

Making the most of our built environment

The Sustainable Construction Task Group

March 2004

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This report has been prepared by the Sustainable Construction Task Group, Chairman Sir Martin Laing. SCTG members are the British Property Federation, CABI, Construction Confederation, Construction Industry Council, Construction Products Association, Electrical Contractors' Association, Forum for the Future, Housing Corporation, Insight Investment, Office for Government Commerce, Spon, and WRAP. The secretariat for the group is provided by BRE.

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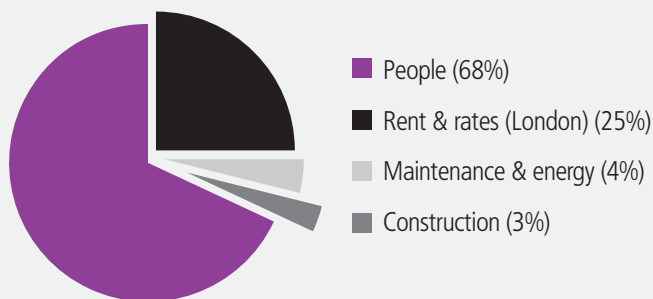
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Introduction

Around £25 billion is spent in the UK on maintaining and repairing the built environment asset base per year. In any year, new build construction projects add 1-2% to the built environment. Three-quarters of the current building stock is pre-1980s¹. In 50 years time, approximately half of the stock will be 'new' and the other half will have been through several refurbishment cycles. Received wisdom holds that maintenance and people costs are far greater than the capital cost of work.

The property industry is concerned that current legislative changes will discourage refurbishment by making it too onerous, leading to wasteful demolitions and new build. A complex interaction of market forces, legislation and cultural needs will shape the demographics of the built environment. Sustainability has moved from the fringes to being a desirable feature: over the next one to five years we will see it become essential.

Average cumulative costs for an office over 20 years



The age of the built stock and the costs involved underline the importance of management, operation, maintenance, refurbishment and regeneration. Sustaining Sustainability² highlighted that these sectors are under-represented in policy, research and innovation, with the care of infrastructure being particularly ignored.

The built environment is a key contributing factor to the wealth of the nation³, but it also has to function to support domestic and commercial activities. The Energy White Paper⁴ recognised the need for a low carbon future, and the role the built environment has to play. Energy generation and transport also play a role in reducing carbon emissions, but the construction and property industries cannot wait for these areas to change first. Given that the UK needs to reduce CO₂ emissions by 60% by 2050, simple logic suggests new buildings need to reduce their CO₂ contribution by a factor of four⁵, and as a whole existing buildings will roughly have to halve their CO₂ emissions over the same period in order to meet this target. Understanding how the property industry can be supported in reaching such targets is vital, particularly concerning the possible rate of and constraints on change.

The structure of this paper follows the average life cycle of a built facility, from management, operation and redecoration, through refits, to refurbishment and rebuilding or regeneration. Case studies focus on housing, commercial and historic properties. Information about infrastructure projects is included where appropriate.

Some buildings are cherished, while others are seen as liabilities that are poorly managed until demolition is the only option. This is partly a social and cultural construct. However in environmental terms, many older buildings (particularly 18th and 19th century buildings) have key characteristics which make them more adaptive and resilient: modest plan depths, high thermal mass, high ceilings and narrow windows. There are lessons to be learnt from the built heritage that has survived thus far. Heritage features are valued by occupiers, but have to be part of a functional whole.

Many large corporate occupiers and property companies have now adopted environmental and/or sustainability policies. Is this reflected in improved performance in sustainability terms of the properties they occupy or are responsible for? This document presents some examples. Even The Economist⁶ has noted the growth of sustainable properties, and how they reduce company liabilities and improve company profile, relationships with stakeholders and user productivity. Therefore are innovations such as post-occupancy evaluation and whole life costing, both of which should cover environmental, social and economic impacts, cascading through the market? This paper demonstrates some of that cascade and aims to encourage it further.

The importance of the existing built environment is implicit in the government agenda for sustainable communities. DTI, ODPM and Defra all supported the Better Buildings Summit, and ODPM is particularly focussed upon creating and regenerating communities that are sustainable environmentally, socially and economically. Developments such as the Thames Gateway provide the opportunity for the step change from three planet living, to one planet living⁷.

Following the publication of the Progress Review⁸, the Sustainable Construction Task Group recognised that management of the existing built environment is a priority for sustainability and decided to prepare this document. Not only is this an important area where progress will benefit society as a whole, it is also one in which innovation will provide significant opportunities for the construction industry and its stakeholders.

This briefing paper touches on some of the benefits to business and the community that will arise from the application of sustainability principles. It seeks to highlight good practice throughout the supply chain: specific projects, changes in working practices and new business processes. The paper identifies some barriers to progress and suggests financial and regulatory frameworks for change. It also sets some wide-ranging, process-led targets for each of the groups described (see box). These have been set to provide leadership in an impetus for change.

In parallel with this activity, the Sustainable Buildings Task Group⁹ is working to develop recommendations for targets to improve performance relating to energy, water, waste and building materials. These will be reported by summer 2004. The targets will be applicable to the existing environment as well as new build.

'The dilemma of whether to refurbish or rebuild new is never an easy one, from a sustainability view-point. But generally speaking there will only be a case for partial or complete deconstruction and rebuilding, if the new facility will achieve truly leading-edge performance (i.e. zero carbon like BedZed). Otherwise, and this is currently the more likely scenario, retaining and enhancing existing structures is likely to be preferable, especially when they have innate quality of design or construction. (This is of course a bold oversimplification!)

Dave Hampton,
Chairman, CIC Sustainable Development Committee

'The need to maintain, upgrade and enhance the performance of our built environment is self-evident. It shows how important it is that we use the new construction products available today to respond to the challenges of sustaining our stock and reducing its environmental 'footprint', thereby enhancing its value, life and re-usability.'

M J Gilbert RIBA FRSA
Chair, Construction Products
Association Environment Committee

Issues and targets in this document are applicable to

- 1 Upstream influencers such as planning authorities, Housing Corporation, English Partnerships, British Property Federation, British Council for Offices, House Builders Federation, Highways Agency, Environment Agency, Construction Clients Group'.
- 2 Property investors.
- 3 Clients and occupants such as asset managers and owners (housing associations, local authorities, private companies and homeowners etc).
- 4 Supply chain such as service providers, contractors and material and component suppliers.

Management, operation, maintenance and redecoration

What are the issues?

High quality management is vital for competitive business, decent housing and well-functioning infrastructure. Many property owners and managers address maintenance on a piecemeal basis, sometimes as part of their business or personal objectives.

A key issue for management to deal with is occupant needs, communication and provision of information for users. Many improvements revolve around advancing occupant choice and control, and better understanding occupant behaviour, perception and interactions.

Keeping up with changes in legislation has an impact on management, for example through disability access standards, energy efficiency requirements, labelling, and health and safety compliance.

Productivity and satisfaction in the built environment

In civil engineering there is increasing pressure to more effectively utilize and maintain the existing infrastructure.

Private housing is a problematic area: the opportunity to influence or control householder and landlord behaviour is limited, even through legislation.

What is being done?

Concerned occupiers can now turn to operational frameworks like 'Continuous Commissioning'¹⁰ in order to strategically optimise all aspects of their facility or accommodation in accordance with occupant priorities, financial performance and environmental improvement. Often the most important issue to address with owners, particularly commercial owners, is their approach to risk and uncertainty through the built environment¹¹.

Many professionals support the principle that the most effective strategy is to place the needs of the occupant first. The handover protocol (HOB0¹²) provides a framework for communication process and documentation. Schemes like BREEAM require the provision of 'user guides' and ODPM is investigating the guidance provided to new homeowners. Information and training for occupants and managers on the importance of issues such as climate change is available through The Carbon Trust and CarbonSense¹³.

To keep members up-to-date on legislation and encourage them to go beyond regulatory requirement, the industry is addressing sustainability through:

- Sustainable facilities management group, owned by the British Institute of Facilities Management (BIFM), International Facility Management Association (IFMA) and Royal Institute of Chartered Surveyors (RICS);
- Sustainability Special Interest Group in BIFM;
- CIBSE FM group;
- Fit Building network;
- Be and CFM guidance¹⁴ on facilities management and construction collaboration;
- BCO guide on best practice specification¹⁵ and companion document on fit-out.

Research on how the built environment affects productivity, absenteeism, morale and health¹⁶, and the comparative costs of different management and maintenance regimes¹⁷, is providing further impetus to improved management.

Major improvements have been made, for example by the Highways Agency standardising specifications to include recycled aggregates in highways maintenance programmes.

There could be considerable impact through utility companies five year plans for example, and the timescales for their planning being lengthened.

CEEQUAL¹⁸ is starting to have an impact on new build projects, but is yet to consider management of existing assets.

NHBC¹⁹ and Zurich²⁰ guidance are influential for homebuyers and the London Borough of Enfield has produced a guide for householders. WWF has recently reported on the performance of the UK's leading housebuilders²¹.

Tools to help

There are now many methods for building functionality and quality assessment, whole life performance calculations and user satisfaction evaluation: Continuous Commissioning, Overall Liking Score, post occupancy evaluation services carried out by BRE, Design Quality Indicator (DQI), HOB0, Managing Buildings Sustainably, Project SIGMA²² and Soft Landings to name but a few. Specialist environmental ratings exist for materials, though information on floor coverings and other finishes remains sparse at present.

Green Street

Four million homes are maintained and managed by housing associations and local authorities. Green Street brings together a wealth of information on meeting the needs of residents and communities while achieving improved environmental performance. It contains information on energy efficiency, water efficiency, material use, waste reduction, health and wellbeing and residents' lifestyle, as well as data on standards, costs, funding and procurement. Green Street contains information about eight dwelling types, ranging from the 1900s to the 1980s, including case studies. See www.greenstreet.org.uk



**London Borough of Lambeth:
Holles House, Angell Town, Brixton**

The National Trust

The National Trust is a well-known example of a property owner that has sought to reduce the environmental impact of its buildings:

- The Trust tries to ensure that all materials used in building projects are from as benign a source as possible. The building department holds stocks of reclaimed materials for reuse.
- Efficient appliances, energy monitoring and stewardship projects can reduce consumption. For example, approximately 13,000 low energy light bulbs have been installed at Trust properties as an energy saving measure.
- National Trust members challenged the Trust at the 1995 AGM to reduce car borne visits from a level of 90% to 60% by 2020. In order to achieve this, the Trust is working on a number of initiatives: better access by public transport; improved facilities for cyclists; and a review of car park provision.
- Reducing water consumption and protecting supplies, for example by using spray & auto off taps, waterless urinals, dry compost toilets, cistern misers and flow restrictors (for staff and visitor facilities).
- The Trust are also putting sustainability into practice in their new HQ in Swindon, designed by Feilden Clegg Architects.

More information on maintaining heritage assets is available at

www.maintainourheritage.co.uk/research.htm

Refitting

Decisions on systems and appliances made every 5-15 years

What are the issues?

Whole life costing and performance is coming to the fore as investors and clients wish to comply with legislation, and reduce risk and future liabilities.

Technological innovations in energy and water efficient systems and renewable energies are opening up new markets.

Unnecessary refitting when tenants change causes waste. Planned refitting can be less wasteful and costly if facilities management understand how systems can be deconstructed.

A problem that often becomes apparent at the refit stage is that the supply chain can find compliance with an output specification from the client difficult.

What is being done?

Part L is having an impact at the refit stage, when refurbishments meet the criteria. The requirement for a logbook is encouraging consideration of whole life issues. CIBSE's building log book template and guide²³ provide valuable support. BCO's office fit-out guide is also helpful and CIBSE has published guidance on Adaptable Building Services²⁴.

Andrew Stunnell's Private Members Bill on 'Sustainable and Secure Buildings' gives some indication of how some wish to see Building Regulations change.

The tools that are rapidly becoming available in the realm of facilities management can be applied to the refit or refurbishment stage, but as yet no specific tools have been developed for this stage.

In 2003, the CIBSE/ASHRAE Conference in Edinburgh presented some of the latest innovations in heating, ventilation and cooling. A key message was the cost effectiveness of many low energy and water systems, and renewable energy sources. There is a physical limit to what can be achieved in energy use within the existing fabric – so there needs to be a focus on infrastructure, for example CHP and district heating and cooling. Decoupling energy and carbon is an important step to take in considering energy efficiency and renewable energy.

In the commercial sector, new tenants tend to rip everything out when they move in even if the property is newly fitted out. This generates unnecessary waste of natural resources, time and money. Assessing occupant need prior to changes can minimise unwarranted work.

Different components in buildings have different design lives, and so facilities management need to learn about design for disassembly, separation technologies, materials reclamation and recycling and loose-fit detailing.

There is a huge range of modelling and whole life performance tools available to help the client, designer and supplier. The supply chain is also becoming more involved in measuring performance in-situ and remaining involved post-commissioning.

Sainsbury's

Sainsbury's annual energy costs are £50M per year. They aim to reduce carbon dioxide emissions by 10% from 97-98 baseline by 2005. Reducing costs is a driver, as well as anticipating legislation, improving corporate responsibility, and improving comfort. A wide-ranging refit programme, involves stepping down voltage supply (reducing energy use 3%), modifying lighting and control (5%), and recommissioning, optimising and monitoring refrigeration units (10%).



Sainsbury's flagship store, Greenwich

'There is a clear need for continuous improvement and innovation. We must fulfil our environmental aims. The consequences for not doing so are already onerous and these will only escalate.'

Colin Goodwin
Sainsbury's Property Company

Public Housing Strategy

The Housing Corporation's Sustainable Development Strategy sets out its approach on sustainability. It considers that the existing stock will play a vital role in the long-term viability of housing associations. Guidance already supports refitting and refurbishment, across almost 50 policy areas and policies provide opportunities to incorporate cost-effective environmental improvements. Policies cover:

- Decent Homes
- Fuel poverty
- Reducing carbon dioxide emissions
- Prudent use of natural resources
- Sustainable Communities; building for a better future
- Regulatory Code
- Asset management/reinvestment strategies
- Stock condition surveys
- Anti-poverty strategies
- Affordable Warmth strategies
- Affordable Water strategies
- Responsive, planned and routine maintenance strategies.

At the least, homes must be decent, which means having a modern kitchen, modern bathroom and insulation to help keep residents warm. The need to meet Decent Homes provides an excellent opportunity to reduce harmful environmental effects, meet Affordable Warmth targets, reducing running costs for residents, increasing comfort levels and cutting long-term maintenance and management costs.

Refurbishment and conversions

Decisions on roofs, walls, cladding, windows, joinery and insulation made every 15-50 yrs

What are the issues?	What is being done?
Opening up older buildings to new and multiple uses is often crucial to their survival, and encourages the vitality of the surrounding area.	Converting buildings has been a key part of the success of schemes such as the Mail Box development in Birmingham and Norton Park in Edinburgh. Thoughtful planning and design, with consideration of running costs, is essential.
Incentives for more sustainable refurbishments and conversions.	Various incentives are available for more sustainable activities. A guide to incentives has been produced by British Council for Offices ²⁵ . Repeated requests to reduce VAT for refurbishments have not been acted upon yet.
Local utilities infrastructure often dates from the Victorian era to the 1960s, and requires refurbishment.	'A Sustainability Estimator for Utilities' ²⁶ provides asset managers and contractors with a set of simple indicators for specifying and monitoring local infrastructure from neighbourhood hub to consumer. It is designed to encourage sustainable practice in the construction and refurbishment of utility infrastructure. Guidance on the appraisal and treatment of cuttings and embankments is available from CIRIA.
Costs and benefits of refurbishments are often complex to determine.	Refurbishment and conversion may not always be capable of saving much in terms of energy consumption, but will have a huge impact on comfort and other social factors. Assessing productivity and satisfaction will help. Choices will increasingly be affected by how well the facility is reacting to climate change and impacts such as increased water ingress ²⁷ .

Tools

The decision to refurbish or redevelop office premises is aided by OfficeScorer²⁸. The tool compares major or complete refurbishment with complete redevelopment, and redevelopment within an existing facade. It enables users to systematically compare and test the environmental and economic impact of different building design concepts and to identify sources of further relevant guidance. Tools such as this are needed for other building types. The Housing Market Renewal Pathfinders (sponsored by ODPM) are taking forward huge numbers of refurbishments and demolitions, such as Stoke's recent announcement that it will be redeveloping a third of its terraced housing over the next fifteen years. Such decisions must be well-informed.

Sustainable housing refurbishment

Research on sustainable refurbishment of tower blocks is available at www.sustainingtowers.org

- Sandwell Council has refurbished two 1960 tower blocks: Bowater and Braybrooke. Both towers suffered with empty properties, damp, condensation, and costly heating. Refurbishment measures included photovoltaic cladding, solar hot water systems, advanced sound and heat insulation, fire and security services, use of local labour and materials, high quality standards of design, workmanship and materials. A year long monitoring programme tested the effectiveness of the measures. An excellent community participation scheme involved the residents from the beginning, and continues to operate in the community. Results from this example and other European countries are available at www.sureuro.org
- The production of a refurbishment guide for Westminster Council kick-started a development with Integer. Now planning permission has been granted for an ambitious refurbishment of Glastonbury House in Westminster. For more details see www.integerproject.co.uk/westminster.html



Regeneration and rebuilding

Decisions made 50+ years

What are the issues?	What is being done?
<p>Key issues for new construction are integrating facilities management, travel plans and whole life costing.</p>	<p>Integrating facilities management into design is the focus of a best practice guide²⁹.</p> <p>Consideration of where the site is and how users are going to get there will probably be an important part of gaining planning permission. Guidance on travel plans and transport facilities are available from DfT.</p> <p>Whole life costing can solve some very complex design decisions, if it is widely and consistently applied.</p>
<p>The Government policy for 60% of development to be on brownfield land has boosted regeneration and rebuilding.</p>	<p>Targets have been met but whether such development can continue long term has been questioned by English Partnerships³⁰. Measures to encourage brownfield development such as the Brownfield Land Assembly Trust will continue to support regeneration.</p>
<p>Keeping facades and foundations is a key aspect of many projects.</p>	<p>This can reduce waste of materials, reduce nuisance to neighbours and help retain neighbourhood character. Regenerating and rebuilding infrastructure is also often required.</p>
<p>Improving existing or creating new green spaces is often core to schemes.</p>	<p>CABE Space was established in 2003 as part of the Commission for Architecture and the Built Environment, to bring excellence to the design, management and maintenance of parks and public space in our towns and cities. CABE Space is funded by the Office of the Deputy Prime Minister (ODPM)</p>
<p>Skills for regeneration and sustainable communities have been recognised as lacking</p>	<p>The Office of the Deputy Prime Minister's continuing work on sustainable communities³¹ will encourage regeneration throughout England. John Egan's upcoming report on skills will include many relevant recommendations for the industry.</p>

Hulme

The major redevelopment of Hulme in Manchester has resulted in one of the most advanced approaches to inner-city regeneration in the UK, which pre-dates the Urban Task Force and subsequent initiatives. In the 1960s Hulme was redeveloped with the then fashionable high-rise towers and the deck access blocks which formed the notorious Hulme crescents – 900 flats within a monolithic skyline. The inherent faults of industrial slab construction techniques lead to chronic damp and vermin infestation which exacerbated the social problems of the shifting populations.

In 1991 a financial package to regenerate Hulme as part of the City Challenge initiative was approved. A participatory process was initiated by the partnership organisation, Hulme Regeneration, and this resulted in the publication in 1994 of 'A Guide to Development'. This has been used in the evaluation of all applications for planning permission in the new Hulme and emphasised a community-based approach to developing a new urban 'quarter'.



Hulme regeneration

Conclusions

Management, refitting, refurbishment and rebuilding are crucial parts of the property and infrastructure sector, in terms of environmental impact, social wellbeing and financial success. This document has identified some key priorities and targets. More targets will result from the Sustainable Buildings Task Group. Many of the points in this document are based upon received wisdom within the industry. Quantified studies of environmental, social and economic costs and benefits, to support decisions and develop new tools, are welcomed.

Upcoming legislation, such as the implementation of the European Building Performance Directive, present great opportunities for change through promoting a level playing field. Facilities management has the chance to be recognised for the added value it can bring to every business and occupier. They are central to the discovery of buildings that people need, want and love to be in, use or look at.

Key priorities and targets

UPSTREAM INFLUENCERS: in management, refits, refurbishments and rebuilding, require funding to be used responsibly, encouraging investors and clients to specify high levels of environmental and economic performance, fit for user and community needs. Upstream influencers should remember their dual role as a client.

CLIENTS: always involve end users in management, and adopt tools to assess user satisfaction, environmental impact and risk as common practice. Arrange visits to facilities that are being managed sustainably. Appraise whether refit is needed if facility has been recently fitted out. Specify ambitious output targets for refits, for example based on energy (CO₂ /m²), water, waste and user satisfaction. Reward design and construction teams who exceed your output targets. Publicise your achievements.

INVESTORS: seek to minimise long term risk through awareness of productivity and satisfaction issues, innovative systems and whole life costing.

SUPPLY CHAIN: there is currently a paucity of guidance on the environmental and whole life cost impacts of furniture and finishes. Materials producers should initiate and cooperate with environmental and whole life costing studies and comparisons and authoritative guidance about choosing innovative systems.

Some priorities apply to all:

- Equalising how VAT applies to new construction and refurbishments.
- Cross-industry reappraisal of property rental agreements, allowing consideration of service charges to incentivise action to make buildings more sustainable.
- All players must become involved in Government and industry sponsored exemplar refurbishments and rebuilds, aiming at radical social and environmental sustainability, to promote visions of sustainability, gather information on the costs and benefits, and encourage a step-change in the industry. These exemplars should be integrated into existing initiatives and plans, such as the Housing Market Renewal Pathfinders and Urban Development and Regeneration Company plans for sustainable communities.

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From April 2004 the group is reforming under Constructing Excellence, Chairman Ian Coull, renamed the Sustainability Forum.

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