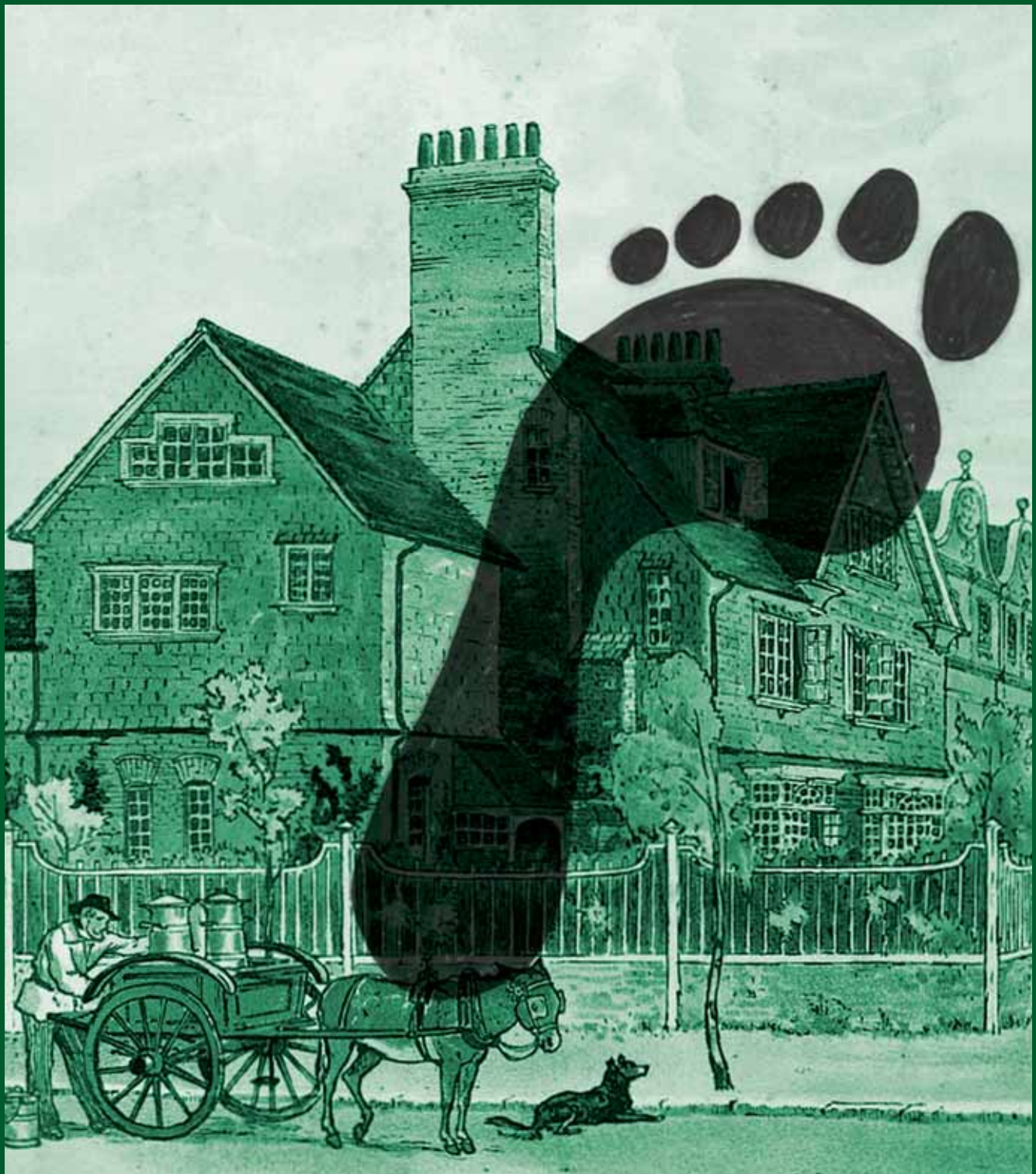


# A Greener Bedford Park

Reducing the carbon footprint of the first garden suburb



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## Introduction

This guidance note advises householders in Bedford Park how they can reduce their energy consumption and their carbon footprint in a manner that is compatible with architectural and historical conservation. Solutions vary depending on the work to be carried out, and whether the house is listed or not. Repairs and alterations to listed buildings require listed building consent.

According to English Heritage renewable energy projects can have adverse impacts on historic sites and that careful planning, at local level, is required in order to manage potential conflicts.

The idea of creating a more energy-efficient community is something that fits well with the philosophy of the creators and early residents of Bedford Park. The intent of this guidance note, produced as part of the Bedford Park Society's programme "Greening Bedford Park", is to provide advice specific to Bedford Park houses. The guidance includes how to improve heating and ventilation efficiency; insulation of roofs and walls and reducing energy wastage through air leakage around windows and doors; water conservation; waste management; and an assessment of new technologies such as wind generation, heat pumps and solar panels.

The Bedford Park Society seeks to encourage home owners and their architects and builders to take a responsible position in the conservation of energy by limiting heat losses through the enclosure of the buildings. The Society is providing some pointers to the way intelligent and sympathetic interventions can be made that preserve and enhance rather than hinder architectural conservation at the same time as energy conservation.

Encouraging significant improvement energy performance of existing buildings during major repair or refurbishment needs to be balanced by conservation issues – in particular concentration on system improvements (eg boiler replacement with higher performance equipment when replacement is due) is usually more cost-effective and less

damaging to the historic fabric of buildings than making general improvements to the enclosure of the building.

This guidance note covers the main issues to be considered, the most commonly successful techniques; it is not intended to be a substitute for appropriate professional advice. The possible approaches that can be taken depend on what building work the householder plans to carry out, and whether the house is a listed building or not. Repairs and alterations (internal as well as external) to listed buildings require listed building consent.



## 1. Energy conservation legislation

Energy used to heat and construct buildings accounts for over 50 per cent of all energy consumed in the United Kingdom. The main by-product of producing that energy is carbon dioxide (CO<sup>2</sup>). As a result, the Government is now committed to stabilising CO<sup>2</sup> emissions.

The 2006 revisions to Part L of the UK Building Regulations requires that energy conservation issues now need to be considered by all involved in the design, construction, alteration and maintenance of buildings. These apply both to the construction of new buildings and renovation of existing buildings. Part L includes the following wording:

“Reasonable provision shall be made for the conservation of fuel and power in buildings by – limiting heat gains and losses – through thermal elements and other parts of the building fabric”.

Where more than 25% of the surface area of a “thermal element” (meaning a roof, ceiling, floor, window, etc) is being renovated or replaced, then there are now target values for the thermal performance of the element following the works.

“Consequential Improvements” rules apply where buildings with a floor area of more than 1,000m<sup>2</sup> undergo a major renovation, in which case Part L requires the building to be upgraded to meet minimum thermal performance standards as described in Part L.

In an existing **non-listed** building it is usually only the components being altered which are affected by the Regulations. Large extensions (>100m<sup>2</sup> and >25% existing floor area) should be treated as a new building. **A conservatory may not need to comply if it is separated by doors from the remainder of the building.**

Part L of the Building Regulations specifies certain categories that are exempt from these requirements, notably buildings which are listed, in conservation areas or are included in the schedule of monuments – where compliance with the energy efficiency requirements would unacceptably alter their character or appearance.



## 2. Special considerations for listed buildings

**Section 2 of Part L notes that the need to conserve the special characteristics of historic buildings needs to be recognised, whilst aiming to improve energy efficiency where and to the extent that it is practically possible.**

Some single private dwelling houses have had their permitted development rights removed by an Article 4 (2) Direction under Conservation Area legislation and in these instances, planning permission is required for any change to a property that materially affects the external appearance, such as changes to windows or external doors.

Window and door openings and frames are crucial components in the character of a building's elevation. In listed buildings they should not generally be altered in their proportions or details. English Heritage advises that "existing glazed doors should be retained wherever possible, and all original or historically important glass kept".

BS 7913: 1998 'Guide to the principles of the conservation of historic buildings' provides guidance on the principles that should be applied when proposing work on historic buildings. As a rule, windows and doors in listed buildings should wherever practicable be repaired, or

if beyond repair should be replaced 'like for like'. For proposed replacement of windows to a listed building, you will need Listed Building Consent which will only be granted where the council is satisfied that the replacement windows would not adversely affect the character of the listed building.



## 3. Reducing your carbon footprint

The first step in improving your carbon footprint is to reduce the amount of energy that you use. Energy-saving measures can save you money as well as lowering your environmental impact.

Step two is to look at sources of renewable energy. Solar panels can provide substantial amounts of clean energy and are described later in this paper. Wind turbines are not recommended for Bedford Park. Not only are wind conditions in the garden suburb unsuitable for efficient operation but they should not be fixed to buildings since they can damage the fabric as well as being a nuisance to neighbours.

For those of us on the national grid, the simplest approach to renewable energy is to buy electricity from a green supplier (such as Good Energy or Ecotricity). They offer either a 'green tariff', in which they match the electricity you use by buying the same amount from renewable sources such as wind farms, or a 'green fund' which invests money into research or setting up renewable energy projects.



## 4. Reducing energy consumption

Even where no substantial alterations are envisaged there are lots of things that can be done to your house without affecting Bedford Park's character.

Replacing your boiler with a condensing type delivers around 90% efficiency compared with an old boiler which could be as low as 50%. Thermostatic radiator valves can be fitted to radiators to provide room-by-room temperature control.



**A condensing type boiler with bottle to show scale**

For comparisons of boiler efficiency go to [www.boilers.org.uk](http://www.boilers.org.uk)

Bedford Park houses typically have about four times the air-change rates of modern houses, you can reduce heat escaping up your chimneys by blocking unused flues.

The actions to reduce heat loss are grouped into two categories. Category A applies where no substantial refurbishment or alterations are envisaged; category B applies where extensions or other alterations are to be made to the property.

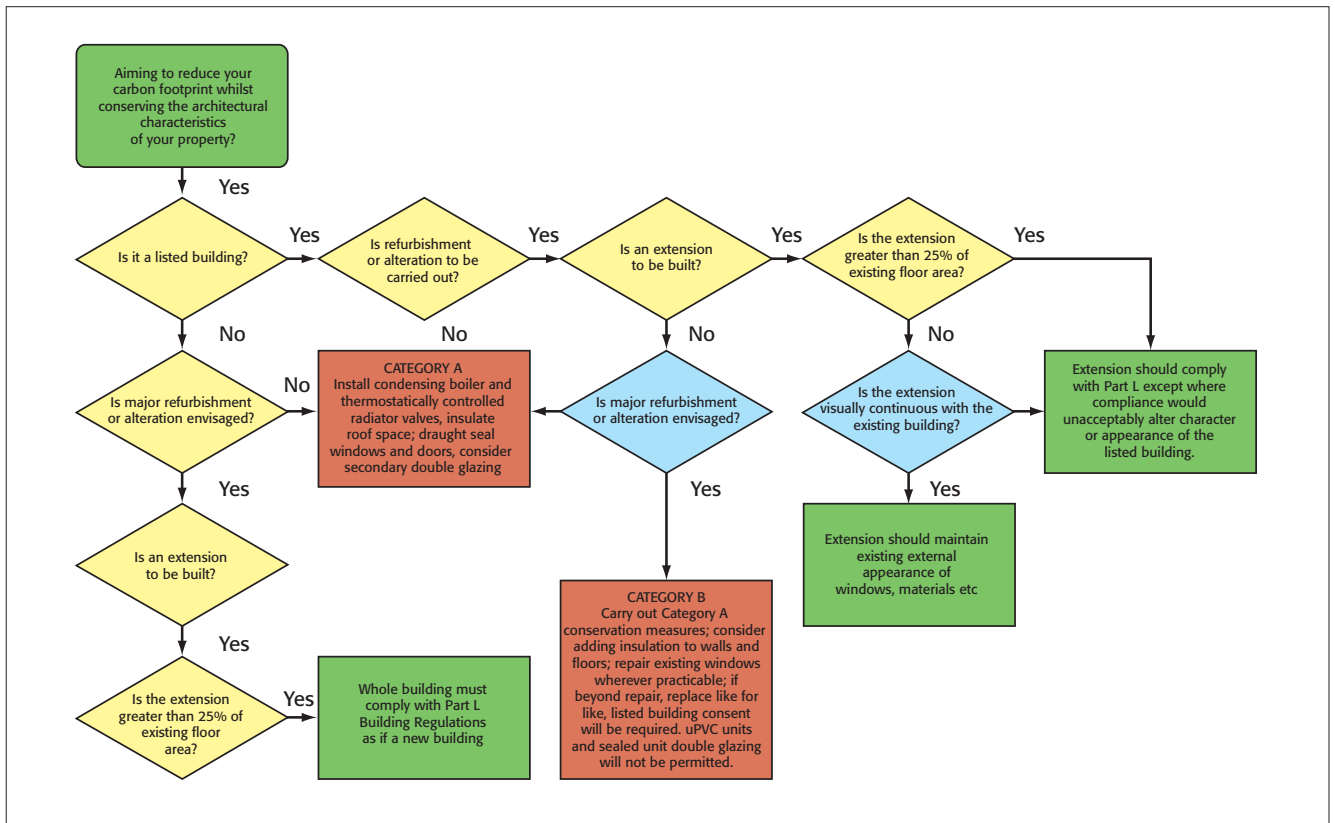


## Category A: non-substantial alterations

The following actions to reduce heat losses and hence energy consumption can be taken without significant impact to the fabric or character of the building:

(i) Reduce draughts through windows and external doors. This is best done by having grooves cut into the windows by a specialist to receive high-performance weather strips.

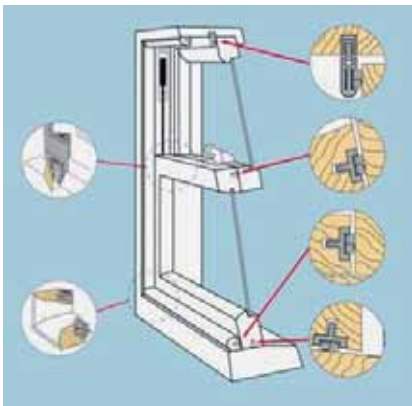
Air infiltration around and through old windows is often excessive, so draughtproofing and weather stripping can be very effective in reducing not just heat loss and consequent heating bills by limiting the number of air changes per hour, but also reducing levels of noise and dust infiltration. Care must be taken to ensure that adequate ventilation to remove internally generated moisture and pollutants is maintained although this is rarely



The chart illustrates a decision-making route which tells you which category your project falls into

a problem in Bedford Park houses which often have considerable air infiltration via airbricks, chimney flues and floor voids and may well not need more.

Several forms of draughtproofing can be applied to doors and existing and replacement windows, which



### Ventrolla glazing seals

operate in different ways. Gaps around window frames can be sealed with mastic. Opening elements can be fitted with weather-strip, comprising silicone rubber tubes, rubber, polyester, or sprung-metal 'Z' and 'V' fins or with pile brushes. A number of firms now provide an effective specialist installation and refurbishment service for existing windows.

[www.ventrolla.co.uk](http://www.ventrolla.co.uk) and [www.classicwindow.co.uk](http://www.classicwindow.co.uk) firms who have previously carried out this work in Bedford Park.

(ii) Insulate between the timbers of the top floor ceiling with 100 to



### Thermafleece insulation

150mm thickness of material. "Thermafleece", made from sheep's wool is an efficient, easily handled and environmentally responsible material.



### Category B: extensions and substantial alterations

Where extensions are proposed the new work will have to comply with

Part L of the Building Regulations requiring strict limitations on glazed area and insulation to roofs, walls and floors. Where substantial alterations or refurbishment to the existing building are proposed, the following measures additional to Category A can be taken:

1. Existing ground level timber floors can be insulated between the joists,



### Insulated joists

if floor boards are to be lifted.  
2. Sheet insulation with a vapour barrier can be applied to external walls either bonded to plasterboard

or applied between treated timber battens. This will entail adjustments to skirtings and architraves, etc. around openings

3. Sheet insulation with a vapour barrier can be applied to sloping ceilings either bonded to plasterboard or applied between joists provided a ventilation gap is maintained or the roof covering is “breathable”.
4. Existing windows should be repaired wherever practicable and otherwise must be replaced like-for-like; in either case the windows should be fitted with high-performance draught-stripping. The type of windows and doors in Bedford Park almost invariably cannot have sealed double-glazed units fitted and comply with listed building legislation. Window renovation uses one fortieth of the energy of replacement.
5. Secondary glazing units installed behind existing windows can be successfully accomplished.
6. Where an extension is designed in replica style, new windows should use glazing bars matching the existing in profile. Glazing should be single glazing\* with insulation achieved by weather-stripping, secondary glazing, insulating blinds or curtains and other measures outlined in this document. These constraints do not apply to extensions designed in a contemporary style.

\* Recent developments in double glazing technology allowing much thinner glazing bars provide a more acceptable solution than standard double glazing units with stuck on beading.

<http://www.slimliteglass.co.uk>



## 5. Windows in listed houses

Bedford Park houses are characterised by a diverse range of windows, often highly modelled and offer significant challenges in attempting to reduce energy consumption and heat loss through glass and air leakage.

Almost all the listed buildings in Bedford Park have timber sliding sash or side-hung casement single-

glazed windows (with slender glazing bars in most cases) and partially glazed timber panelled doors.

No historic window can reach the thermal transmission values recommended in Part L of the Building Regulations. ‘Facsimile’ windows with double-glazed sealed units and “low emissivity” glass have improved insulation values, but normally fail to provide an adequate visual alternative as it is impossible to replicate original, slender glazing bars that can accommodate sealed double glazing units. Except where replacement is inevitable, the aim should therefore be to improve thermal performance whilst retaining the existing windows.

Roof glazing in studios can normally be modified to receive double- or even triple-glazed sealed units without adverse visual impact. Rooflights in roof slopes will have to be the “conservation” type which have sealed double-glazed units.



## 6. Secondary glazing

Secondary glazing is an effective means of achieving increased insulation. The design of secondary double glazing, whether for additional thermal insulation or noise reduction, should reflect the design and configuration of the principal windows behind which they are to



“Lift-out” secondary glazing applied to a fixed stained glass light



Horizontal sliding secondary glazing applied to a French door

be installed, to minimise their visual impact. Listed building consent may be refused for designs that alter the character of the building.

Secondary glazing improves insulation, draught proofing and noise control. If carefully designed, it can be relatively unobtrusive, with divisions between panels hidden behind the transoms, rails and glazing bars of the existing windows.

However, not all windows are suitable for secondary glazing, owing to the narrowness of the internal sill or reveals; the difficulty of accommodating the new panes within an oddly-shaped or unduly protruding architrave; or clashes with internal shutters. Traditional means of minimising heat loss are still effective, such as heavy lined curtains. Modern alternatives include insulated curtains and reflective and/or insulated internal blinds.

The dangers of restricting air movement in historic buildings must be recognised. The technical risks in adding roof insulation include condensation within roof spaces; overheating of electric cables; freezing of water in pipes and cisterns (if above the insulation layer); and increased risk of frost damage to roof coverings. Companies in this field include Granada Secondary Glazing [www.gsecg.com](http://www.gsecg.com) and Storm Windows [www.stormwindows.co.uk](http://www.stormwindows.co.uk)



## 7. Solar Energy

### Photovoltaic (PV) panels

Solar PV uses energy from the sun to create electricity to run appliances and lighting. PV requires only daylight – not direct sunlight – to generate electricity.

Photovoltaic systems use cells to convert solar radiation into electricity. The greater the intensity of the light, the greater the flow of electricity... PV systems generate no greenhouse gases, saving approximately 325kg of carbon dioxide emissions per year – adding up to about 8 tonnes over a system's lifetime – for each kilowatt peak (kWp – PV cells are referred to in terms of the amount of energy they generate in full sun light).

You can use PV systems for a building with a roof or wall that faces within 90 degrees of south, as long as no other buildings or large trees overshadow it. If the roof surface is in shadow for parts of the day, the output of the system decreases. Solar panels are not light and the roof must be strong enough to take their weight.

For the average domestic system, costs can be around £4,000-£9,000 per kWp (the maximum output) installed, with most domestic systems usually between 1.5 and 2 kWp.

Through the Low Carbon Buildings grant scheme you may be able to claim about half of the cost. A 1 kilowatt (1kW) system will cover about 10 square metres, and produce about 750kWh (units of electricity) over a year – mostly in the summer. As 1kWh of grid electricity costs about 10p, this annual output would offset about £75.

[www.lowcarbonbuildings.org.uk/how/householders/](http://www.lowcarbonbuildings.org.uk/how/householders/)

### Solar Water Heating Systems

Solar water heating systems use heat from the sun to work alongside your conventional water heater.

Solar water heating can provide almost all of your hot water during the summer months and about 50% year round reduces your impact on the environment – the average domestic system reduces carbon dioxide emissions by around 400kg

per year, depending on the fuel replaced.

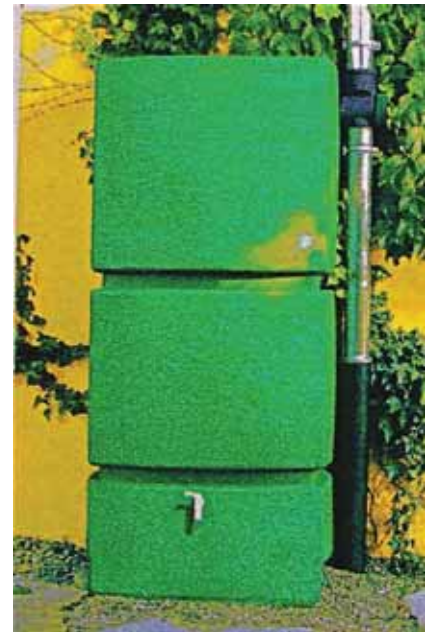
You will need 2-4m<sup>2</sup> of southeast to southwest facing roof receiving direct sunlight for the main part of the day. You'll also need space to locate an additional water cylinder if required.

The typical installation cost for a domestic flat plate collector system is £2,000 – £3,000. Evacuated tube systems will cost £3,500 – £4,500.

Solar hot water systems generally come with a 10-year warranty and require very little maintenance. A yearly check by the householder and a more detailed check by a professional installer every 3-5 years should be sufficient (consult your system supplier for exact maintenance requirements)

Planning permission will be required to install any of the discussed renewable energy systems. Listed buildings will require listed building permission.

The Bedford Park Society supports the use of solar panels in appropriate positions. What is appropriate will vary from house to house – each case must be considered on its merits.



Garden water butt

by harvesting rain. We have an annual rainfall in Bedford Park of around 799mm pa and a Bedford Park roof can collect some 75,500 litres in a year. This can be used for watering the garden or can be recycled for use in the house.

A list of suppliers of water harvesting equipment can be found on the Environment Agency web site. [www.environment-agency.gov.uk](http://www.environment-agency.gov.uk)

Dual flush toilets can save up to half the water used by the old litre WC units.



## 8. Reducing water consumption

Each UK citizen uses on average 150 litres of water per day (55,000 pa) but only 2.5 litres per day are used for drinking.

You can reduce your water usage



Water harvesting pic



## 9. Reducing water run-off

The paving over of front gardens is having a serious impact on London's storm drainage system. To give an idea of the scale of the problem, there are 74,300 front gardens in Ealing, nearly two-thirds of their total area is covered with hard surfacing creating an impermeable surface one and a half times the size of Hyde Park.

Hard surfaces like this increase the risk of flooding, add to the pollution of water courses, increased urban temperatures, increased noise, reduce habitat for wildlife, reduce CO<sub>2</sub> absorption and create a less attractive environment.

Where hard surfaces are used it is recommended that permeable paving surfaces or gravel.



## 10. Lighting

Substantial savings can be had by changing to low energy lightbulbs.

For instance, Osram's 20W low-energy bulb claims the same light output as a 100W incandescent bulb. Moreover, its lifetime is said to be 15,000 hours (or '12 years', at three hours per day). In contrast a typical incandescent bulb might last 1,000 hours. So during a 12 year period, you have this choice: buy 15 incandescent bulbs and 1500 kWh of electricity (which costs roughly £150); or buy one low-energy bulb and 300 kWh of electricity (which costs roughly £30).

[www.energysavingtrust.org.uk](http://www.energysavingtrust.org.uk)



## 11. Energy assessments

The Green Homes Concierge, subsidised by the London Development Agency, is designed to help homeowners improve the energy efficiency of their homes. It will carry out a comprehensive energy assessment of your home followed by a year long dedicated service to help you implement energy saving measures, saving you money on your fuel bills and measurably reducing your carbon footprint.

Tel: 0800 089 0098

[www.greenhomesconcierge.co.uk](http://www.greenhomesconcierge.co.uk)

### Further Reading

- *Building Regulations and Historic Buildings Balancing the needs for energy conservation with those of building conservation: an Interim Guidance Note on the application of Part L, revised 2004*
- *English Heritage, 1994 Draughtproofing and Secondary Glazing, leaflet 1 in the Framing Opinions Campaign leaflet series, London: English Heritage (All the published leaflets in this series are downloadable from [www.english-heritage.org.uk](http://www.english-heritage.org.uk)*
- *BS 7913: 1998 'Guide to the principles of the conservation of historic buildings'*
- *Wrightson, David, Mandatory Double Glazing (?) Heat Loss Versus Heritage. Article in Context, issues 45 and; 46. Association of Conservation Officers, London*
- *Framing Opinions, Supplement to Conservation Bulletin, English Heritage, London 1991.*
- *National Trust for Historic Preservation, Repairing Old and Historic Windows. The Preservation Press, Washington D.C., 1992*
- *Munn, Harry, Joinery for Repair and; Restoration Contracts. Attic Books, Bulth Wells, Powys, 1989.*
- *Draughtstripping of existing doors and windows, Good Practice Guide 139, Building Research Energy Conservation Support Unit, The Construction Information Service*
- *Refurbishment site guidance for solid walled houses – windows and doors: Good Practice Guide 295 Building Research Energy Conservation Support Unit, The Construction Information Service*
- *T Oreszczyn, R Lowe and D Olivier, Domestic Window Energy Rating (DWER) & Revisions to Part L of the Building Regulations, British Fenestration Rating Council (BFRC), 1999*

### Caveat:

*This technical note draws on the knowledge amassed about Bedford Park houses by local expert practitioners and members of the Bedford Park Society, as well as accepted good conservation practice in building construction. Whilst every care has been taken to ensure the accuracy of the contents of these technical notes, no responsibility or liability for any loss occasioned to any person acting or refraining from action in reliance upon any statement in the technical notes will be accepted by the Bedford Park Society, any of its officers or members, or any contributors to the technical notes.*

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