Supplementary Planning Guidance

ENERGY EFFICIENCY & RENEWABLE ENERGY IN NEW DEVELOPMENTS

Area Strategy Guidance
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Adopted - June 2002
1.0 Introduction

1.1 Purpose and Status of this Document
This Guidance supplements policies of the Replacement City of Leicester Local Plan (2001 - 2011) through the provision of practical advice on how to incorporate energy conservation measures and opportunities for the use of renewable energy into new development. It should be considered within the wider aims of the Local Plan and other relevant supplementary planning guidance.

A variety of energy related measures, many with little or no cost implications, can be incorporated into plans for development. Throughout the guidance sources of further information and assistance are given and these are summarised on page 19.

The environmental arguments for reducing energy use and our dependence on fossil fuels are now widely accepted; in particular, the implications of climate change are increasingly apparent. There are also several other good reasons for reducing energy use in developments including:

- saving money - the running costs of buildings can be significantly reduced thereby helping to alleviate fuel poverty and decreasing running costs for businesses.
- improving the internal conditions of a building through natural daylighting and ventilation.
- raising the profile of a development and improving its public image.
- improving the marketability of a development.

1.2 Local Policy Context
Leicester City Council has a long history of promoting energy efficiency. The Leicester Energy Action Plan and Energy Strategy 2 details Leicester’s commitment to an energy efficient city. The aims of the Plan are to reduce the CO₂ emissions in the city by 50% from 1990 levels by 2025 and to source 20% of the city’s energy requirements from renewable energy by 2020. Initiatives within the City include the development of small-scale district heating systems and Combined Heat and Power (CHP) in individual buildings. The Council is also investigating other options for CHP and renewable energy and remains committed to incorporating these technologies wherever appropriate.

Transport is the fastest growth area for energy use in the UK. The Local Transport Plan (2000-2005) for the city aims to encourage and develop walking, cycling and public transport and, where appropriate, to bring about a reduction in travel overall. These measures will help stem the increase in energy consumed by transport.

The City of Leicester Local Plan supports energy efficiency and the use of renewable energy within the context of land use planning and sustainable development. The Plan also complements the aims of the Local Transport Plan by encouraging development to locate in areas with good access and to provide for pedestrians, cyclists and public transport. These considerations constitute only some of the elements contained in the urban design principles outlined in the Local Plan. It is recognised that in some instances, the benefits of energy efficiency will have to be balanced with other needs such as safety and amenity. Good preparation can, however, ensure that all aspects of urban design are successfully incorporated into a development.
This guidance supports some of the main strategic themes of the Deposit Draft version of the Replacement Local Plan (ST03 Quality Places, ST07 Energy Conservation and Waste Minimisation, ST11 Transport Strategy). In particular, the guidance provides further advice to supplement the following policies:

**UD08. Energy Efficiency**

Development will be expected to make full use of energy conservation techniques, including:

a) the siting, form, orientation and layout of buildings which maximise the benefits of heat recycling, solar energy, passive solar gain and the efficient use of natural light; and,

b) the use of planting to optimise the balance between summer shading and winter heat loss through exposure.

**BE18. Renewable Energy and Combined Heat and Power**

Planning permission will be granted for the development of renewable energy and combined heat and power schemes where they do not have an adverse effect on the surrounding environment.

Applicants will be strongly encouraged to provide an assessment of the potential contribution renewable energy technologies and combined heat and power schemes could make towards the energy requirements of the proposed development.

In pursuing the aims of the above policies the City Council strongly encourages new developments to follow the principles of the energy hierarchy. The hierarchy is defined in the following order of priority:

1. Reduce the need for energy
2. Use energy more efficiently
3. Use renewable energy
4. Clean and efficient use of fossil fuels for heating and co-generation.

**2.0 Sustainable Energy Use in the Built Environment**

**2.1 Reducing Demand**

A wide range of measures from passive solar design to good insulation can be used to reduce energy demand in new developments. In some instances it is even possible to reduce the energy consumption of a building to zero. The location and layout of the whole development has a significant impact on energy demand both in buildings and through transport use. These factors need to be considered at an early stage of the development.

The refurbishment and conversion of existing buildings can provide an ideal opportunity to improve energy efficiency. The reuse of buildings has the added benefit of maximising the use of energy embodied in existing resources and can contribute towards the regeneration of areas of the city.
Advice is available on these issues from various sources including the Building Research Establishment (BRE), Leicester Energy Efficiency Advice Centre and Energy Agency and the City Council (page 16 gives contact information).

This section illustrates how energy saving can be achieved in all types of development through location, site layout, building design, materials and appliances.

2.1.1. Location
The location of a development can have a significant impact on energy consumption due to the implications for: a) access and movement; b) passive solar gain; and, c) microclimate.

Consideration will have to be given to the locational policies of the City of Leicester Local Plan when identifying possible sites.

A. Access and Movement
The most energy efficient cities are highly dependent upon transportation systems that are well integrated with urban layout. Developments which locate in areas that minimise the need to travel and encourage cycling, walking and public transport use can lead to significant energy savings. Existing centres often provide the optimum location for development as they have good public transport access and encourage combined trips. Mixed use development can also help reduce the amount of energy used by transport. Good access for pedestrians, cyclists and by public transport to facilities that are likely to generate a large number of trips is key to achieving these savings.

B. Potential for passive solar gain.
Whilst site selection within the City may be limited, sites on southerly facing slopes will have a greater potential for the capture of passive solar gain in buildings rather than those which are north facing. Solar gain may also be affected by the proximity of tall buildings which lead to overshadowing.

C. Microclimate
Sheltered sites at lower altitudes will have less building heat loss than exposed sites. Mitigating measures, such as the creation of shelterbelts and building design, can be taken to reduce heat loss from the building envelope (see section 2.1.3).

2.1.2 Site Layout
Site layout also has important consequences for energy used in buildings and through access and movement. Within the context of good urban design principles a) access and layout; b) orientation; c) overshadowing; and d) microclimate, should be considered early in the design process to maximise a reduction in energy demand.

A. Access and Layout
The initial survey of a site should include consideration of the most energy efficient layout. Site layout can have important implications for saving energy through reducing the need to travel and maximising solar gain. This should include good pedestrian, cycle and public transport links both within and beyond the development area to locations that generate a high number of trips.

Local topography and landscape features should be considered to allow best use of natural daylight and solar energy across the whole development. Slopes will influence the spacing of buildings for solar access. As previously mentioned, southerly slopes are beneficial allowing greater solar access at smaller separations than a level site. North facing...
slopes can cause significant overshadowing, which can only be alleviated by larger separations between buildings. Overshadowing will also vary throughout the year as the sun's altitude varies and will be more of an issue with taller buildings.

The losses caused by overshadowing can often be counterbalanced in higher density development, such as terraced properties or flats, through reduced heat loss from the building envelope, greater thermal massing, increased potential for Combined Heat and Power and other measures described in this guidance. Higher densities can also have a positive impact on other design issues including the need to create good street enclosure. This can be difficult to achieve at lower densities.

"Sustainable Settlements – A guide for planners designers and developers" and “Planning for Solar Design” provide useful information on the overall principles.

Figure 1: Southerly slopes allow greater solar access at smaller separations than level or northerly slopes.

Figure 2: A suggested layout for the centre of 'Ashton Green', a proposed neighbourhood on the fringe of Leicester, demonstrates how energy efficiency can be achieved through high densities with good street enclosure near to central facilities. The neighbourhood and surrounding area will be well linked to pedestrian and cycle routes and a regular bus service. Further energy savings are to be achieved through building design and the installation of energy efficient appliances. The supply of energy from renewable sources is also a key element of the development concept.
B. Orientation
The orientation of a building has a significant impact on the amount of passive solar gain available. To maximise solar gain buildings should be generally orientated with the longest face within 30 degrees of south. South easterly orientation is generally preferable to south westerly as this maximises early morning gains and reduces the likelihood of overheating in the afternoons.

C. Overshadowing
Any nearby building, trees or fences can potentially cast shadow on the southerly face and reduce solar gains. Careful layout can still maximise solar gain within the constraints of higher density developments. The following principles should generally be followed:

- garages should be sited away from southerly elevations.
- in mixed height developments taller properties should generally be sited to the north.
- higher density properties, i.e. terrace properties should generally be placed north of detached properties, since they cast a greater shadow.
- Care should be taken when planting trees within 30 degrees of the southerly aspect as they can significantly reduce passive solar gain. Deciduous trees can, however, be useful for providing shading from glare and overheating during the summer, whilst the bare branches will allow solar access during the winter.
D. Microclimate
The local site microclimate can help to shelter buildings from inclement weather and help reduce heat loss from the building envelope. Careful design of the site can help to enhance local microclimate. This is important for comfort in open spaces, which need to be protected from wind, but retain solar access.

- Shelter from cold northerly and prevailing winds can be provided by vegetation. Planting would need to be appropriate to the site and type of development.
- Higher density building, such as terraced housing or taller buildings sited to the north can provide wind protection for housing to the south.
- Avoid long uninterrupted road passages that may channel the wind.
- Buildings can be arranged in an irregular street pattern to avoid channelling the wind. Taller buildings need careful design in relation to the rest of the site to avoid channelling wind and creating unpredictable areas of high wind speeds.

2.1.3 Building Design
The energy efficiency of a building can be influenced by how the space within a building is used, insulation and materials used. Part L of the Building Regulations require a minimum standard of energy efficiency in new developments. The Council, however, strongly encourages developers to strive to achieve standards beyond these minimum levels, so that the significant benefits of reducing energy consumption are maximised. Several methods of rating the energy efficiency of individual buildings are now available. Most domestic properties are given an energy rating such as a SAP or National Home Energy Rating (NHER). The City Council will seek all new residential development to achieve an NHER of at least 10. The Building Research Establishment (BRE) have also introduced an “Ecohomes” environmental rating for homes. Non-domestic buildings can be assessed through BREEAM (Building Research Establishment Environmental Assessment Method). This provides guidance on ways of minimising the adverse effects of buildings on the environment, both locally and globally.

Sources of further information on the above assessments are given on page 19. Leicester City Council strongly encourage the use of the BREEAM and Ecohomes ratings, particularly for larger developments. There is currently a free Design Service offered under the DEFRA Energy Efficiency Best Practice Programme for developments or refurbishments with a floorspace over 500m².
A. Passive Solar Design
The use of space and glazed areas within a building can improve energy efficiency. Passive Solar Design (PSD) allows better daylighting, improves solar gains and provides natural ventilation reducing the need for costly mechanical ventilation. The following principles should be followed to reduce energy requirements.

- The main rooms, with maximum occupancy should be on the south side of the building to make best use of solar gain. The north side of the building should be taken up with rooms with lower occupancy such as toilets, cloakrooms and storage space that require less heating. These considerations must, however, be balanced with the need for good surveillance of public areas.

- Kitchens can be situated on north facing facades as overheating is less likely. This is also true of rooms containing machinery that generates heat.

- Glazed sunspaces such as conservatories can be used to regulate the heat of the rest of the house. These spaces must be thermally isolated and unheated otherwise increased energy use occurs.

- The use of buffer zones and draught corridors such as porches, stairwells and adjoining buildings can significantly reduce heat loss if those areas are not heated themselves.

- A larger ratio of glazed areas can be considered for the south-facing facade to enable a larger contribution of solar radiation for space heating. However excessive glazing can lead to summer overheating and net heat loss in winter and should be avoided. Consideration must also be given to the need for good surveillance from glazed areas of the public domain.

- The mass of a building will affect its ability to store heat through thermal massing

The Building Research Establishment and the DEFRA can advise on all aspects of PSD and building design\(^7,12,16\).

B. Insulation
To maximise energy efficiency the heat losses from the building envelope must be kept to a minimum. This is achieved by applying high levels of insulation to the roof, walls and floors. Insulation can also be improved through the joining of units to increase thermal massing and reduce heat loss through exposed walls. To reduce heat loss from windows double glazing with low emissivity glass, or triple glazing should be considered. However adequate ventilation without draughts is essential to avoid condensation problems. Air handling units with heat recovery and active solar supplies can be considered.

The conversion and refurbishment of properties provides an ideal opportunity to improve the energy efficiency of a building. Insulating material can be applied or improved in the roof and internally on the walls. Reglazing also allows energy savings to be made. When considering the reglazing of historic buildings account must be taken of their special characteristics. The use of UPVC (plastic) units is not appropriate in such instances. English Heritage can provide advice on the use of effective alternatives to UPVC. (Further information on insulation is available from BRE or Leicester Energy Efficiency and Advice Centre and Energy Agency; see details on page 19).

C. Materials
The materials used in the construction and refurbishment of property affect the embodied energy of a building. In general, materials with low embodied energy should be used. The embodied energy of a building can be reduced by using:

- local supplies to reduce the energy used by transport.
- materials that require low energy for manufacture.
- recycled materials.

There are a number of tools available for performing life cycle analyses and further information is available from the BRE\textsuperscript{3,13}. Information and advice on a range of other tools such as BREEAM and ecohomes certification, which can be used to improve the energy efficiency of buildings is provided by the BRE\textsuperscript{10}. The DEFRA is also a good source of information on sustainable construction\textsuperscript{16}. 
2.2 Using Energy Efficiently

Once the demand for energy has been reduced further savings can be made through the use of energy efficient appliances and the behaviour of people using the buildings.

2.2.1 Appliances

Appliances provide heat, lighting and other essential services and are major consumers of energy. The careful choice of appliances can reduce energy demand and therefore costs significantly.

Domestic property should as far as possible use the most energy efficient appliances within the required price range. In particular:

- Condensing boilers with good heating and power controls. Boiler managers with weather compensation and temperature optimisation with modulating, condensing boilers are the most efficient.

- Energy and water efficient white goods. The European Union energy label classifies the energy rating of goods from A (most efficient) to G (most inefficient). The Energy Saving Trust ‘Energy Efficiency Recommended’ Scheme highlights A and B appliances as energy efficient.

Leicester Energy Efficiency and Advice Centre and Energy Agency can provide advice on the above. The Ecohouse run by Environ demonstrates many examples of good practice (contact information p.19).

In non-domestic buildings the opportunities for energy efficiency can be even greater. For example:

- Energy efficient lights can save money in both running costs and maintenance.

- Energy efficient boilers for heating and hot water demands can also reduce costs.

- In larger buildings a Building Energy Management System (BEMS) can be useful.

- Ventilation can be provided naturally or if this is not possible an energy efficient ventilation system can be used.

Leicester Energy Efficiency and Advice Centre is able to offer advice to all businesses in the city on their energy usage. The DEFRA “Best Practise Programme” provides information on efficient energy usage in all types of building and industry. Guides are available from the BRE.
2.2.2 Encourage Energy Efficient Behaviour

Significant savings on energy expenditure can be made through changing individuals behaviour. Encouraging people to be responsible for energy efficiency and the use of energy is an effective way of improving energy savings. At places of work this may be achieved through individual initiatives or as part of a more formal environmental auditing system such as EMAS or ISO 14001. Staff travel plans can also be developed to encourage more energy efficient means of transport to and from work. The Leicester Energy Efficiency Advice Centre and Energy Agency can provide staff training for businesses as well as providing free and impartial advice on all aspects of energy use in homes.

2.3 Renewable Energy

There is a great potential for using renewable energy in urban areas such as Leicester through the incorporation of passive solar design and active solar technologies into developments. The planning implications of the main types of renewable energy relevant to the City are discussed in Appendix 1 and Table 2 summarises the key technological and planning requirements. Major developments within the City will be encouraged to carry out an assessment of the contribution renewable energy technologies can make in meeting the energy requirements of the proposal. The Leicester Energy Efficiency and Advice Centre and Energy Agency can provide support and guidance on carrying out an assessment.

Renewable energy technologies that have the potential to be exploited in the city include:

- **Solar Water Heating**

  Solar Water Heating can offset a large part of the hot water requirements for a building. Such systems:
  
  - perform best in the summer when other heating needs are at a minimum, avoiding the need to run boilers at low loads when they are less efficient.
  
  - can be easily installed.
  
  - need to be operated in conjunction with a traditional water heating method
  
  - can often be incorporated where roofing work is taking place thereby reducing costs.
  
  - are particularly suited to swimming pools and leisure centres.

- **Photovoltaic Cells**

  Photovoltaic (PV) cells generate electricity from the sun and can be incorporated on most buildings as tiling or cladding. Whilst the technology is quite expensive (although prices are falling) they can be used to raise the profile of more prestigious commercial buildings or pioneering residential developments. The cost of photovoltaic cladding can offset the cost of other building cladding materials.

- **Small Scale Wind Turbines**

  Industrial or leisure sites with some open space can be suitable for small-scale deployment of wind turbines.
• **Energy from Waste**

Some industrial developments may produce sufficient waste for on-site energy from waste and CHP to be considered. Certain processes produce large amounts of organic waste and waste can be removed from the municipal waste stream to operate either aerobic or anaerobic digesters. Biogas produced by either process can be used in a CHP plant.

Biomass may be appropriate for both the domestic and non-domestic sectors and can meet Clean Air controls.

2.4 **Combined Heat and Power**

Combined Heat and Power plant (CHP) provide both the electricity and heat to a site. They can reach 85% efficiencies in comparison to 30% from traditional electricity generation where the heat is wasted. Latest Government policy is encouraging the use of CHP and funding may be available for innovative projects through the Climate Change Levy. CHP schemes generally run on gas or diesel fuel although biofuels can be used. The reuse of heat is a key element in the cost effectiveness of a scheme and if heat is not required CHP loses much of its appeal.

CHP technology is well proven and plant size is reducing making it more viable for a range of schemes. District Heating networks offer a potential heat market and heat can be sold to neighbouring buildings or developments thereby earning income for the building operator. Opportunities for CHP can be exploited in:

• **Mixed Use Developments**

Mixed-use developments offer good opportunities for CHP. Heat from industrial or commercial sites could be used in a district heating system whilst small groups of community buildings including shops, offices, halls and swimming pools can exploit small scale CHP. Leicester City Council would welcome the provision of district heating infrastructure in new and refurbished developments.

• **Large Buildings**

CHP units are well suited to large buildings, such as offices and shopping precincts and factories. The Queens Building at De Montfort University is a good example.

• **Hospitals and Leisure Centres**

Hospitals and leisure facilities including swimming pools are well suited to CHP as heat is required throughout the year.
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- **Refurbished Buildings**
  
  CHP schemes may be suitable in refurbished buildings where the heat produced can be sold or sent to neighbouring buildings to reduce their heating demand. Refurbished buildings could also draw on heat from neighbouring CHP schemes.

- **City Centre Developments**
  
  City centre developments may particularly lend themselves to sharing heat and or electricity as the costs of infrastructure will be lower.

- **Energy from Waste Plants**
  
  Biogas produced from waste plants can be used for CHP.

The Leicester Energy Efficiency Advice Centre and Energy Agency can provide further Guidance on Combined Heat and Power and District Heating Schemes. Information is also provided through the Government’s Energy Efficiency Best Practice Programme (see page 19).
Table 1: Opportunities for Energy Conservation and Renewables for New Developments in Leicester

<table>
<thead>
<tr>
<th>Energy Hierarchy</th>
<th>Domestic</th>
<th>Non-domestic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Reduce Demand</td>
<td>• Located to minimise car journeys</td>
<td>• Located to minimise car journeys</td>
</tr>
<tr>
<td></td>
<td>• Well designed layout</td>
<td>• Well designed layout</td>
</tr>
<tr>
<td></td>
<td>• Passive solar design</td>
<td>• Passive solar design</td>
</tr>
<tr>
<td></td>
<td>• Life cycle analysis of materials</td>
<td>• Life cycle analysis of materials</td>
</tr>
<tr>
<td></td>
<td>• High levels of insulation</td>
<td>• Natural ventilation</td>
</tr>
<tr>
<td></td>
<td>• High NHER (10 or above)</td>
<td>• High levels of insulation</td>
</tr>
<tr>
<td></td>
<td>• Condensing boilers</td>
<td>• BREEAM</td>
</tr>
<tr>
<td>2. Energy Efficiency</td>
<td>• Energy efficient white goods and lighting</td>
<td>• Building Energy Management Systems</td>
</tr>
<tr>
<td></td>
<td>• Good heating controls</td>
<td>• Energy efficient appliances and equipment</td>
</tr>
<tr>
<td></td>
<td>• Influence behaviour</td>
<td>• Condensing boilers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Energy efficient/ natural ventilation</td>
</tr>
<tr>
<td>3. Renewable Energy</td>
<td>• Passive solar design</td>
<td>• Energy from waste</td>
</tr>
<tr>
<td></td>
<td>• Solar water/air heating</td>
<td>• Small scale hydro</td>
</tr>
<tr>
<td></td>
<td>• Photo voltaics</td>
<td>• Small scale wind</td>
</tr>
<tr>
<td></td>
<td>• District heating</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Small scale vertical axis wind turbines</td>
<td></td>
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<tr>
<td>4. CHP/District Heating</td>
<td>• District heating and CHP</td>
<td>• CHP with waste digestion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• CHP feeding district heating</td>
</tr>
</tbody>
</table>
Table 2: Key Technology Requirements and Planning Considerations* for Renewable Energy in Leicester

<table>
<thead>
<tr>
<th>Renewable Energy Technology</th>
<th>Main Technology Requirements</th>
<th>Key Planning Considerations</th>
</tr>
</thead>
</table>
| Passive Solar Design             | • Good solar access                                                                           | • Urban Design Policies  
• relevant SPG                                                                                 |
| Solar Heating                    | • South facing roof based collector with no shading                                             | • Amenity (visual impact)  
• Conservation issues                                                                       |
| Photovoltaic                     | • South facing roof or wall mounted collectors with no shading                                 | • Amenity (visual impact)  
• Conservation issues                                                                       |
| Energy From Waste                | • Steady waste supply  
• Storage for waste for a number of days  
• Proximity to grid                                                                        | • Waste Local Plan  
• Amenity (including noise, emissions, safety)  
• Traffic movements  
• relevant SPG                                                                                |
| Landfill Gas                     | • Methane gas from waste site  
• Proximity to electricity grid                                                               | • Waste Local Plan  
• Amenity (including noise, emissions, safety)  
• relevant SPG                                                                                |
| Small Scale Wind                 | • Larger turbines require reasonably exposed, open site away from buildings  
• Close to point of use                                                                      | • Amenity (including noise, safety, visual Impact)  
• Electromagnetic Interference  
• relevant SPG                                                                                 |
| Biomass                          | • Steady supply of Biomass  
• Proximity to Grid  
• Storage                                                                                   | • Waste Local Plan  
• Amenity  
• Traffic movements                                                                           |

*Any renewable technologies requiring planning permission will be considered against the policies of the City of Leicester Local Plan and other material planning matters. The above table indicates key planning considerations that are most likely to affect each type of technology.
Further Information and Advice

- **Leicester City Council** Environment and Development Department, New Walk Centre, Welford Place, Leicester LE1 6ZG. Relevant services include:
  - Development Control Group - for planning related issues - tel: 2527249
  - Urban Design Group - for design related issues - tel: 2527294
  - Pollution Control Group - for environmental health issues - tel: 2526339

  Website: [www.leicester.gov.uk](http://www.leicester.gov.uk)

- **Leicester Energy Efficiency Advice Centre and Energy Agency**, 2 Market Place South, Leicester Tel: 0116 2995147. Provide comprehensive and up to date technical advice and training on energy efficiency and renewable energy.

- **Environ**, Parkfield, Western Park, Leicester LE3 6HX Tel: 0116 222 0222

  Environmental organisation with energy expertise. Examples of good practice are included in the Ecohouse next door to their offices.

  Website: [www.environ.org.uk](http://www.environ.org.uk)

- **Institute of Energy and Sustainable Development**, De Montfort University, Netherleys Building, Scraptoft Campus, Leicester. LE7 9SU. Tel: 0116 257 7964. [www.iesd.dmu.ac.uk](http://www.iesd.dmu.ac.uk)

- **Building Research Establishment (BRE)** Garston, Watford WD2 7JR. Tel: 01923 664258. Useful BRE related websites include:
  - [www.bre.co.uk](http://www.bre.co.uk) for homepage.
  - [www.bre.co.uk/sustainable](http://www.bre.co.uk/sustainable) includes information on BREEAM and Ecohomes.
  - [www.energy-efficiency.gov.uk](http://www.energy-efficiency.gov.uk) for information on DEFRA Best Practice Programme including the publications, information on the free design service (available to developments and refurbishments with a floorspace over 500m$^2$) and information on CHP.

  Direct telephone advice on all energy efficiency measures is also available to UK organisations from the [Environment and Energy Hotline](tel:0800 585794): 0800 585794

- **National Home Energy Rating** Rockingham Drive, Linford Wood, Milton Keynes MK14 6EG. Helpline: 0908 672787.

- **Energy Technology Support Unit (ETSU)** Harwell, Oxfordshire OX11 0RA. Tel: 01235 436747

  Provide advice on energy efficiency and sustainable energy technologies. Further information is available on their website: [www.etsu.com](http://www.etsu.com)

- **DEFRA Sustainable Construction Team** Zone 3/J1, Eland House, Bressenden Place, London SW1E 5DU.

  Website: [www.construction.detr.gov.uk/sustain/index.htm](http://www.construction.detr.gov.uk/sustain/index.htm)
References


3. Leicester City Council and Leicestershire County Council “Central Leicestershire Local Transport Plan 2000-2005”.

4. DETR website for sustainable construction: www.construction.detr.gov.uk/sustain/index.htm


8. DoE Good Practice Case Study 340 “Environmentally Sensitive Housing”.


14. BRE Environmental design guide for naturally ventilated and daylit offices BR345 1998.

15. BRE The green guide to specification: an environmental profiling system for building materials and components BR351.

16. BRE Sustainable Retail premises: an environmental guide to design, refurbishment and management of retail premises BR366 1999.

17. DETR, 1999 “Planning for Passive Solar Design”.

Appendix 1: Renewable Energy

1. Solar Energy
Solar Energy is well suited to providing heat and power in an urban setting. There are three ways of using solar energy:

- Passive solar design
- Active solar heating
- Solar electricity

Passive solar design makes best use of the sun's rays to defer the need for heating and lighting within a building. As such it can allow large energy savings, and is thus commonly regarded as an energy efficiency measure. Active Solar Heating provides hot water or warms up air for heating but not electrical power. Again this can offset the need for heating from conventional boilers or electrical heaters, and lead to a saving of CO2.

Solar electricity can be used to power household appliances or to feed into the electricity grid, as well as providing space and water heating.

Passive Solar Design
Allowing as much of the sun's energy to naturally heat and light rooms is the essence of passive solar design. In general, there is no additional cost associated with the building, but the design must be incorporated from the beginning, as retrofitting is not generally an option.

Active Solar Heating
Active solar heating systems consist of solar collectors, commonly sited on roofs. The solar energy is used to heat water or air, which is then used within the building. Active solar systems are commonly employed alongside a conventional, energy efficient, heating system, and therefore reduce the amount of heat from conventional sources. In general, most summer hot water requirements could be met by solar power.

There are a number of commercially available solar heating systems, of varying efficiencies and cost. The systems can be easily incorporated in new buildings or retrofitted on older buildings. For the systems to work efficiently they need good exposure to maximum hours of sunlight. South facing roofs are generally the best location. In the urban environment there is the possibility of overshadowing form adjacent tall buildings that can seriously reduce the efficiency of a system. Site surveys to check on orientation and the possibility of overshadowing would be advised if fitting active solar water heating systems.

The potential for active solar apparatus in Conservation Areas and on Listed Buildings or buildings subject to “Article 4” controls will be restricted and Conservation Area Consent or Listed Building Consent would also be required.

Solar Electricity
Solar electricity is generated using photovoltaic (PV) cells made from semiconductor material. The sun's heat is converted directly to electricity. PVs are now available commercially and have been employed in a variety of building projects. Costs are still comparatively high and full market penetration is not likely for several years. However, costs can be offset against the cost of other building cladding making photovoltaics the cheaper option.

PVs can be mounted anywhere on a building. They can be used as alternatives to cladding or roof materials or they can be mounted as arrays on flat roofs. Orientation is important, with the best results achieved when the angle of the PV cells matches the angle of the sun. This is not always practical as it involves altering the pitch of the cells throughout the year. In practice most arrays are fixed at an angle which is best suited to the buildings electricity requirements. For example, optimum generation in summer to meet a building's cooling requirement, through air conditioning.
PVs are well suited for use in large offices and public buildings, as the energy supply is at maximum during the maximum building occupation. They are particularly useful in buildings that require air conditioning as maximum power coincides with maximum demand. In general the electricity requirements for domestic properties are not well matched by the power from PVs, as most domestic dwellings have maximum demand between about 6pm and 10pm when the sun is low in the sky or has set. However a grid linked system can export electricity during the low demand period and import electricity in the evening.

The positioning of PVs need careful attention as overshadowing can reduce the efficiency of the cells markedly. The cells need to be in full sun throughout the day to function best. This requires particular attention in heavily built up areas where buildings can overshadow each other for large parts of the day. Careful site surveys are advised and a visual impact assessed.

2. Energy from Waste

Although the City Council actively pursues waste reduction and recycling most municipal solid waste (MSW) is taken to landfill sites. The increased cost of landfill with the new landfill taxes and the cost of transporting waste to sites at some distance from the city make the provision of energy from waste within the city an attractive option.

Energy from MSW can be achieved through aerobic or anaerobic digestion or incineration. The incineration of waste within the City is not, however, a favoured option. Modern plants are designed to both generate electricity and provide heating, as a Combined Heat and Power (CHP) plant. Even with extremely successful recycling schemes the amount of MSW is still large and is likely to remain substantial even if the Governments recycling targets are met. The digestion of MSW will significantly reduce the amount of material to be disposed of in landfill and ensure that harmful greenhouse gases such as methane do not escape into the atmosphere. Many other harmful chemicals can be separated out eliminating leaching from landfill sites into groundwater supplies. Waste heat can be channelled into district heating schemes thus reducing the need for local heating. CHP is also a possibility where waste is disposed of on site such as hospitals.

Energy from waste plants have to meet strict pollution standards although there are often public concerns on the levels of harmful substances in potential exhaust gases. Any new plant should be sited sensitively in relation to the local community and every effort should be made to involve the local community throughout the planning process, to increase the public confidence in the scheme. Discussions should also be undertaken early on in the site selection process with the Development Control section at the Council. Any major schemes would have to carry out an Environmental Impact Analysis to be submitted with the planning application.

3. Small Scale Wind Power

Leicester is not an area of high wind speeds and its urban nature means that the city has not been associated with large-scale wind power. Wind turbines that are tailored to the local wind regime can, however, generate electricity effectively, as long as there are not too many totally calm days. The wind is not a constant source of power, which means that back up systems are needed which would usually be the National electricity grid. The power from the wind can also be converted into heat for use as a heat store.

Wind turbines need to be sited away from buildings, both for safety reasons and to ensure that the airflow to the turbine is as undisturbed as possible. Generally turbines need to be sited around 10 times the height of the tower away from the nearest building. The generating equipment is usually located within the tower and so public access is possible right up to the tower. Other considerations include noise and electromagnetic interference although these should not be too problematic in small scale developments.

Wind power applications are possible on more open sites such as industrial complexes or leisure facilities. The views of the local community and planning authority should be sought at an early stage.
4. Small-Scale Hydro Power
The rivers in Leicester flow over gently inclined land limiting applications for hydro-power. There are faster flowing sections of watercourses which may be appropriate for the development of small-scale hydro-power. Any development would need to be carefully balanced against the needs of other river uses, including leisure, fishing and water supply, as well as the impact on the local natural habitats and amenity.

5. Biomass
Biomass can be in the form of crop residue, coppiced wood or animal waste. Biomass can also be used to produce liquid fuels, which may be substituted for oil. Many of these applications are more suited to rural and agricultural areas. There may be limited possibilities for energy crop production on the fringes of the city or within the Green Wedges.

Willow and birch coppices can also improve biodiversity by providing natural habitats for animals and birds. For the best effect the wood should be used as close as possible to the source, as the energy used in transferring the wood to a distant site soon equals the energy achieved from the wood. Use of Combined Heat and Power technology with liquid fuel or gassified biomass rather than oil or natural gas could also be practical for areas close to the cities Green wedges with heat from the CHP providing district heating to nearby housing or offices.

Further guidance is also available in Planning Policy Guidance Note 22 on Planning and Renewable Energy (February 1993). Most renewable installations would require planning permission and early dialogue with the City Council is advised. Some technologies may also require an Environmental Impact Assessment and are subject to other legislation such as the Environment Act 1990. The City Council can also provide advice on these issues (see contacts p.16).
Appendix 2: Policy Context

A1.1 International
The prospect of global climate change, due to the heating of the earth’s atmosphere by greenhouse gasses is probably the most convincing reason for pursuing sustainable development. The need to take action to curb greenhouse gas emissions has been recognised by international commitments made at the Rio De Janeiro Earth Summit of 1992 and the subsequent Kyoto conference in 1997. The Kyoto Protocol set legally binding emission reduction targets for developed countries, with the UK, as part of the EU, accepting a 12.5% target below 1990 levels by the period 2008-2012. However the UK government has set itself an even tighter target of 20% reductions.

The European Union White Paper on Renewable Energy (1997) confirms the potential of renewable technologies to supplement and eventually replace fossil fuel derived energy given improving market conditions. It highlights the relative shortfall of schemes in the UK and the benefits for remoter areas. In 1999 it was translated into a co-ordinated Action Plan entitled “Campaign for Takeoff” which made financial and regulatory support available.

A1.2 National
Throughout the 1990s it has been the UK Government policy to stimulate the use of renewable resources wherever it is economic and environmentally acceptable to do so. The target of 1500 MW of generation by 2000 originally set by the ‘Prospects for Coal’ White Paper of 1993, was increased by the incoming Government of 1997. The New and Renewable Energy Review confirmed this domestic target of 10% of electricity generated from renewables by 2010, as feasible.

To date the main instrument for securing electricity capacity from renewables has been the Non-Fossil Fuel Obligation (NFFO). In the UK since 1990 its subsidy has enabled some 650MW to be commissioned; in this way technologies approaching viability such as landfill gas, small hydro, energy from waste and windpower schemes have gained entry to the electricity market. The National situation is now progressing rapidly. The Utilities Bill places an obligation on all electricity suppliers to purchase 10% renewable electricity, this will supersede the NFFO arrangements. The introduction of the Climate Change Levy and possible carbon trading are also encouraging energy efficiency in business.

A1.3 Regional
The Regional Planning Guidance for the East Midlands (RPG8) recognises the need to improve energy efficiency and increase the amount of renewable energy in the region.

RPG8 includes a target of producing 9.4% of the Regions electricity from renewable resources by 2010. It recognises that settlement patterns and buildings will probably survive into a time when climate change targets are likely to be much more restrictive in our use of fossil fuels. Therefore energy efficiency and renewable energy are key issues in development plans and will impinge increasingly on development control practice.

Policy 57 calls on Local Authorities to consider energy efficiency in land use planning.

Development plans should take into account possibilities for:

- new development to be appropriately located in relation to renewable energy development;
• appropriate siting, orientation, density and layout of new development to minimise energy requirements, and maximise the potential for connecting with existing energy infrastructure, utilising waste heat from local generation schemes and for incorporating other renewable energy.

“Viewpoints on Sustainable Energy in the East Midlands” (March 2001) identifies the potential of, and barriers to, energy efficiency savings and renewable energy within the Region. A Regional Energy Strategy is now being developed and will take forward this work.

A1.4 Local
The Deposit Draft (May 2000) of the Leicestershire, Leicester and Rutland Structure Plan (1996-2016), as amended by the Proposed Modifications (March 2002) incorporate the following policies on energy efficiency and renewable energy:

**Resource Management Policy 2: Energy Efficiency**
All proposals for development of individual buildings, mixtures of land uses and land use patterns will be expected through design, layout, use of materials and relationship of different land uses, to take full account of their ability to:

a) minimise the consumption of energy resources, particularly non-renewable energy;

b) promote a more efficient use of energy resources;

c) promote walking, cycling, economic operation of public transport, rail freight and waterborne transport; and

d) reduce the need to travel by car.”

Proposals for energy generating installations will be permitted provided that:

• any adverse impact is minimised and outweighed by the wider benefits that the proposal may bring;

• they do not adversely affect designated environmental assets or designated landscape features;

• they meet high environmental standards;

• they can demonstrate that they meet energy requirements;

• they are, as far as practicable, well located in relation to the existing electricity transmission network; and

• they offer, where possible, scope for heat recovery for example by the use of Combined Heat and Power technology.

The generation of energy from renewable sources will be encouraged and particular account will be taken of the wider environmental benefits of using renewable energy sources.
The relevant planning policies for energy from waste developments are found in the Deposit Draft (June 1998) of the Leicestershire, Leicester and Rutland Waste Local Plan (1995-2006):

**Policy WLP3: Anaerobic Digestion**
Planning permission will be granted for anaerobic digestion plants provided the following criteria are met:

a) any digestate produced as a residue of the process can be satisfactorily managed and disposed;

b) The proposed operations do not cause demonstrable harm to interests of acknowledged importance having regard to Policy WLP 8;

c) energy recovery is maximised where appropriate.

**Policy WLP 5: Incineration**
Planning permission will be granted for waste incineration provided all the following criteria are met:

a) it can be demonstrated that the need for the facility cannot otherwise be reasonably met;

b) energy recovery is maximised where appropriate;

c) the proposed operations do not cause demonstrable harm to interests of acknowledged importance having regard to policy WLP 8.

The key Deposit Draft Replacement City of Leicester Local Plan policies relating to energy efficiency and renewable energy are given at the beginning of this Supplementary Planning Guidance on page 6.