Achieving whole life value in infrastructure and buildings (BR 477)

The guide explains methods, techniques and tools to achieve whole life value in planning, commissioning and maintaining assets such as schools, offices, hospitals, airports and maintenance schemes.

£45.00 (for Connect subscribers)

Ventilation, air-tightness and indoor air quality in new homes (BR 477)

This is a report on a study of ventilation and indoor air quality in 97 homes built in England since 1985. It aims to assess whether the guidance in the 1990 edition of Building Regulations Approved Document Part F is effective at providing adequate ventilation and good indoor air quality in domestic buildings, and thereby removing risks to health and maintaining the comfort of the occupants (see page 2).

£32.50 (for Connect subscribers)

Summer-time performance of windows with shading devices (FBR)

This report provides data that can be used to quantify the ability of windows and shading devices to control summer-time overheating. It covers different types of shading devices: simple internal, with or withoutVenomous fritid, external shading including marquees and curtains, and internal and non-venomous, and combinations of the above (see page 15). £37.50 (for Connect subscribers)

Good Buildings Guidelines

Practical guidance on building design and construction.

GBG 64 Tiling and slating pitched roofs

This three-year Good Buildings Guide deals with the upper surfaces of pitched or slated roofing. It concentrates on those aspects of tiling and slating that are most important in ensuring good performance of the completed work. The objective is to provide a summary of good practice.

Part 1: Design criteria, underlays and battens

Part 2: Tiling and profiled clay roof tiles

Part 3: Natural and manmade slates

Information Papers

- Part 2: plain and profiled clay & concrete tiles
- Part 1: design criteria, underlays and battens

Completed roof. The objective is to provide a summary of good practice.

IP3/05 Composting in the construction industry

This three-part Good Building Guide deals with the interstitial condensation within structures. To run the models, certain parameters on burning behaviour, the various types of fire tests and their selection to specify materials and products of reduced flammability.

IP2/05 Modelling and controlling interstitial condensation in buildings

This report provides data that can be used to quantify the ability of windows and shading devices to control summer-time overheating. It covers different types of shading devices: simple internal, with or withoutVenomous fritid, external shading including marquees and curtains, and internal and non-venomous, and combinations of the above (see page 15). £37.50 (for Connect subscribers)

Diary of forthcoming events

24 May 2005 at the Peter’s Foundation in London

An introduction to dynamic planning and design charrettes

The Design Charter is changing the way communities, developments and individual buildings are planned and delivered. It has established a best practice in the US where the process is being employed by major clients, developers, architects and planning authorities. In this one-day seminar, leading exponents from both sides of the Atlantic explain the importance of the Charter’s contribution in guiding masterplanning and the design of buildings (see page 2).

25 May 2005 in the Groun Hotel, London

Fire safety in hotels

A free one-day event to discuss hotel fire safety issues. The aim of this event is to give those attending the opportunity to raise any concerns they may have regarding the fire safety of their hotels, with BRE experts. At the event, a firesafety friendly guide to help hotel managers and staff meet their responsibilities for the safety of guests (see page 4).

28 May & 26 June 2005 at BRE, Hornton

Smart homes need smart controls

A one-day workshop describing the benefits of the European Installation Bus (EIB) - one of the fastest growing in European integrated home control systems. The seminar covers EIB-based installations including control, commissioning, selection to specify products and applications. It also provides an understanding of the key elements of design and commissioning of EIB systems.

2-3 and 26-28 June 2005 at BRE, Hornton

Fire safety engineering

This three-day residential training course will provide Building Control and associated professionals with a basic understanding of the engineering of fire safety systems. The course will cover specific case studies and will discuss in detail any experimental data.

For further information - Contact: 01923 664462, breeam@bre.co.uk

Fire safety in hotels

A firesafety friendly guide to help hotel managers and staff meet their responsibilities for the safety of guests.

6-9 June 2005 at BRE, Watford

OFFSITE2005

A major exhibition and conference that will demonstrate the ability of offshore and other modern methods of construction to MMC to realise quality homes, schools and hospitals and commercial buildings that are energy efficiently designed, constructed and cost effective (see page 5).

6-12 June 2005 at Aberdeen Exhibition and Conference Centre

Waste minimisation in construction

Seminar about best practice in construction waste minimisation in Scotland, which provides an understanding of the component processes of construction waste legislation, problems that have arisen and successful strategies and decisions with respect to the whole-life management of waste minimisation on site, and the cost savings to be made (see page 26).

20-24 June and 11-15 July 2005 at BRE, Watford

Building services integration with EIB

European installation bus (EIB) technology delivers building performance through building services integration, reducing energy costs, enabling remote management and introducing lifestyle benefits. This two-day course allows designers to effectively define the benefits of EIB, and provide value-added service to clients. The course provides them with an understanding of the key elements of design, installation and commissioning of EIB systems.

22-23 June 2005 at BRE

BRE ECO Assessor training course

Two-day training course to become a BREAM for Offices assessor, covering the technical content of BREAM for Offices and the details of the assessment process.

Contact: 01923 664462, breeam@bre.co.uk

Further information

For further information on these events and training courses contact: breeam@bre.co.uk or breconnect@bre.co.uk

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Recent publications

Constructing the Future is distributed in association with Contract Journal.

For a list of all BRE Connect related events see:
- all BRE Digests, Good Buildings Guides, Good Repair Guides and Information Papers such as those listed on this page — touring at least 50 publications each year - at all BRE Connect events - at all BRE Connect events - at all BRE Connect events

For further information - Contact: 01923 664462, breeam@bre.co.uk

bRE

OFFSITE2005 showcases latest MMC innovations

Standard for innovative housing

Renevable energy technologies

Avoiding air conditioning

Building with glass

SPRING 2005 ISSUE 24

For more information - Contact: 01923 664462, breeam@bre.co.uk

To obtain any of the publications listed above

For more information – Contact: 01344 404407, Fax 01344 714440, email BREBookshop@IHSRapidoc.com

- Fax 01344 714440
- all BRE Digests, Good Buildings Guides, Good Repair Guides and Information Papers such as those listed on this page – totalising at least 50 publications each year – totaling at least 50 publications each year – totaling at least 50 publications each year – totaling at least 50 publications each year – totaling at least 50 publications each year – totaling at least 50 publications each year – totaling at least 50 publications each year – totaling at least 50 publications each year

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Comment

Design charrettes

The term design charrettes may not yet be a familiar one to many, but charrettes are already best established practice in the United States, and are used by a number of major UK clients, developers, architects and planning authorities to develop better buildings and communities.

The charrette process brings the client, design team and stakeholders together at the start of a development to create the best possible plan. During intensive, facilitated discussions, opportunities are identified to reduce waste and environmental impacts, improve performance and enhance the well-being of communities and occupants. Substantial savings in construction costs and time are also often made.

The word charrette derives from a pre-1900 exercise at the École des Beaux Arts in Paris where architectural students were given a design problem to solve in an allotted time. When time was up, the students would rush their drawings from the studio to the école in a cart called a charrette, often jumping into the cart to finish drawing and involve creative input from their peers.

The term evolved to refer to the intense design-exercise itself and to a creative process that is used to develop solutions to a design problem within a limited timeframe. USA and UK examples, including BRE seminars of the USA-based National Charrette Institute, David Storlly of BRE Environment and Building Researcher Dr Philippe Paris and the Prince’s Foundation, will explain the use of charrettes in improving building and community design at a seminar in London on 24 May 2005.

For more information on the seminar, “How to create demonstrably better communities and buildings,” 01933 646100 or email events@bre.co.uk.

Recycled and secondary aggregates

A number of recent research projects have been promoting the greater use of recycled and secondary aggregates.

The UK, already the leading user of recycled and secondary aggregates (RSA) in Europe, with around 25% of the aggregates annually consumed being RSA. But national targets have been set for RSA use to rise further—from 40 million tonnes in 2001 to 55 million tonnes by 2006.

One thing is certain—there will be no shortage of waste to choose from. Landfill Regulation and new definitions from the EU relating to the compulsory recycling of electronic waste and vehicles (the WEEE and the ELV Directives), mean there will be a proliferation of plastics and other industrial wastes that could be landfill and could be potential RSA materials.

If such materials are to be more widely used, specified and promoted by architects and developers, then confidence in their quality and performance must be gained.

The programmes cover the:
- market potential of RSA
- opportunities for research and development available on site and RSA in HBM
- technical and economic benefits to industry
- case studies examples
- technical feasibility and guidance on using RSA in HBM in applications such as external wall protection, piling and slab foundations.

For information on attending these seminars, contact Rachel Charlton
Email—charlton@bre.co.uk

Other RSA projects

Other BRE research that has been promoting the use of RSA includes projects:
- exploring the possible ‘lodged value’ that certain types of RSA have over primary alternatives in asphalt, concrete and concrete products (WRAP and DTI funded)
- using non-fines waste streams as aggregate—using large scale test projects to demonstrate suitability for load construction and RSA in HBM (BRE and industry partners)
- using small volume waste, ie waste materials that are generated in small quantities at many widespread locations—producing guidelines for their suitability for load construction and RSA in HBM
- demonstrating use of RSA through case studies (funded by WRAP and DTI)
- removing barriers to using RSA by specifying and improving service-life forecasting (IP5/94) and
- producing guidance on sustainability

For further information—Flavie Moulinier, 01923 664200 Email moulinierf@bre.co.uk

Published guidance on aggregates from www.BREbookshop.com includes The use of recycled aggregates in concrete (IP5/94) and Recycled aggregates (BRE Digest 413).
Exhibitions
Anyone planning visit any of the following shows would be very welcome to call by the BRE Certification stand to discuss any queries they may have – or just to say hello!

& OFFSITE2005, BRE, Watford, 6 – 9 June.
Website
The development of www.RedBookLive.com continues – a better search function has just been implemented and the following search parameters are now available: are you looking for:

– company location, or any address of the element trade name
– any supporting description, notes or scope

The ability to display the section introductions when searching results are also has also been added.
In addition, Red Books and CD-ROMS can be ordered directly from the site.

Fire Safety Order
The Draft Regulatory Reform Order 2005 has now been laid before Parliament. It is expected that the Regulatory Reform Committee’s web site at www.parliament.uk/regrefcom. It is listed as the Ninth Report of Session 2004-05.

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Tsunami research

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OFFSITE2005 SHOWCASES THE LATEST INTERNATIONAL MMC INNOVATIONS

OFFSITE2005 will be the largest and most ambitious event on off-site and modern methods of construction (MMC) ever seen in this country.

Century Homes. Europe’s largest Timber Frame Manufacturer, will be displaying a full-scale House Showing timber frame as a cost effective MMC. The structure will incorporate a range of innovative features and has been designed with energy efficiency in mind. U-Values of 0.27 will be demonstrated which will comply with changes to Building Regulations.

The structure features no internal load bearing walls. This provides an internal space that can be easily changed for future occupiers – along with the associated savings in foundations. The systems use I-beam technology in the floor to achieve this. The I-beam also features pre-service pop outs to facilitate the fitting of services on site, thus making the build process more efficient.

Century Homes will also feature its unique pre-fitted wall insulation along with a new innovative exterior cladding system – renovable, a brick system that has a traditional appearance, but uses no mortar and offers a rapid construction system.

The Concrete Centre will promote some of the many MMC innovations in the concrete industry such as: 'Thin-joint mortar' that a wall of blocks and thin joint mortar can be laid twice as fast as that built with traditional mortar.

Insulating Concrete Formwork Association (ICFA) will demonstrate the speed and practicality of ICF construction with a daily live build programme. The walling system is designed to exceed the requirements of the Building Regulations in regard to fire, thermal and acoustic performance. ICF is suitable for all types of building, from domestic properties to commercial and public sector buildings. The method of construction is based on the rapid assembly of formwork components which lock together to form the walls prior to being filled with concrete. The acoustics nature of the materials used in the construction have a long life expectancy and are resistant to flooding, so minimising any repair costs following a flood.

Hanson will be exhibiting a full-scale, three-storey building, featuring a below ground basement, built using off-site construction techniques and with a mind to future changes in Building Regulations. It will showcase Hanson’s:

- pre-fabricated, thin joint, blockwork panels with insulated cavity this joint lightweight blockwork walls
- Wonderwall – an insulated composite panel system with brick slip facing
- Jet floor flooring system – pre-stressed T beams with EPS blockwork infill
- twin-wall system for basement construction using insulated precast concrete permanent formwork wall panels that resist ground pressure
- Omega– picant permanent formwork flooring system
- Hollowcore flooring – prestressed precast concrete floor units
- Unifix – precast concrete staircases
- floor cavity – used as cellar, garage, storage – existing box cavel system traditionally used for diverting sewers and water supplies.

The building will be on the BRE site for two years after the event for demonstrations and training.

Insulating Concrete Formwork Association (ICFA) will demonstrate the speed and practicality of ICF

Roukkii will construct an extensive outdoor display to show off the capabilities of systems providing a complete off-site constructed solution, which include:

- roofing elements especially suited to industrial buildings, warehouses, sports halls and large-scale housing
- off-site constructed elements for use in walling applications that can accommodate almost any form of conventional cladding, including rain screens and profiled sheets. They are often delivered to site with windows, doors and cladding already fitted.

Scottsdale Construction Systems who specialise in the manufacture of automated roll forming technology and CAD software systems, will be demonstrating technology for:

- modular framing technology – the UK launch of Scottsdale’s fully automated and engineered truss system, from CAD plans through to roll forming, fabrication and site installation.
- wall forming technology – a demonstration of framing and truss roll forming plant from CAD concept to production of components for:
  - multi-storey modular construction
  - residential house/department steel framing
  - bathroom/kitchen pod frames
  - commercial building external framing for cladding systems
  - roof truss technology.

Terrapin will display two accommodation modules constructed from a rigid light steel frame that enables them to achieve high super imposed loading characteristics in multi-storey structures. The exhibit is part of a £2 billion MoD project to provide living, training, working, recreation and welfare facilities for 3,500 MoD personnel and civilian staff. It is the largest MMC project ever seen in this country. One of the modules at OFFSITE2005 will be fitted out as an individual bedroom with en-suite shower room, carpets and curtains, fully equipped with washbasin, cupboards and a study area. The other module will be a living room.

Van Elle, will be demonstrating their Smartfoot pre-cast, post-tensioned foundation technique, which brings many of the benefits of off-site manufacture to foundation construction, and officially launching the new Litefoot foundation innovations.

In addition to many full-scale outdoor displays, there will be an large indoor exhibition at OFFSITE2005 holding around 50 displays of the latest in modern methods of construction.

For information on attending OFFSITE2005, phone 01923 664800, Email offsite2005@bre.co.uk or visit www.offsite2005.com
Before investing in these systems, we not only have to be pre-fabricated buildings after the War. Also, the construction systems to typical threats, such as fire in the kitchen, burst systems on which they are unwilling to offer a mortgage. Of housing have recommended greater take-up of modern methods of construction, and off-site manufacture in particular. So why haven't we seen more of this approach yet? For one thing, there was a lot of bad publicity associated with ‘pre-fabricated’ buildings after the War. Also, the construction industry tends to be conservative, and is reluctant to change white tried and tested masonry construction, and modern timber frame, maintain a high value in the market and sell well. But it’s not just the construction industry that has reservations. Mortgage lenders and insurers are wary of new technologies, many lenders maintaining a ‘black list’ of building systems on which they are unwilling to offer a mortgage. Insurers also have an interest in the resilience of these new systems to typical threats, such as fire in the kitchen, burst pipes, wind, flooding, theft, etc. Insurers also need to know what the implications are for the repairability of the systems – give confidence to insurers, lenders and owners that innovative systems will perform adequately. Ensure equal treatment for insurance and lending as given to conventional dwellings under normal insurance and lending terms. Enable manufactures to demonstrate optimal enhanced performance of specialist systems, eg enhanced flood resistance or fire performance or reduced environmental impact. Maintain a database of approved innovative systems constructed and their location to be used to these systems for future maintenance. This standard is one of a suite of ‘Life Prevention Standards’ (LPS) that have been prepared by BRE Certification Ltd, and currently comprises the following:

**LPS 2024** This covers flood resilience and is intended to be used where dwellings are likely to be constructed in high-risk flooding zones. It needs an approach that covers the professional skills involved and links to the design checks and approval processes adopted by building control and planning. It is crucial that the standard interfaces smoothly with the operations of on-site inspectors such as building control and warranty providers. As an Expert Group of house builders, mortgage lenders, insurers and others, has been set up to oversee the calibration of the standard. Members of this group, which is chaired by Keith Ross of BRE, includes representatives from the:

- Association of British Insurers (ABI)
- Council of Mortgage Lenders (CML)
- National House Building Council (NHBC)
- House Builders Federation (HBF).

Once the final approved standard is published, manufacturers and suppliers can apply to BRE Certification and its licensees for the certification of their systems and components against the standard. The certification process will assess and validate claims of performance, technically evaluate designs and specifications, and regularly audit the quality control of factory operations.

The scheme document sets out the application process, appraisal procedures, how pre-existing test and other information will be handled, pass/fail criteria, performance grades, factory production control requirements and other matters. More information can be obtained from BRE Certification, enquiries@breccertification.co.uk, Tel: 01923 664800.

**Calibrating the standard**

The calibration of LPS 2024 involves a systematic review to refine specific details and ensure it can effectively integrate product assurance, design assurance and life-time quality assurance.

**Product assurance** can be implemented by extending the scope of existing recognised product certification and technical approvals (ie BRE Certification, BBA, etc). On-site quality assurance can be implemented by extending existing site-based inspection services provided by Building Control and warranty providers such as NHBC and D & R.

Quality assurance of the design process is less straightforward. It needs an approach that covers the professional skills involved and links to the design checks and approval processes adopted by building control and planning. It is crucial that the standard interfaces smoothly with the operations of on-site inspectors such as building control and warranty providers.

As can be seen in the article on page 5, modern methods of construction, including off-site manufacture (such as panelised or volumetric pod construction), have very much arrived on the UK construction scene. Over the next ten years they are expected to revolutionise the way buildings are designed and built – particularly housing. Many factors are influencing this development, including Government policy (John Prescott’s push for greater development in the South East growth areas), improved quality resulting from factory methods of manufacture, shortage of skilled workers, and the needs of social housing providers. Numerous reports, including Egan and the recent Baker review of housing have recommended greater take-up of modern methods of construction, and off-site manufacture in particular. New standards

**BRE Certification** is developing a technical standard to set performance requirements for the new generation of building systems. It aims to address the concerns of mortgage lenders, insurers and others, to tackle some of the perception problems around the new systems, and to encourage the development of high quality products.

The introduction of non-traditional systems does not have an entirely successful history,” says David Hyten of Nationwide (who represents the Council of Mortgage Lenders on the LPS 2020 calibration Expert Group). “So there is confidence gap to be bridged. Lenders have to be satisfied that a building is well designed and constructed, using reliable components and able to last well beyond a full mortgage term, without unreasonable expense. Lenders make a long term commitment when granting a mortgage. We need to ensure that this doesn’t create the lost of the financial security that people don’t faze lenders into shorter terms, with consequent impacts on affordability. There are currently many standards, but our ideal is just one that we can sign off on in conjunction with general inspections.

The Standard for Innovating Methods of Dwelling Construction, LPS 2020, has the support of the Council of Mortgage Lenders and the Association of British Insurers, and of construction sector interests. An extensive programme of development and stakeholder consultation workshops resulted in the launch of the draft standard at the COPM Sustainable Communities Summit in Manchester in January 2005. It will provide a route to certification for innovative building systems, sub-assemblies and elements, which are not wholly covered under current recognised standards and codes for dwelling construction, and have a limited track record of service in conventional dwelling construction in the UK.

LPS 2020 sets out requirements for performance and methods of verification, but not for specific materials, dimensions or design approaches. It is therefore designed to coexist with any individual type or form of construction.

The standard has been designed to meet the variable needs and performance requirements for the new generation of building systems, and to encourage the development of high quality products. The standard needs to be calibrated with the help of an expert group of industry representatives.
Renewable energy technologies have now largely discarded their ‘alternative’ tag. Formally of interest only to committed ‘greenies’ and trendy designers, renewable technologies are an increasingly mainstream and familiar source of energy, and a key element of Government energy policy.

One of the issues influencing that policy is the EU Energy Performance of Buildings Directive – which comes into force in January 2006 – requiring minimum energy performance standards to be set for new buildings and large buildings being refurbished. It also requires the provision of energy performance certificates whenever buildings change ownership or tenancy.

There are few better ways of improving energy performance and demonstrating a commitment to energy efficiency, as well as safeguarding against future energy price rises, than using renewable energy. So important is this technology to the UK’s energy and emissions targets, that the Government is committed to increasing the proportion of UK electricity from renewable sources to 10% by 2020. This is a very ambitious aim when you consider that in 2000 the UK generated just 1.3% of its electricity this way.

Renewable energy technologies

Renewable energy technologies offer virtually free energy in return for an initial capital outlay. There are currently two main Government grant schemes that help with equipment and installation costs – the BRE-managed Clear Skies scheme which provides support for a range of technologies in public-sector buildings such as hospitals, schools and community buildings, and the PV Grants scheme which provides funding towards the costs of photovoltaic systems. A new initiative to supersede both schemes is planned for sometime in 2006.

The most familiar sources of renewable energy are the wind and the sun.

Wind turbines

Wind energy is one of the most cost effective methods of renewable power generation. Wind turbines typically have three blades mounted on a horizontal axis, which is free to rotate in the wind on a tower. The blades drive a generator, either directly or via a gearbox, to produce electricity that can link to the grid or charge batteries.

Modern, quiet wind turbines are increasingly seen in lower-density urban areas, where ease of maintenance and immediate connection to the grid – or the direct use of the electricity in a building – can make them cost effective, despite lower wind speeds than in open areas.

While large wind turbines are generally less suited to dense urban areas, a number of companies are developing small, roof mounted turbines. If successful these are likely to be an increasingly popular way of providing buildings with energy. Wind turbines are available with outputs ranging from 60W to 3.6MW. Average wind speed is the main affecting output. It varies for different areas of the UK, but increases with the height of the turbine above the ground. A database on www. windsoftware.com can be used to predict the approximate wind speed at a particular site of co-ordinates at different heights, although for large commercial installations it is advisable to measure the wind regime at a given site for a number of months.

According to the Clear Skies grant scheme website (www.clear-skies.org) the typical cost of a small wind turbine ranges from £2,500 - £5,000 per kWp installed. The Clear Skies site has a list of registered suppliers that must be used by those applying to the programme.

Photovoltaics

Photovoltaic (PV) systems convert energy from the sun into electricity through semi-conductor cells that are connected together and mounted into modules. Photovoltaics supply electricity to the building they are attached to or to the electricity grid. Electricity can be sold to the National Grid when the amount generated exceeds local needs.

PV systems require only daylight, not sunlight, to generate electricity (although more electricity is produced with more sunlight), in that they can produce energy in overcast or cloudy conditions and can be used successfully in all parts of the UK.

Photovoltaic cells come in modular panels that can be fitted to the tops of roofs (looking similar to rooflights) and in slates or shingles that are integral parts of the roof covering (looking similar to normal roof tiles). Photovoltaic cells can be incorporated into-glass for atria walls and roofs, or used as cladding or rain screens on building walls – this is particularly suitable for prestige offices.

PV systems can be discreet when designed as an integral part of the roof. An ‘invisible’ design using slates or shingles, as opposed to an architectural statement, is likely to be preferable in sensitive areas.

Ideally, photovoltaics should face south-east and south-west at an elevation of about 30° to 45°, but even flat roofs in the UK receive 90% of the energy of an optimum system. They are particularly suited to buildings that use electricity during the day, such as offices, retail premises and schools.

There is a useful standard PV project so it’s difficult to give cost details, but ball-park figures for fully installed systems are:

- £1,000 - £4,000/kWp for a 1kWp (the peak output of the panel) roof mounted system
- £16,000 - £15,000/kWp for a 10kWp system

See www.est.co.uk/solar for details of grants for PV systems.

Solar water heating

Solar water heating systems use a heat collector, generally mounted on the roof, in which a fluid is heated by the sun. The fluid heats up water stored in the building. As these systems can function in diffuse lighting conditions, they work successfully in all parts of the UK. They are suitable for any building type that has sufficient year round hot water needs and a south (or south-east/south-west) facing roof. Offices, retail units or other buildings with car-parks, washrooms, etc, are particularly suited to this technology.

Likely cost details, and a list of registered suppliers and installers, are available at www.clear-skies.org.

Other systems

Among several other renewable energy technologies are:

- Biomass heating – biomass, usually in the form of wood chips or pellets, can be burnt to provide heat in buildings
- Ground source heat pumps – these draw heat from the ground, concentrate it and deliver it to the building
- Ground source cooling – space cooling for a building can be provided by circulating water cooled directly by the ground
- Fuel cells – currently being developed and trialled. Fuel cells convert energy stored in chemical form into electricity - as do batteries, but fuel cells use externally supplied fuel (hydrogen) and do not need recharging

Bipolar – obtained from the breakdown of organic materials by bacterial action (eg landfill gas from waste sites) or enhanced digestion methods.

- Hydro turbines – are turned by water to generate electricity – most hydroturbines is produced in fullies or river valleys.

More information

More information on renewable energy technologies is available in the London Renewable publication Renewable energy technology guide for planners, developers and consultants, which is available at http://www.london.gov.uk/mayor/environment/key-documents.jsp.

resource05

The latest renewable energy and energy efficiency developments will be on display at resource05, a three-day show being held at the ExCeL Lakeside site from 13-15 September 2005. Leading industry figures will discuss advances in low carbon technologies and how they are being applied in building projects across the UK.

Indoor and outdoor exhibitions areas will showcase a wide range of products and materials – solar thermal, advanced insulation, innovative cooling, biomass boilers, lighting, photovoltaics, ground source heat pumps and many others.

For more information on resource05 contact BRE Events on 07923 664800, Email events@bre.co.uk or visit www.resource05.com.
AVOIDING AIR CONDITIONING

Air conditioning use is rising by 8% annually in the UK, which could lead to 6 million extra tonnes of carbon emissions per year by 2020. Despite this, a Harris Research Centre study found that 89% of occupiers prefer buildings without conventional air conditioning.

Where solar gains are a major issue (and in fully glazed buildings they can give up to ten times the heat gains of office equipment or lighting), shading can have a substantial impact, in some cases avoiding the need for air conditioning altogether. A study in Sweden estimated potential energy savings of 3.87 kWh/year (2.7%) in non-domestic buildings. A BRE case study estimated that including air conditioning (a/c) in a typical 1990s open-plan office would require an extra 5.5% heat energy, resulting in overall air running costs of £5/m²/year. The same study showed that comfort could be achieved at a cooling energy consumption, with a combination of solar shading (either mid-pane or external) and night ventilation. The extra cost of such measures will usually be substantially less than that of installing cooling. The calculations also showed that even in a building where cooling had already been fitted, the shading could pay for itself in under five years.

The use of air conditioning can be reduced or avoided with the following techniques.

1. Building layout planning
The layout of buildings and rooms can maximise the benefits of sunlight and view out. For offices and similar side-lit buildings, the BRE recommends that main facades of buildings should face north and south – this makes shading easier and allows the use of winter solar gain that would otherwise be beneficial. Spaces where overheating would be critical can be placed on the north side of buildings.

2. Choosing appropriate window area
The window area can be limited – solar heat gain is roughly linearly proportional to window area – but reducing it can also limit the daylight and view out. For offices and similar side-lighted buildings, the BRE’s Environmental Design Guide gives tables that show the impact of window area (and other design parameters) on peak temperatures, and other useful design guidance.

3. Solar shading
A British Blind and Shutter Association guide details the different shading types and gives a lot of suppliers, and a BRE Report Solar shading of buildings also gives detailed advice on solar shading. Generally, external shading devices and reflecting glazing are more effective at blocking solar gain than internal shading devices. Mid-pane shading has an intermediate level of performance.

External shading
External shading is particularly appropriate for heavily glazed buildings where solar heat gain otherwise would be a major concern. A simple overhang can be highly effective at blocking high angle summer sun. They work particularly well on south facing windows. In fabric form, they can be clipped on to an existing façade. They do not hinder opening of the windows, and a full view out is retained. The light shelf is a form of overhang installed part way up a window, typically just above an occupant’s head height. Extra daylight can enter the space by reflection from the top of the shelf, passing through the glazing above it. In a range of building types, an overhang can be an attractive and simple solution of providing a nearsighted overheating. A variety of external blinds are available, and these provide more flexibility in use than a light shelf or overhang. External venetian blinds, other types of external controllable louvres and external roller blinds can be retrofitted. If having a view out is important, retractable blinds with occupant control are the best option.

Solar control glass and film
A wide variety of solar control glasses are available and have been extensively used in commercial buildings. There are two main types: absorbing glasses that are body tinted, and reflective glasses that have a special coating. Reflective glasses are usually slightly better at rejecting incoming solar gain. Absorbing-glass heats up more when the sun is on it, and some of this heat can reach the inside of the building.

Solar control films can be easily added onto flat glazing. Although less durable than glazing, they are easy to retrofit to existing buildings. As with fixed systems, both glazing and solar films will reduce useful winter solar gain and daylight. Advanced glazing is now available that can control overheating while admitting reasonable levels of daylight. The glass has a spectrally selective coating that reflects infrared radiation while admitting visible light. The coating also reduces heat loss in winter in the same way as a conventional low emissivity glazing. Some forms of solar control film also have this type of coating.

Mid-pane blinds
In double glazed units, mid-pane blinds can be an unobtrusive way to help control solar heat gain. Their performance will generally be intermediate between that of external and internal systems. In a sealed unit, a mid-pane blind will get dirty less quickly than an external or internal blind. Various options are available to allow them to be controlled from inside the building.

Internal shading
Internal systems can contribute towards solar heat control, but tend to be less effective than their external or mid-pane counterparts. Incoming solar gain can also be absorbed by the shading device and convected or reradiated into the interior. Fabrics with a solar reflecting coating, or a metalised finish to the reverse, will help reflect out the solar heat and offer a better solar shading performance than conventional fabrics – so systems that incorporate reflective materials usually have lower heat transmission. As the need for shading changes throughout the year in most buildings, adjustable shading is often the best option, but it does have some disadvantages – it can be more costly and harder to maintain as the moving parts can fail.

4. Thermal mass
An exposed heavyweight structure with a long response time will tend to absorb heat, resulting in lower peak temperatures on hot days. However, appropriate nighttime venting and acoustic requirements will need to be taken into account.

5. Natural ventilation
A reasonable level of ventilation will always be needed in buildings to maintain indoor air quality. The ability to switch to a much higher air change rate can be a very effective way of controlling solar overheating. This can be achieved by wind driven ventilation through conventional windows, particularly if cross ventilation is possible, and by using the solar heat itself through stack effects to vent hot air out at a high level.

6. Reducing internal gains
Internal gains can be reduced, for example by specifying energy efficient equipment, lamps and文科nes, or controls to switch off lighting and other equipment when it is not required. Calculating solar performance
The Building Regulations (Part L) limit solar overheating in buildings other than dwellings. In the 2008 regulations these provisions may be extended to dwellings as well. Appendix H of the 2002 Part L Approved Document (AD) gives guidance on the calculations, using the shading coefficient. This works well for glazing and some forms of blind, but drastically underestimates the influence of other techniques like overhangs, light shelves and external louvres. An overhang or awning for example, will preferentially block high angle summer sun – the shading coefficient, which assumes incoming radiation at normal incidence, takes no account of this.

The BRE has developed an alternative measure of summertime shading performance. This is the ‘effective gain value’ or ‘effective summertime solar transmittance’. For a given window system this is the solar gain on peak radiation days in May–August through a window with a shading device, divided by the solar gain through an unshaded, unglaresed aperture for the same period.

Methods have been devised to enable this to be calculated for a range of windows and shading device types. A recently published BRE Trust Report Summertime solar performance of windows with shading devices (available from www.brebooks.co.uk) gives detailed data for a wide range of systems, and shows how the data can be incorporated into calculations. The tables in this Report give the data for the full range of window orientations. Some shading device types (for example horizontal louvres) block most solar gain when they are on a south, south-east or south-west facing window. In contrast, vertical louvres usually perform best on north-east or north-west facing window.

The transmittance of the solar shading on its own may differ from the overall transmittance when it is placed either outside, inside or between the panes of a window. This can be evaluated using the methods in British Standard (BS) 13363-1. A CD attached to the BRE Trust Report gives a design tool to enable the overall effective gain value of a window and shading device combination to be found from the data for the individual components.

A section of the Report covers the effect of external obstructions, which the data show can have a quite a big impact typically 25-40% on the solar gain received by a window in summer – especially for north-east, east, north-west and west orientations. Traditional calculation techniques, which assume an unobstructed window, are therefore fully to overestimate solar overheating in urban areas.

The BRE Trust is hosting a free seminar on 7 July at its Garston site, on quantifying shading device performance. The seminar will also include a presentation on the latest developments in the Building Regulations.

For further information - Paul Littlefair,
01923 664874, Email: littlefip@bre.co.uk
The BRE publications referred to above are available from www.BREBookshop.com, tel 01923 640402, Email: BREEbookshop@RReidcpl.com

Fire safety guide for hotels

A BRE Trust publication on fire safety management of hotels:

• hotel fire safety and the law
• how fires start and spread
• how fires can be prevented
• building a fire safety culture
• fire risk assessment
• hotel fire safety features
• fire safety checklist

www.BREBookshop.com
T 01923 664100
E train@bre.co.uk
Building with Glass

Glass use in buildings has never been more popular than it is today. Magnificent buildings are being constructed that rely on glass to achieve the desired architectural impact, whilst supplying daylight to living and working spaces.

The project has involved developing a specification document for the factory glazing of windows. This document gives guidance to window manufacturers and specifiers at the various stages of production. It also includes guidance on storage, transportation, handling, installation and maintenance. Good practice with respect to glazing in the factory, and in the quality of IGUs and frames, is encouraged in the specification.

The document has been assessed through experimental work in which factory-glazed windows were produced and tested using the specification, and also through the involvement of leading industry experts. It will be published in spring 2003, and will supplement existing guidance on IGUs and glazing, which includes:
- BRE Report BR280: Double-glazing units
- BRE Digest 495: Insulated glazing units

Structural assessment of glazing under abnormal loads

This ODPM-funded project began in October 2003, in association with Buro Happold, and is focusing on the assessment of structural glazing systems under abnormal loading. It aims to inform the development of Building Regulations related to the structural performance of buildings.

The properties of glass do not lend themselves to excessive loading from diverse climatic events, or from the current terrorist threats. The focus of this work is to examine the different loads that could be experienced by a glazing system and how that system is likely to cope.

Abnormal loads investigated include explosions, extreme thermal shock, wind-driven debris, excessive wind pressure and human impact. The collapse mode behaviour of different glass options and glazing systems have been explored in the work, together with relevant standards and codes that are applicable.

Impact test standards for glass

BRE recently investigated the performance of safety glass as a result of the change from BS6206 to BS EN12600 for the impact test relating to human safety. The European test method was published in 2002 and replaces the current British Standard. This change is significant because the test method differs as a result of the type of impacted used. Instead of a 45kg lead shot filamented bag, the European Standard uses a 50kg steel weight with a double tyre. The nature of the impact is therefore slightly different during the test.

ODPM commissioned BRE to undertake a comparative study to ensure that there is no potential for reduced safety as a result of the change, and to assess the implications for Building Regulations.

A thorough test programme was undertaken using annealed, toughened, laminated, wired and filmed safety glass. The results indicated that there is no potential reduction in safety performance as a result of the change in standard.

The research has involved:
- An initial study of the current approach to safety in the whole life cycle of highly glazed buildings (design, construction, maintenance and deconstruction stages). The type and number of incidents that occur were investigated through a stakeholder workshop, a survey and a review of the current state of the art.
- Site-based studies of design, construction, maintenance and deconstruction stages of highly glazed buildings. The preparation of risk-based guidance for the glazing of such buildings.
- The development of risk models, allowing the identification, assessment and management of risks during the design, construction, maintenance and deconstruction stages of highly glazed buildings.

The report – BR471: Sloping glazing – Understanding the risks (S Garvin and I Murray), CRC Ltd, 2004 – gives examples of highly glazed buildings. These were developed into case studies, and allowed the identification of generic hazards for the glazing of such buildings.

Reduction in safety from overhead glazing

An initial study of the current approach to safety in the whole life cycle of highly glazed buildings (design, construction, maintenance and deconstruction stages). The type and number of incidents that occur were investigated through a stakeholder workshop, a survey and a review of the current state of the art.

For more information - Stephen Garvin:
01355 576200, Email garvins@bre.co.uk