

Housing Learning & Improvement Network

Eco Housing: Taking Extra Care with environmentally friendly design

This factsheet summarises the current policy and legislative context for 'green' and 'intelligent' housing. It presents examples of Extra Care Housing and general need housing developments incorporating such technologies and looks at opportunities and possible future directions. It also includes a useful summary checklist of things to consider, adapted from an article in Building magazine (10 December 2004).

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The Health and Social Care Change Agent Team (CAT) was created by the Department of Health to improve hospital and social care associated arrangements. The Housing Learning & Improvement Network, a section of the CAT, is devoted to housing based models of care and support for adults.



Other Housing LIN publications available in this format:

- Factsheet no.1: **Extra Care Housing - What is it?** (28.07.2003 updated August 2004)
- Factsheet no.2: **Commissioning and Funding Extra Care Housing** (28.07.2003 updated August 2004)
- Factsheet no.3: **New Provisions for Older People with Learning Disabilities** (23.12.2003 updated August 2004)
- Factsheet no.4: **Models of Extra Care Housing and Retirement Communities** (04.01.2004 updated August 2004)
- Factsheet no.5: **Assistive Technology in Extra Care Housing** (20.02.2004 updated August 2004)
- Factsheet no.6: **Design Principles for Extra Care** (26.07.2004)
- Factsheet no.7: **Private Sector Provision of Extra Care Housing** (21.07.2004)
- Factsheet no.8: **User Involvement in Extra Care Housing** (24.08.2004)
- Factsheet no.9: **Workforce Issues in Extra Care Housing** (01.09.2004)
- Factsheet no.10: **Refurbishing or remodelling sheltered housing: a checklist for developing Extra Care** (04.01.2005)
- Factsheet no.11: **An Introduction to Extra Care Housing and Intermediate Care** (04.01.2005)
- Factsheet no.12: **An Introduction to Extra Care Housing in Rural Areas**(04.01.2005)
- Case Study Report: **Achieving Success in the Development of Extra Care Schemes for Older People** (July 2004)

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Introduction

This factsheet summarises the current policy and legislative context for 'green' and 'intelligent' housing. It presents examples of Extra Care Housing and general need housing developments incorporating such technologies and looks at opportunities and possible future directions. As well as 'green' building techniques presenting environmentally sensitive, intelligent, networked properties are seen as offering resource saving opportunities. Website links are given at the end of the factsheet.

Policy and Legislative Context

There are many forces that are driving innovation in housing towards more sustainable methods of building and use¹.

- At the international level, the parties agreeing to the Kyoto Treaty aim to reduce emissions of greenhouse gases. Under the United Nations Framework Convention on Climate Change the UK has agreed to reduce emissions of greenhouse gases by 12.5% below the 1990 levels by the first commitment period of 2008 - 2012.
- United Nations Department of Economic and Social Affairs Division for Sustainable Development set out a comprehensive plan of action for human impact on the environment in Agenda 21 (full implementation 2002). This has been taken up in the UK, and Local Agenda 21 statements have been prepared by local government bodies. These require certain environmental considerations in local decisions, for example transport and housing.
- At a European level, the Energy Performance of Buildings Directive 2002/91/EC requires that the energy performance of new buildings is calculated and an energy performance certificate is produced for all new dwellings. This builds on the UK Building Regulations that already stipulate that a Standard Assessment Procedure rating (SAP rating) should be displayed on new properties. The method of calculating the SAP rating is currently being revised.
- At a UK level, the 2003 Energy White Paper – 'Our energy future – creating a low carbon economy' defines a longer-term goal of reducing CO₂ emissions by 20% by 2020 with a further goal of 60% by about 2050.

During the compilation of this factsheet the UK government has launched a review of the UK Climate Change Programme. While the UK is on target to meet its Kyoto commitment, it is currently not on track to meet the goal of 20% CO₂ emissions reduction by 2020. This review includes a section on household energy consumption and asks whether further steps can be taken towards improving building efficiency and to promote more energy efficient households.

¹ See *One Planet Products – A BioRegional Development Group report* for a more detailed explanation of the policy and legislative background.

www.bioregional.com/programme_projects/opl_prog/op_products/One Planet Products report - 4th october 2004.pdf

Other European initiatives are aimed at reducing the energy requirement of domestic products and services.

- The EU Energy Using Products Directive, expected to be published in 2005, establishes a framework for setting eco-design requirements for energy using products.
- The EU Renewable Energy Targets proposes that by 2010 22% of the energy generated in the then 15 member states should be from renewable sources.

There are other items of environmental legislation that cover packaging waste, waste electrical and electronic equipment, hazardous substances and chemicals that affect domestic appliances and products and the built environment².

UK government legislation that directly affects the nature of the built environment includes:

- The Housing Act 2004
- The Sustainable and Secure Buildings Act 2004
- The Home Energy Conservation Act 1995
- Building Regulations – Part L is being amended to lead to an improvement in the energy efficiency of new buildings.
- Planning and Policy Guidance Notes 1 General Policy and principles and 3 Housing. Other PPGs also impact on the way that housing developments can be built and their requirements sometimes lead to innovative designs, methods or techniques i.e. 9 Nature Conservation, 13 Transport, 16 Archaeology and planning, 17 Planning for open space, sport and recreation and 23 Planning and pollution control.

These are, in addition, a number of UK government plans and initiatives that focus directly on the nature and quality of housing in both the public and private sectors and include emphasis on energy efficiency and reducing environmental impact of developments.

- Sustainable Communities plan and the Egan Skills Review
- Regional and Local Government supplementary planning guidance
- The London Plan and The Mayor's Energy Strategy
- Decent Homes standard for social housing
- Housing Quality Indicators
- The Housing Corporation's Sustainable Development Strategy and Scheme Development Standards, including minimum EcoHomes rating of 'Good', and the 'Routes to Sustainability' information resource
- Constructing Excellence

² Producer Responsibility Obligations (Packaging Waste) Regulations, Waste Electrical and Electronic Equipment Directive (WEEE), Restriction of Hazardous Substances (ROHS), Registration, Evaluation and Authorisation of Chemicals (REACH).

- Code for Sustainable Buildings
- English Partnerships requirement for EcoHomes standard of 'Very Good' and sometimes 'Excellent' and National Home Energy Rating (NHER) of 9.0 or higher.

And also initiatives that aim to promote reduced domestic energy use including:

- DEFRA's Market Transformation Programme aims to develop policy strategies for improving the resource efficiency of traded goods and services in the UK.
- The Advisory Committee on Consumer Products and the Environment (ACCPE) provides advice to Government on policies to reduce the environmental impacts of products and services.
- Energy Saving Trust, which aims to achieve the sustainable and efficient use of energy, and to cut CO₂ emissions. EST offers advice to consumers and anyone involved in housing provision about the choices and schemes that are available to promote more efficient energy use. It publishes a range of briefing notes including some that summarise the various housing standards related to energy efficiency standards. It also manages a network of Energy Efficiency Advice Centres (EEAC) throughout the UK that provides free impartial advice on energy efficiency to households³.

A further range of activities is targeted at improving the outside environment of new buildings and developments:

- Commission for Architecture and the Built Environment (CABE) aims to improve quality of design of both public and private sector developments in all types of building, not just housing.
- Secured by Design aims to design out crime and create secure, quality places where people wish to live and work.

Examples of housing with minimal environmental impact and 'intelligent' technology

During the last 5 to 10 years there have been a number of projects, including with providers of Extra Care Housing, that have built homes using a range of environmentally friendly building methods and techniques. Some also combine this with 'intelligent' technology to enhance the living experience of the occupants. This section presents examples of developments that have been designed with environmental principles, and some have included 'intelligent' technology. Information in this section has been drawn from publicly available sources and was also supplied by participants in the projects and Housing LIN members.

³ EST www.practicalhelp.org.uk/briefings/main.cfm?main_id=69

Green and Intelligent Extra Care Housing

Durham County Council, in partnership with **Hanover Housing**, have built six Extra Care Housing schemes. Each development has between 36 and 45 self contained flats. They replace existing residential care homes and all are wheelchair accessible.

Durham County Council has a clear policy on sustainability and has compiled a guide to sustainable development in the North East, which takes into account local requirements as well as the wider agenda. This policy was used to inform discussions with Hanover Housing once they were selected as partners, and the Council was able to fund the additional capital requirement of some of the features because it acknowledged that there may be reduced running costs as a result. The partners and the contractors were very accommodating of the Council's requests.

The project has only recently been completed and formal evaluation into the effectiveness of the building design and services has not yet taken place. A study will be undertaken to compare progress of people in Extra Care and Residential Care for people with similar care needs.

Energy use on site is reduced by:

- Combined heat and power (CHP) – a gas fuelled DACHS unit supplied by Baxi Technologies UK. The unit produces 12.5kWth of heat for the flats and 5.5kWe electricity for use in the plant room, communal areas and lighting. The system works alongside high efficiency condensing boilers, solar water heating and the national grid.
- Solar power – solar panels to provide domestic hot water. At one site 40m² of solar collector panels were mounted on the south facing pitched roof. The water is pre-heated by the panels before entering the gas-fired hot water system. It was estimated that it would take 10 to 15 years to pay back the capital cost and estimated to save in the region of 40,000kWh and 20 tons of CO₂ per year in comparison to water heating with fossil fuels. The system was estimated to have a lifespan of over 25 years.
- High levels of building insulation
- Building Energy Management Systems (BEMS) to operate heating and hot water plant at each site. BEMS ensures buildings are operated to their optimum performance; it intelligently manages seasonal changes and alterations in usage of the buildings. The systems remotely monitor individual properties and are used to monitor any faults or alarms that are raised. It also allows utility consumption to be logged and used to compare trends across individual plant and buildings. It was estimated that the capital costs of the network controls and the central management point could be paid back after 12 to 18 months operation. The costs will be reduced by targeted maintenance and optimal energy use.

- Heat recovery ventilation systems that extract warm air from kitchens and bathrooms and recover the heat from this warm air before it is discharged outside. The heat is transferred to incoming cold air used to ventilate the rooms.

Water savings are generated by:

- Rainwater harvesting for use in toilets and central laundry. At one site it was estimated that 1900m³ could be collected per year. As well as providing a high quality source of 'soft' water, using rainwater in this way reduces the overall quantity of sewerage to be processed.
- Grey water recovery

Building methods reduced on site costs and time:

- Timber frame construction enabled a substantial amount of work to be completed off site and speeded up the construction timescale.

Intelligent technology is used to promote the well-being of the occupants:

- Telecommunications
- CCTV for premises surveillance
- Secure access and alarm call service
- Occupant monitoring for users with high dependency needs which tenants, their families and care staff can choose.

The external environment was designed to be attractive for the occupants and to link them to the outside world:

- Garden and leisure areas
- Links to public transport
- Promotion of interaction with the local community with facilities and activities open to non-residents and the encouragement of interaction with local schools, church groups etc.

Vertically challenged!

The **Integer Partnership** is a partnership of architects, housing providers, the construction industry and research bodies that is committed to delivering the benefits of step change innovation in housing and the built environment. Examples of their work include housing, a school and a demonstration facility in Hong Kong.

Working with **Westminster Council** and **City West Homes**, the **Integer Partnership** is currently working on the refurbishment of Glastonbury House in Pimlico, London. It is a tower block that is occupied by people aged 55+.

A review of five pilot housing projects, *Improving Quality Performance and Value in Housing*, is available from the Housing Corporation.

The six key findings from the pilot projects were:

- Innovative intelligent and green homes can be achieved within the budget constraints of standard projects
- Innovative homes save money for residents
- Innovative homes are replicable
- Innovative homes have a lower impact on the environment throughout their lifetime
- Residents enjoy living in innovative intelligent and green homes and want to stay in their homes
- Innovative homes are easy to let

The report gives nine guidelines for successful innovation:

- Establish early shared ownership between the development and operations teams
- Align requirement specifications with budgets
- Align innovative solutions to performance specifications
- Train and educate residents, staff, management and other professionals
- Manage expectations
- Carefully source products, systems and support
- Select contractual strategies that support partnership and innovation
- Share success, acknowledge and address problems
- Plan and manage for success

The review document also contains lists of design and construction innovation, environmental technologies, and intelligent technologies that have been deployed on each pilot project.

The Integer principles have moved into some mainstream housing provision, examples include:

SOHA - EcoHomes in Lydalls Road, Didcot, Oxfordshire – satellite and terrestrial TV distribution networks, phone and data networks, photovoltaic and solar thermal, grey water recycling and two geo-thermal heat pumps.

Notting Hill Housing Trust – Gold Lane, Burnt Oak, North London - low-energy, timber-frame homes with natural roofs complete with grass mono-pitch roofs, Western Red Cedar cladding and graffiti resistant walls.

Gallions Housing Association – Gallions Reach Urban Village EcoPark, Greenwich, London – 39 houses that form part of a 1500 home development. Features include – timber frames, high insulation, advanced argon filled double glazing, condensing boilers, solar water heating, low-flush toilets (2.5 or 4 litres), spray taps, smaller sized baths, showers, rainwater harvesting for garden use, energy efficient lighting, recycling facilities, solar spaces to warm the house, under floor heating. The project also aims to monitor four house types and will measure how airtight the buildings are, how effective the insulation is, how sound proof the structures are and how effective the solar water heating system is. The project will also monitor each house, and a non-eco control house using telemetric logging. Gallions also aims to disseminate the results of the project to the widest possible audience.

Green and healthy living

BedZED (Beddington Zero Energy Development) is an oft-quoted, and award-winning, example of innovative eco-housing. Situated in the London Borough of Sutton it is a joint venture between the Peabody Trust, the BioRegional Development group and Bill Dunster Architects.

The project comprised 82 homes, 34 for sale, 23 for shared ownership, 10 for rent, and 15 for social housing. The site also has workspace for residents and retail and community facilities. The site was reclaimed land.

The design emphasis was on zero fossil energy use and practical 'green' living. It was estimated that there would be a 60% reduction in total energy demand and a 90% reduction in heat demand when compared to a typical suburban home.

Energy on site is supplied from:

- A small 130kW CHP unit fuelled by tree surgery and forestry waste. The electricity and hot water from this unit are distributed around the site.
- 777m² photovoltaic panels, which generate power for electric vehicles used by local residents.
- Renewable electricity purchased on a 'green tariff' through the national grid.

Energy use on site is reduced by:

- Super-insulated roofs, walls and floors
- Triple-glazed windows in timber frames

- A heat exchanger in the wind-driven ventilation system
- Passive solar gain through large glazed areas on southerly facing aspects.
- Low energy lighting

Water savings are achieved by installing water saving appliances and making the most of rain and recycled water.

- Water efficient washing machines were chosen
- Lower-volume baths and taps with water-saving flow restrictors
- Dual flush toilets that use rainwater
- Highly visible water meters
- Recycling water on site to a standard for flushing the toilets

There was an emphasis on local building materials and employing local contractors. Where possible elements of the local vernacular building tradition were incorporated into the design.

The transport strategy aims to reduce the need to travel, to promote the use of public transport and to offer alternatives to using private cars.

Energy efficient homes

Anchor Trust. Dolan Court in Childwall, Liverpool, is a 137 property development that replaced 7 tower blocks and a block of maisonettes. The project is planned in a number of phases and this summary gives an outline of the technology being deployed across the sites, however, not all will be used in all locations.

Energy use on site is reduced by:

- High levels of insulation
- Combination boilers
- Orientation to maximise passive solar gain
- Photovoltaic panels to generate electricity for household use and export to the national grid
- Solar panels for water heating

Water use on site is reduced by:

- Water saving appliances including low flush toilets and low flow taps
- Rainwater recycling
- Grey water recycling

Building methods:

- Timber frame reduced on site costs and time
- Recycled materials were used for road building

The external environment includes:

- A communal garden run by tenants with recycling and composting features.

Sustainable communities

Yorkshire Housing Association is undertaking a redevelopment of two streets that form a problem area on a housing estate on the outskirts of Huddersfield. The previous homes were undesirable, difficult to let and suffered from a high turnover of residents. The area fell into decline and its reputation dropped. A brief was developed to design a sustainable scheme with a target of Ecohomes “Excellent” and to work with the community to seek a sustainable solution to the redevelopment.

The new development is being undertaken with extensive consultation with local residents, the local authority, housing office and police in order to understand the problems and to design them out of the new development. The development will include apartments and housing and there will be a mix of tenures. Some design elements are intended to keep the turnover of residents as low as possible, for example, the apartments, although intended for single people, will have two bedrooms to allow for changing situations. The houses will have an adaptable loft space to accommodate a growing family.

Energy use by residents will be reduced by:

- Thermally efficient building fabrics in excess of new building regulations
- Solar panels for water heating on the houses
- Photovoltaic panels on both houses and apartments
- Funding for the solar and photovoltaic panels comes partly from the DTI Clearskies and the EST Major Photovoltaic Demonstration Programme

Water use will be managed on site through:

- Sustainable drainage
- Rainwater recycling
- Reduced water consumption appliances

Building methods will include:

- Modular methods of construction. Yorkshire Housing has pioneered volumetric modular building methods with Yorkon for the 6th Avenue, York scheme. The family housing will be built using highly thermally efficient panelised timber houses. The build method for the flats is yet to be finalised. These construction methods are estimated to reduce the time on site by around 25% compared to traditional build. It will also reduce waste and the numbers of workers on site. It can also reduce the number of defects in a new building and can reduce the number of accidents on site.
- The houses will have an adaptable loft space that gives additional living space if more room is needed.
- Recycling of some demolition materials, for example York Stone blocks for facing and retaining walls.
- 'New' materials to be either recycled/recyclable and/or from renewable resources, for example Forest Stewardship Council certified timber.

Intelligent technologies will include:

- Broadband Internet access to encourage and allow people to work from home.

External environment will include:

- Secure play areas
- Traffic management and through routes will be discouraged
- Open areas that are 'owned' by the residents and overlooked by residents to increase security

Rural development

West Lancashire District Council and Muir Housing Association, and two other registered social landlords are working to provide 85 affordable new homes in rural villages. Included in the package are two bungalows in Halsall, near Ormskirk, to be built to both "Excellent" EcoHome and 'Lifetime Home' standards. 'Lifetime Home' standards ensure that a home is both accessible and have the flexibility to adapt to a resident's changing lifestyle. The project also includes a consultant to advise Muir Housing Association and the architect on the measures that can be taken to maximise the EcoHome rating and to assist in applying for grants for solar power or ground heat sources.

Energy use on site will be reduced by:

- A no emission low carbon heating system
- Appliances that are rated 'A' for energy by the EU energy labelling scheme
- Low energy light fittings

Water use on site will be reduced by:

- Water butts for garden water
- Low flow taps

Building methods will include:

- High insulation levels
- Timber frame and furnishings from Forest Stewardship Council approved sources.
- Sound insulation exceeding Building Regulations Part E requirements
- Materials used in construction will be 'A-rated' in the BRE *Green Guide to Specification*

Outside environment

- Secured by Design principles will be employed on the exterior of the properties
- An ecological consultant will be appointed to design the exterior landscape to reduce rainwater run off and maximise water retention and to design a planting scheme to increase the ecological diversity of the site
- There will be easily accessible parking for each property

What next?

Raised standards

The English Partnerships Millennium Communities Programme⁴ sets out to promote sustainable development principles, raise awareness and demand for improved design and environmental quality and give developers the opportunity to research and test innovative development processes, techniques and products. The Programme now has a number of core standards that are being used on its latest projects, and aspirational standards that will be included as the opportunity arises. As well as raising performance standards they also include the need for IT data points in living rooms and bedrooms, which will enable residents to use the Internet or other

⁴ Contact the Millennium Communities Programme for more information www.englishpartnerships.co.uk

digital services. This is widely seen as a first stage in enabling the connected lifestyle.

The design standards will be reviewed annually with regard to applicability and technical development, and will be revised appropriately when the assessment schemes they are based on are updated. Residents of the Millennium Communities will also be asked about their experience of living in their homes and the places that they inhabit in order to understand the impact that the environment (in its widest sense) has on them.

English Partnerships also now chairs the National Standards Working Group with CABI and the Housing Corporation. This will develop a consistent and holistic framework for the range of design and sustainability standards used by the three Government agencies.

There is potential for English Partnerships to set the agenda and address some of the issues that are raised by the trend towards more efficient and intelligent homes. More information about the Millennium Communities will shortly be available on a dedicated website.

Consumer awareness

The Housing Act 2004 introduces the Home Sellers Packs as a requirement for people moving home. Part of the pack will include an assessment of the energy efficiency of a property. Since 2001 the display of a energy efficiency SAP rating on a new property has been obligatory, but research by National Energy Services showed that 18 months after the introduction of this regulation there was a low level of compliance in the display of the energy rating and that sales negotiators generally had a low level of knowledge about the energy efficiency of the homes they were selling⁵.

The new requirement for all sellers to provide information about energy efficiency will draw the relative performance of their property to the attention of buyers, who will then be able to compare properties. It will also highlight the difference in energy efficiency between new-build and older properties. The choice of a new home is, of course, a personal matter, however, but energy efficiency, and other sustainability issues are likely to feature alongside location, price, size, layout and fitted kitchens in the decision making process of house-buying in the future. But there remains a need to educate consumers about the information that they will receive in the Home Sellers Pack.

People will also need more information on how best to use their new home and benefit from any energy saving or other environmentally friendly features. Defra has

⁵ NES 2003 *Selling the SAP* www.nher.co.uk/pdf/Selling_the_SAP_Final_version.pdf

recently announced that it will launch Environment Direct - an internet-based service that will provide clear facts about the effects of consumption choices and energy efficiency. It aims to have this running in 2006.

Bringing private developments up to standard

There is currently little incentive for private developers to build beyond regulation standards. They are generally only concerned with the short-term impact of their work, and not with the whole lifetime impact of the buildings⁶. The new building regulations will improve sustainability standards and mixed developments are likely to encourage innovation beyond the regulation standards. This is particularly true of English Partnerships developments. Additional consumer education may lead to further demand for more sustainable homes.

In terms of the potential for household intelligence, private developers do not generally see the need to build properties that are ready for home networks. But developments such as the Oakgrove Millennium Community in Milton Keynes which will have optical fibre to the home may set an example of how future developments should be prepared for broadband delivery⁷. Within the home, the spread of wireless networking devices may kick off the demand for networked home devices that intelligently control the home, not just entertainment activities. The Cenelec SmartHouse Code of Practice, to be published in 2005, will specify requirements for installers, operators and manufacturers of intelligent devices⁸.

London – showing the way?

In February 2004 the London Mayor published *The London Plan* and *The Mayor's Energy Strategy*. The Energy Strategy shows how the Mayor would like to see the supply and use of energy in London in ten years' time. The Greater London Authority Act 1999 allows the Mayor to set regional targets that allow London to play a full role in meeting national targets, and to set those targets in the way that is most appropriate for London. The Energy Strategy sets out a number of proposals that could accelerate the rate at which energy efficient measures can be adopted. For example, in order to increase the pace with which both the planning system and construction industry embrace sustainability as a fundamental design criterion there is a proposal that there should be at least one zero-carbon development in every borough by 2010⁹.

⁶ WWF 2004 *Building Towards Sustainability* www.wwf.org.uk/filelibrary/pdf/OMSHbrief.pdf

⁷ Select Committee on Trade and Industry 3 February 2004
www.publications.parliament.uk/pa/cm200304/cmselect/cmtrdind/321/321we26.htm

⁸ Cenelec Smart House Code of Practice
www.cenelec.org/Cenelec/CENELEC+in+action/Horizontal+areas/ICT/SMARTHOUSE++PHASE+II.htm

⁹ The Mayor's Energy Strategy, p 55 proposal 2.

The London Plan replaces the Secretary of State's Regional Planning Guidance for the London region. It sets the need for energy efficiency into context with other environmental measures such as water efficiency and noise reduction, and the other policy themes of long-term economic growth and social inclusiveness. London uniquely has the opportunity to set standards for the other regions through setting out clear long and short-term aims for the capital.

Future needs

The projects described above have all been designed with meeting the *current* needs of the occupants. In the area of housing for older people there has been little emphasis on the digital requirements of occupants, particularly in terms of digital television and Internet connections. However, it is likely that future residents will come to an Extra Care Housing environment from a home that is already equipped with up to date digital entertainment facilities. They will particularly want to take that with them if they move into extra care or other social housing because it enables their family and community interaction. Some people may have their family spread across the world and they use digital technology to keep in touch. For others their community may be the people they meet through digital interaction in special interest groups for hobbies, interests, lifestyles and so on.

Digital technology can also enable residents to interact with each other, to arrange appointments or book on-site facilities. A recent review of a block of flats with ICT functionality in Sweden suggests that functions that increase residents' safety and security (electronic key to the flats, CCTV), that save time (booking on-site facilities, broadband) and increase occupants' comfort (monitor energy use, provision of a laptop computer, and integration of the computer and telephone) are the ones that were most appreciated¹⁰.

Developers should also be aware of add-on services that could be included within developments that will enhance residents' sense of community. Indeed, these are features that can also be easily incorporated in an Extra Care Housing scheme and/or integrated into existing community alarm or telecare services (for further details, see Factsheet no.5, *Assistive Technology in Extra Care Housing* available on the Housing LIN website, www.changeagentteam.org.uk/housing).

Better and more accessible products

There is a clear need for further development of products for reduced-energy homes. Many of the projects discussed above also involved piloting newly-designed appliances that met the specification of the project, or making compromises because the available products did not quite meet the project's needs. Increased "mainstreaming" and the availability of off-the shelf solutions will reduce the costs

¹⁰ Sandstrom & Keijer 2004 *User Values Evaluated in Three Smart Home Projects*
www.smarthomeforum.com/start/int190404.asp

and enable designers to have a choice in what they can do and how it can be achieved.

Residents must also be able to control their own homes and the devices that are used for this must be improved. Recent research by Ricability, a charity dedicated to providing independent information of value to disabled and older consumers, on central heating controls highlights the gap between current designs and the ability of users to fully and easily set controls. If users can't fully use the available programmes they will be using default settings that are not always appropriate for them or will not achieve the maximum personal and/or environment benefit.

Website links - in the order of their appearance in the text:

- Kyoto Treaty <http://unfccc.int/resource/convkp.html>
- Agenda 21 www.un.org/esa/sustdev/documents/agenda21/index.htm
- EU Energy Performance of Buildings Directive
 - European level: <http://europa.eu.int/scadplus/leg/en/lvb/l27042.htm>
 - UK implementation www.diag.org.uk
- Energy White Paper www.dti.gov.uk/energy/whitepaper/index.shtml
- Review of UK Climate Change Consultation Paper
www.defra.gov.uk/corporate/consult/ukccp-review/ccpreview-consult.pdf

- EU Energy Using Products Directive
http://europa.eu.int/comm/enterprise/eco_design/index.htm
- EU Renewable Energy Targets
www.europa.eu.int/comm/energy/res/index_en.htm

- Producer Responsibility Obligations (Packaging Waste) Regulations
www.environment-agency.gov.uk
- Waste Electrical and Electronic Equipment Directive (WEEE) and Restriction of Hazardous Substances (ROHS) www.dti.gov.uk/sustainability/weee
- Registration, Evaluation and Authorisation of Chemicals (REACH)
www.defra.gov.uk/environment/chemicals/eufuture.htm

- Housing Act 2004 www.legislation.hmso.gov.uk/acts/acts2004/20040034.pdf
- Sustainable and Secure Buildings Act 2004
www.hmso.gov.uk/acts/acts2004/20040022.htm
- The Home Energy Conservation Act 1995
www.hmso.gov.uk/acts/acts1995/Ukpga_19950010_en_1.htm
- Building Regulations part L amendments
www.odpm.gov.uk/stellent/groups/odpm_control/documents/contentservertemplate/odpm_index.hcst?n=4963&l=2
- SAP 2005 <http://projects.bre.co.uk/sap2005/>

- Planning and Policy Guidance Notes 1 & 3
www.odpm.gov.uk/stellent/groups/odpm_control/documents/contentservertemplate/odpm_index.hcst?n=2263&l=2
- Decent Homes Standard
www.odpm.gov.uk/stellent/groups/odpm_housing/documents/page/odpm_house_602095.hcsp
- Housing Corporation Sustainable Development Strategy
www.housingcorp.gov.uk/resources/sustain.htm
- Housing Corporation Scheme Development Standards Fifth Edition, April 2003
[www.housingcorplibrary.org.uk/housingcorp.nsf/AllDocuments/F88FC069D09617D380256CFB0052682C/\\$FILE/SDSv5.pdf](http://www.housingcorplibrary.org.uk/housingcorp.nsf/AllDocuments/F88FC069D09617D380256CFB0052682C/$FILE/SDSv5.pdf)
- Routes to Sustainability www.routestosustainability.org.uk
- Housing Quality Indicators
www.odpm.gov.uk/stellent/groups/odpm_housing/documents/page/odpm_house_023533.hcsp
- Constructing Excellence www.constructingexcellence.org.uk
- Code for Sustainable Buildings and Sustainable Buildings Task Group
www.dti.gov.uk/construction/sustain/sbtg.htm
- Eco Homes <http://products.bre.co.uk/breeam/ecohomes.html>
- English Partnerships
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CHECKLIST

Low energy is a key issue in building specification and must be considered alongside sustainability criteria. Barbour Index and Scott Brownrigg offer some suggestions (from *Building* magazine 10 12 2004)

1. Take a balanced view

Energy use has been a topic of concern for decades, but with the onset of global warming it has recently taken a leap up the political agenda. This has fed through into tougher Building Regulations, making energy use one of the specifier's key considerations. Balancing low energy use during construction with other sustainability issues, such as lifetime energy use is critical.

2. Know your materials

Specifiers should ensure that they understand the criteria being considered. Ensure when you are specifying a material that it meets the client's requirements and remember to balance high embodied energy material like concrete against its everyday energy performance and long life. Also carefully consider the building's use pattern to specify targeted energy conservation measures.

3. Consider thermal performance

Thermal performance takes into consideration a number of terms, typically thermal resistance (R-value) or thermal conductivity (K-value). The U-value is an overall measure of thermal transmittance through a section of the building. It takes account of the R-values of all materials used in that section and allows for surface transmittance and any air gap. Remember the U-value is only a relative guide as U-values are based around static conditions that hardly ever apply in the real building. Also the law of diminishing returns applies to improving U-values after a certain point, so it may be more cost-effective to save energy in other ways such as installing efficient boilers.

4. The airtightness issue

Consideration of the building's air infiltration rate is another key issue that is being brought into focus by Building Regulations. Infiltration now has to be checked in most buildings by pressure testing. Specifiers need to be clear what materials are being used as air seals, particularly around doors and windows, and what is being utilised as the vapour control layer. These may be the same or different depending on the design and performance required

5. Work with the M&E engineer

Close liaison is also required with the mechanical and electrical engineer on all but the simplest projects. This is because the building's systems have a fundamental part to play in energy use and are becoming increasingly sophisticated. Use of condensing boilers, under-floor heating, night purging to cool the building mass and intelligent facades are a few examples of good practice

6. What about green features?

Many projects now consider the use of some form of solar collector, rainwater harvesting and even wind generation. It is clear that the payback is long for photovoltaic panels, making it difficult to justify its viability while energy outputs are so low and the costs so high. Thermal

solar collectors, on the other hand, provide a very useful energy input for comparatively very little cost.

7. Think about your glazing

The energy performance of glazing, particularly if south or north facing, can be considerable. New types of glass with up to 13 coatings that reject low-frequency heat but let light through are now available. The combination of energy-saving low-emissivity coated glass and edge seals with low thermal conductivity are achieving very good U-values (in the region of 1.2 W/m²K). This is still 10 times more conductive than unglazed areas, though, so snug -fitting thermal blinds are a practical solution. Insulation embedded in the floor and at cold bridges is also a good way to improve performance. Most heat escapes through large glazed external surfaces and at the corners, so concentrating on these areas will improve performance.

8. Stay cool without air-conditioning

With potentially warmer summers, we should be considering how to keep building occupants cool without recourse to energy-intensive air-conditioning. Use of the building's form to draw in air currents, ideally over water, can provide an attractive feature and achieve a significant amount of cooling. Adequate shading cant be created by the roof or architectural features such as brises-soleils.

9. Retrofitting old buildings

A big problem is energy-inefficient existing building stock, as significantly improving the energy performance of an existing building can be difficult. However, overcladding the walls with insulation and render can be very successful. Overlaying flat roofs with insulation and a single-ply membrane is effective too, and pitched roofs can be improved by installing prefabricated insulation panels, leaving just the tiles to be installed. New windows may be expensive but are straightforward to install. The British Federation Rating Council's new-scheme (see www.bfrc.org) for grading window-s in the same way that white goods are rated makes the process very straightforward. Remember, all windows are now subject to Part L of the Building Regulations.

10. Whole building calculation

The move towards whole building calculation methods of energy use means analysis of energy performance is becoming more complex for the specifier. Specifiers should make a start on understanding what is involved now.

11. Keep abreast of technological advances

Look out for new' materials, including foils and multilayer sheets, low-density foams such as nanofoam, more sophisticated coatings and hybrid insulation products such as vacuum-sealed panels. However it is important to be aware that the thermal analysis of these products is still not necessarily carried out very well.

References

- Standards and Quality in Development: A Good Practice Guide published by the National Housing Federation, which also produces a range of other useful guides.
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