking is set out in Scottish Planning Policy Statements 'Creating Places' (2013) and 'Designing Streets' (2010). In both of these documents the efficient use of resources is considered to be one of the six qualities of successful places. This can be achieved, through careful consideration of orientation, construction methods, materials, and natural features.

3.1.2. Sustainable placemaking can contribute to energy efficiency by encouraging the use of sustainable modes of transport and Designing Streets details the following key considerations which will improve the energy efficiency of new development:

## 3.2. Access and Movement

- Street user hierarchy should consider pedestrians first and private motor vehicles last;
- Street design should provide good connectivity for all modes of movement and for all groups of street users respecting diversity and inclusion;
- Public transport planning should be considered at an early stage in the design process;
- Junctions should be designed with the considerations of the needs of pedestrians first;
- Street layouts should be configured to allow walkable access to local amenities for all street users.

3.2.1. In addition to the above, further consideration should be given to mixed use development and increased building density within developments. Locating residential areas near to other uses can reduce the need for vehicular movement, while higher residential densities can enhance the viability of public transport systems and create opportunities for non-transport energy efficiency, such as community heating schemes or promoting housing types which are inherently more energy efficient because of shared party walls.

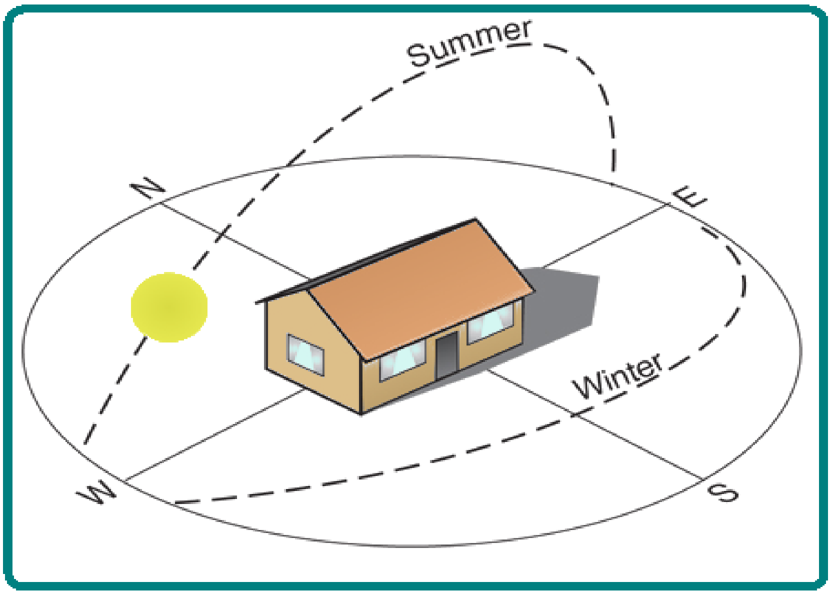
## 3.3. Siting of Buildings

3.3.1. There are two key considerations where the siting of buildings can have an impact on their energy efficiency, namely, sunlight and shelter.

3.3.2. Solar energy gain can make a significant contribution to the energy efficiency of buildings. This can be enhanced by orientation to make maximum benefit from the sun's heat and light. This has benefits both in terms of the sun both directly heating buildings, but can also be further enhanced through actively using solar systems which use sunlight for heating, hot water (e.g. solar thermal panels) and generating electricity (e.g. photovoltaic panels).

3.3.3. The ideal building orientation places the long axis of the building running from east to west as shown in diagram A. Deviation from this by as much as twenty degrees will have minimal detrimental effect, but it is fundamental to have the maximum amount of glass on the building facing towards the sun.

### Diagram A: Building Orientation




3.3.4. Landscape features on the plot should be taken into account such as trees, hills, walls etc. as they could block sunlight which would reduce the effect of this solar heating process.

3.3.5. The location of buildings in relation to each other should also be considered. Taller buildings located towards the south of a development can prevent sunlight reaching those to the north. Conversely, locating taller buildings to the north can prevent overshadowing and improve solar gain.

3.3.6. Siting of buildings in a way that shelters them from the prevailing south-westerly and north-easterly winds will reduce heat loss and energy consumption. This can be enhanced through landscape features such as trees which can act as a shelter belt. Shelter belts should be located between one and three times the building height away from the building. A well positioned shelter belt can reduce wind infiltration by up to 40%, this can be increased to 60% by the addition of fencing.

## 3.4. Renewables

3.4.1. Generating energy at home helps to limit the impact on the environment and also has the advantage of reducing household costs. Small scale renewables incorporate low carbon technologies and come in a variety of forms. Wind turbines, solar panels, air and ground source heat pumps and biomass boilers let householders generate their own energy, saving money and reducing the carbon footprint in the process. Government financial incentives are available to offset some of the initial start up costs. These incentives come in the form of the new government 'Green Deal' scheme. Energy-saving improvements can be made to a home or business without having to pay all the costs up front. These improvements include renewable energy technologies, with insulation, heating, draught-proofing, and double glazing also being included in the 'Green Deal' scheme www.gov.uk/green-deal-energy-saving-measures.

3.4.2. Through the use of renewables, householders and businesses will be able to make use of secure, local resources; reduce dependence on non-renewable energy; help to keep the air clean; help to reduce the production of carbon dioxide and other greenhouse gases; create new jobs in renewable energy industries and save and potentially earn money.

# 4. NEW BUILDING CONSTRUCTION

## 4.1. Building Standards

4.1.1. Much can be done to increase the energy efficiency of individual buildings in new construction by careful consideration of factors which make the most of solar heat gain, natural light and natural ventilation. The Building Standards Technical Handbooks provide guidance on achieving the standards set in the Building (Scotland) Regulations 2004. The most recent Domestic and Non Domestic Handbooks were published in 2013 and set out the minimum requirements for Bronze/Bronze Active sustainability for buildings as well as indicating higher ratings of Silver/Silver Active, Gold and Platinum (carbon dioxide emissions only). East Renfrewshire Council encourages standards higher than the minimum in order to gain maximum benefit in terms of energy efficiency. Further information on this can be found at www.eastrenfrewshire.gov.uk/building-standards

4.1.2. The 2013 revisions to the Domestic Handbook state the aim for a 30% reduction in emissions compared to 2007. The intention of the building standards targets is to better recognise and encourage inherently energy efficient design.

4.1.3. In addition to the tiered approach to sustainability outlined in the building regulations, there are alternative measures for rating the energy efficiency of buildings.

4.1.4. The Building Research Establishment has developed the Environmental Assessment Method which can be used to assess the environmental efficiency of any property. The Environmental Assessment Method sets the standard for best practice in sustainable building design, construction and operation and has become one of the most comprehensive and widely recognised measures of a building's environmental performance. Further information can be found at www.breeam.org/

## 4.2. Passive House

4.2.1. The term passive house (Passivhaus in German) refers to the rigorous, voluntary, Passivhaus standard for energy efficiency in a building, reducing its ecological footprint.

4.2.2. Typically a Passive House will include the following characteristics:

- Very high levels of insulation;
- Extremely high performance windows with insulated frames;
- Airtight building fabric;
- Thermal bridge free construction;
- A mechanical ventilation system with highly efficient heat recovery.

4.2.3. The Passive House standard focuses on maximising the energy that can be gained from the sun through Passive Solar Design. Passive Solar Design can improve natural lighting levels, decrease the need for heating (other than solar) and can provide natural ventilation.

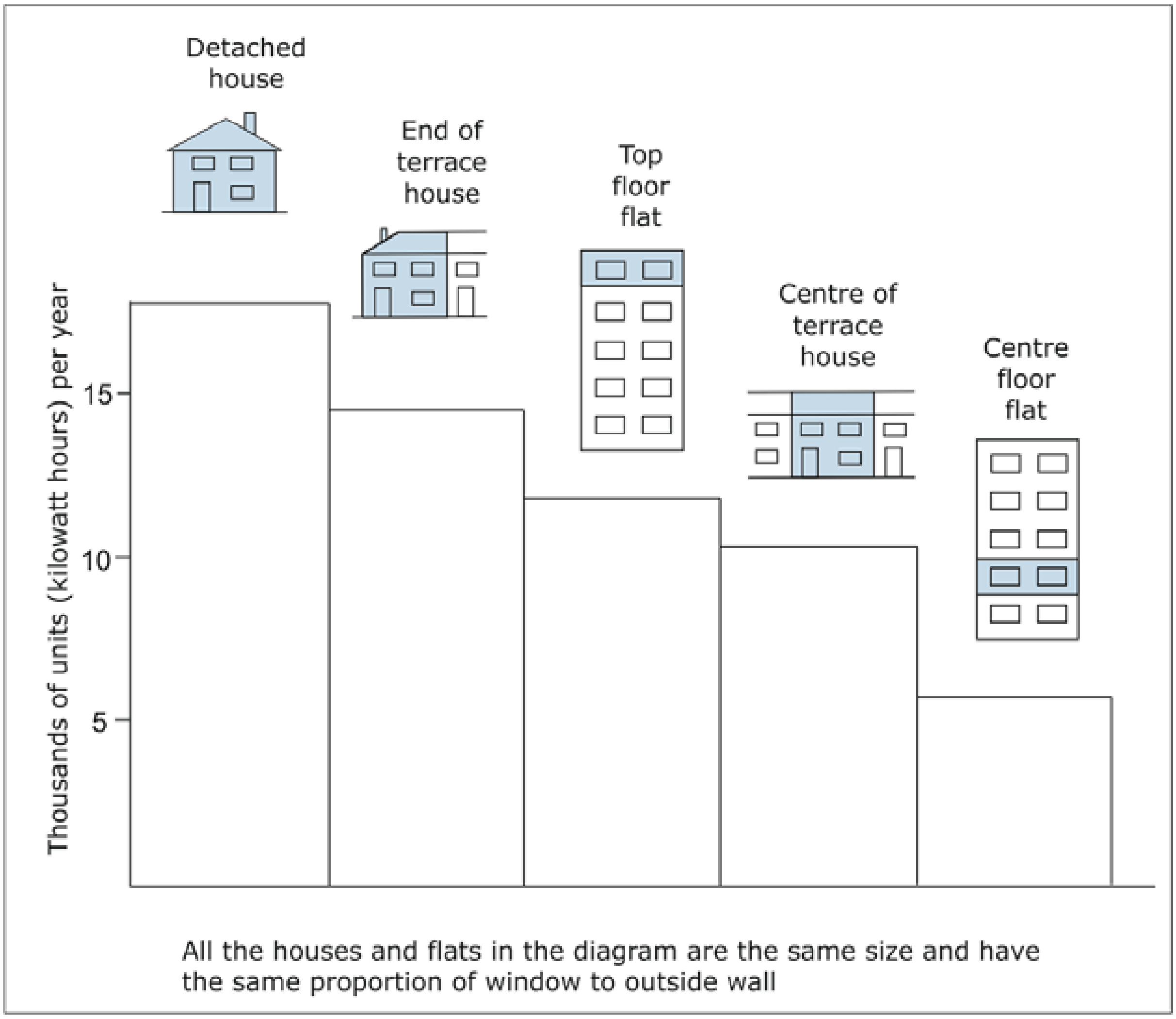
4.2.4. In order to maximise the benefits from Passive Solar Design there are a number of factors which may assist in energy reduction. Building construction, location of windows and arrangement of rooms within the building can have a significant role to play:

- Maximum glazing on the south facing elevation helps to increase solar gain for both heating and lighting. Where possible minimise glazing on the north facing elevations. A 70:30 ratio of glazing from the south to the north elevation is the optimum level for maximising passive solar gain.
- To capture day time sun, habitable rooms should be south facing. Wherever possible service areas, such as bathrooms, kitchens and storerooms, should be located to the north of the building.
- The thermal mass of a building can have a significant impact on its energy efficiency. Thermal mass e.g. masonry absorbs heat from the sun during daylight hours and slowly releases this as temperatures cool. Materials with a higher thermal mass should be located within the building's insulated envelope and on the side of the building that catches the most sun.

## 4.3. Building Form

4.3.1. Building form can have a significant impact on the energy efficiency. Buildings which have shared walls or which can otherwise benefit from being insulated by surrounding properties are significantly more energy efficient than detached properties. Diagram B shows the relative energy consumption per year by different house type.

## Diagram B: Relative Annual Energy Consumption by House type




*Source: The Sustainable Housing Design Guide for Scotland, Sustainable Development Commission (2007)*

## 4.4. Insulation

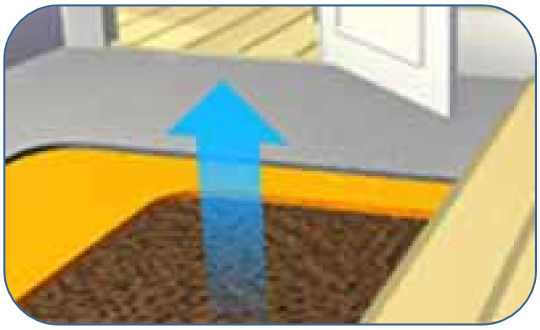
4.4.1. One of the key ways to improve the energy efficiency of buildings is by limiting the heat loss from the building envelope. This is best achieved through effective insulation. This can be improved at both the initial construction phase or by retrofitting. Insulation can be applied to floors, walls, roofs pipes and boilers.

4.4.2. The three common types of insulation used in new construction are:

- Flexible Insulation, glass fibre and mineral fibre quilts;
- Rigid Insulation, usually a form of plastic board such as polyisocyanurate board. For their thickness, they usually have better insulating properties;
- Thermal Lining Boards, usually consist of mineral wool or plastic foam insulation bonded to plasterboard, and containing an integral vapour check.

## 4.5. Floor Insulation

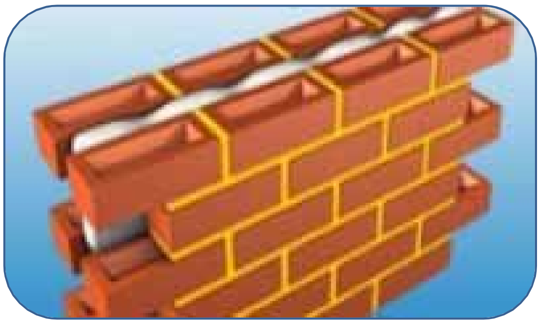
4.5.1. New ground floors should be insulated to the Best Practice Standards, to achieve maximum U-values of 0.20W/m²K. The most common types of new ground floors are:



- Ground-bearing concrete slabs;
- Suspended pre-cast concrete ‘beam-and-block’ floors;
- Suspended timber floors.

## 4.6. Wall Insulation

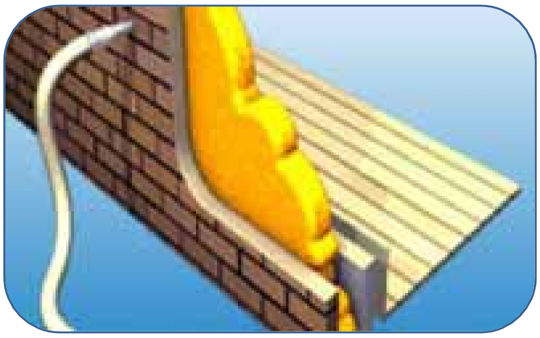
4.6.1. Exposed walls should be insulated to Best Practice Standards – achieve maximum U-values of 0.25W/m²K. The external walls of domestic extensions are usually constructed by one of two methods:



- Masonry cavity construction;
- Timber-framed construction.

## 4.7. Masonry Cavity Construction

4.7.1. This consists of an outer leaf of brickwork, a ‘cavity’ that is fully or partially filled with insulation, an inner lead of concrete block-work, and a plasterboard lining. The thermal performance of this type of construction varies with the thicknesses of the insulation and cavity, the block-work type used for the inner leaf, and the type of lining board. In order to meet the Best Practice standard, it is necessary to:



- Use a thermal board instead of ordinary plasterboard;
- Make the insulated cavity at least 100mm wide;
- Use a lightweight ‘thermal’ block-work for the inner leaf.

## 4.8. Timber-Framed Construction

4.8.1. This usually consists of a structural timber frame with insulation placed between framing members, lined internally with plasterboard and externally with a sheathing board and a waterproof breather membrane. The timber frame is often clad externally with a skin of brickwork, separated from the frame by a cavity. Timber frames are usually 90mm or 140mm thick. In order to meet the Best Practice Standard it is necessary to:

- Use at least 140mm thick framing;
- Use a thermal board instead of ordinary plasterboard;
- Use high-performance insulation within the frame.

## 4.9. Roof Insulation

4.9.1. Roofs should be insulated to the Best Practice Standards, to achieve maximum U-values of 0.18W/m²K. There are three common methods of insulating roofs:

- Insulating at ceiling level (with an unheated loft above);
- Insulating within the pitch of the roof (between the rafters);
- Insulating a flat roof.

## 4.10. Loft Insulation

4.10.1. Where an unheated loft lies beneath a pitched roof, flexible insulation quilt may be placed immediately above the ceiling, between and over ceiling joists. The insulation is supported by the ceiling lining (typically plasterboard or thermal board). In order to meet the Best Practice Standard the following should be followed:

- The ceiling lining should be thermal board instead of ordinary plasterboard;
- The insulation quilt should be in two layers, one between the ceiling joists, and the other across them, to prevent thermal bridging;
- The insulation layer should be 270mm in thickness;

- The insulation material should not be compressed when it is tucked into tight corners

4.10.2. It is important to ventilate the roof space, above the insulation, in order to reduce the risk of condensation. If the roof space is to be used for storage, bearer boards should be placed across the existing joists, to prevent the insulation from being compressed.

## 4.11. Pitched Roof Insulation

4.11.1. Where insulation is to be placed within the pitch of the roof (between the rafters) the building regulations specify that a 50mm wide ventilation gap must be maintained above the insulation (and beneath the roofing felt and tiles), in order to reduce the risk of interstitial conditions. Consequently, the thickness of any insulation placed between the rafters cannot exceed 50mm less than the depth of the rafters. Eaves ventilators and ridge or abutment ventilators must be installed.

4.11.2. Additional insulation can be provided in two ways:

- Adopt a form of construction called a 'vapour balanced' or 'breathing' roof which allows moisture to permeate, removing the need for ventilation of the roof construction. The impervious roofing felt is replaced by 'breather felt', and the 50mm ventilation gap, the soffit and ridge ventilators and the polythene vapour barrier are all omitted. This simplifies the construction and leaves more space for the insulation;

- Supplement the insulation between the rafters by using a thermal board, instead of ordinary plasterboard, for the internal ceiling lining.

## 4.12. Flat Roof Insulation

4.12.1. A 'warm roof' construction should be used. This is the most common type of insulated flat roof construction, in which the insulation is placed above the timber structure and deck, with the waterproof external finish layer bonded directly to it. In order to meet the Best Practice Standard it will be necessary to include a substantial thickness of rigid, high performance insulation.

## 4.13. Windows

4.13.1. Windows are a critical component in a sustainable building design. The majority of energy flows in and out of a building through its windows, well designed windows can provide heating, cooling, lighting and ventilation.

4.13.2. There are many combinations of frame type and glazing type that will meet the Best Practice Standard – maximum U-value 1.8W/m²K.

4.13.3. Glazing types include double and triple glazing with different spacing, low emissive coatings, and argon filling between the panes. Frame types include unplasticised polyvinyl chloride (UPVC), timber and metal. Metal-frames should include thermal breaks to reduce heat loss through the frames. Examples of windows that meet the Best Practice standard are as follows:

- Timber-framed windows with triple glazing, 12mm glazing gaps, and one 'hard' low emissivity coating;

- Timber-framed windows with double glazing incorporating at least a 16mm glazing gap, argon gas fill and one 'soft' low emissivity coating;

- Metal-framed windows (incorporating thermal breaks) with triple glazing incorporating at least 16mm glazing gaps, argon gas fill and one 'soft' low emissivity coating.

4.13.4. Special consideration should be given to the type of window fitting to be used in listed buildings or conservation areas. Typically UPVC windows will not be appropriate in these circumstances.

## 4.14. Ventilation

4.14.1. Domestic buildings have traditionally relied on air infiltration through the building fabric to provide background ventilation. This is supplemented by extract ventilation fans or by opening windows when additional ventilation is needed.

4.14.2. Modern construction methods and regulations deliver a higher standard of air tightness, and it is no longer acceptable to rely on infiltration to provide background ventilation. The maxim is 'build tight, ventilate right'. In extensions, the provision of appropriate, controlled ventilation is therefore essential, in order to ensure good air quality and avoid the risk of surface condensation. However, excessive ventilation results in unnecessary heat loss, and consequently increased fuel use, fuel costs and carbon emissions.

4.14.3. Ventilation falls into the following types:

- Background ventilation – provided by air bricks, trickle ventilators in window heads, or facilities to secure windows slightly open in a 'slot ventilation' position;
- Rapid or 'purge' ventilation – provided by opening windows, when there is a need to expel pollutants or admit fresh air;
- Extract ventilation – provided to expel moist stale air from 'wet areas' (i.e. kitchens, utility rooms, bathrooms) in order to reduce the risk of surface condensation.

4.14.4. Energy efficient ventilation is achieved by providing ventilation only when and where it is needed. 'Wet' areas must be provided with extract ventilation, in the form of electric fans or 'passive stack ventilation':

- Extract ventilation fans should be controlled by humidistats, or wired to operate with light switches;
- Energy efficient, low power fans incorporating direct current (DC) motors are now available. Fans of this type reduce the fuel use, fuel costs and carbon emissions associated with providing ventilation.

## 4.15. Heating

- The existing heating system must be provide fully pumped circulation (i.e. not gravity feed);
- The heating controls must be upgraded to include a programmer, a room thermostat and a thermostat on any hot water storage cylinder;
- The room thermostat must be interlocked to the boiler so that it does not fire when there is no demand for heat.

## 4.16. Lighting

4.16.1. In a typical home, lighting accounts for between 10% and 15% of the electricity bill, and contributes significantly to carbon emissions. As stated previously, the design of a building can play an important part, with natural lighting providing a cost effective and energy efficient way of providing the necessary light.

4.16.2. There are two main types of energy efficient lamps:

- compact fluorescent lamps (CFLs);
- light emitting diodes (LEDs).

4.16.3. A fluorescent lamp converts electrical power into useful light more efficiently than an incandescent lamp. Lower energy costs typically offset the higher initial cost of the lamp. Although larger fluorescent lamps have been mostly used in commercial buildings, the compact fluorescent lamp is now available in the same popular sizes as incandescent lamps and can be used as an energy-saving alternative in homes. Modern CFLs can provide good lighting effects. A large range of types is available, including spot lamps, candle lamps, and coloured lamps of every description.

4.16.4. LEDs use light emitting diodes as the source of light. LED lamps offer long service life and high energy efficiency, but initial costs are higher than those of fluorescent and incandescent lamps. Recent advances in technology have reduced the costs of LEDs substantially, and they are now considered a viable option for households and non domestic properties.

4.16.5. Energy efficient lighting is most cost effective in rooms where the lighting is most often used. Any room in which the lighting is used for more than four hours each day should be considered.

4.16.6. Further information on lighting technology can be found at: www.energysavingtrust.org.uk/Electricals/Lighting

# 5. CONTACT DETAILS

For further advice on this Supplementary Planning Guidance and its application, please contact:

Development Plans Team
Council Offices
2 Spiersbridge Way
Spiersbridge Business Park
Thornliebank, G46 8NG
Phone: 0141 577 3001
Fax: 0141 577 3781
Email: ldp@eastrenfrewshire.gov.uk

If you require this information in large print, Braille or translated,
please telephone our Customer Service Officer on 0141 577 3001.

**इस सूचना-पत्र मे उल्लेखित सूचना यदि आप हिन्दी अनुवाद मे चाहे तो कृपया सम्पर्क करे।**

ਜੇ ਤੁਸੀਂ ਇਸ ਲੀਫਲੈਟ ਵਿਚ ਦਿਤੀ ਜਾਣਕਾਰੀ ਦਾ ਅਨੁਵਾਦ ਚਾਹੁੰਦੇ ਹੋ ਇਥੇ ਸੰਪਰਕ ਕਰੋ।

اگر آپ اس لیف لیٹ میں درج معلومات کا ترجمہ اپنی زبان میں چاہتے ہیں تو ہم سے رابطہ کریں

如果您想得到该资料所含信息的译文，请联系：

East Renfrewshire Council
Planning Property and Regeneration