


# ECONOMICS

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## Sustainability Offices

 In this latest feature on eco-friendly development, **Simon Rawlinson** of **Davis Langdon** examines how a growing commitment to sustainability will affect the commercial offices sector, with a case study on how a client's requirements can be met in a leased building

### 01 Introduction

In previous articles on sustainability, we have examined specification options that enhance the environmental performance of new buildings.

Many of these, green roofs for example, lie at the aspirational end of the sustainability spectrum and are often specified as much to exemplify the green agenda as to embody long-term, low carbon performance.

The sustainability agenda is developing quickly and large

companies such as Asda Wal-Mart have pledged to reduce their carbon footprints, giving corporate credibility to sustainability initiatives.

With client expectations changing rapidly, developers and funders are increasingly required to promote a sustainability agenda that goes beyond compliance with regulations.

Although local authority requirements for on-site renewable energy may prove too

difficult to meet using current technology, there are other aspects of sustainable development that can be addressed to meet a tenant's environmental policy.

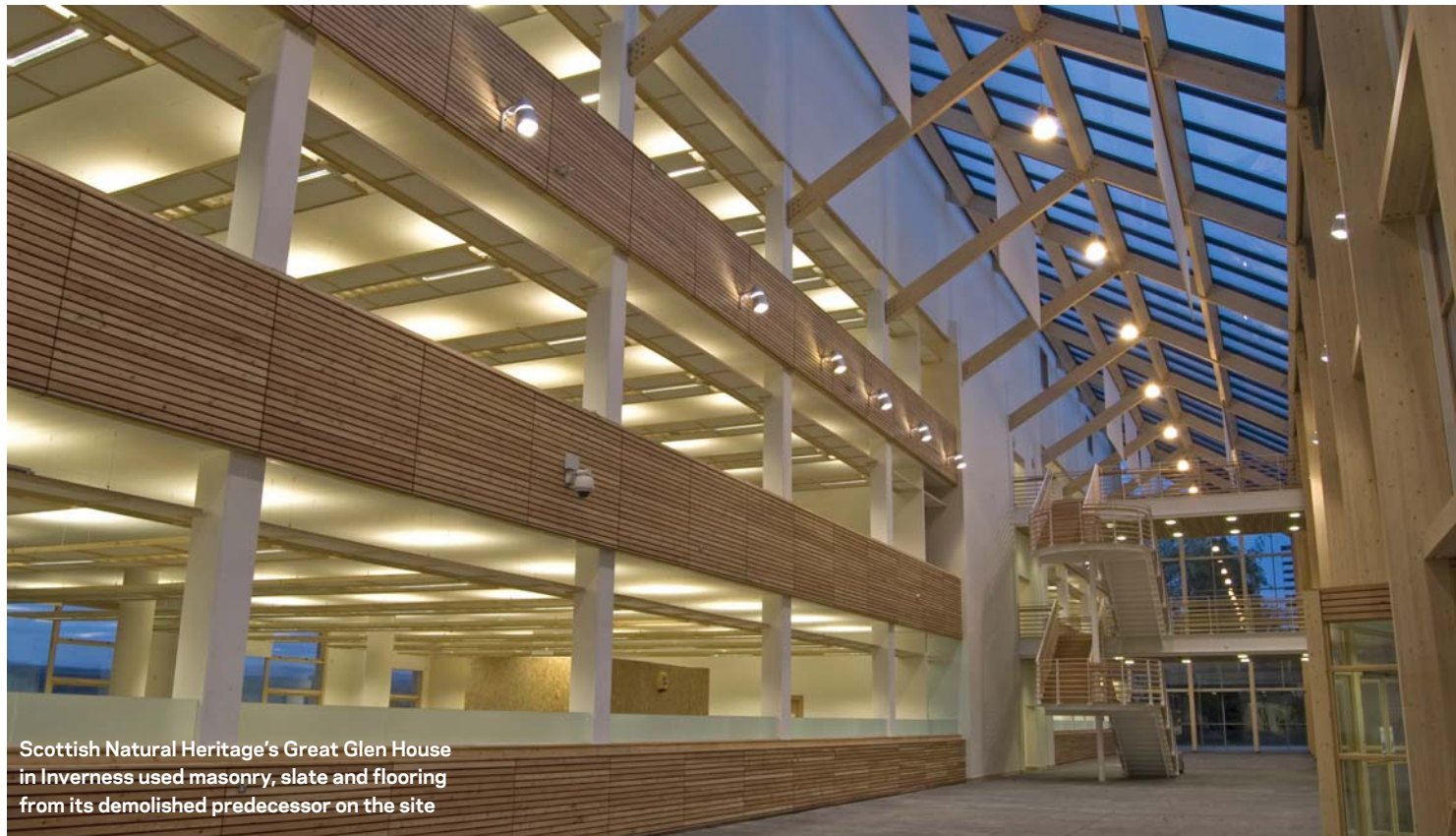
The question for developers is how far they need to go over and above present requirements to meet future client expectations and account for the impacts of climate change.

This article looks at occupier expectations of the sustainability

agenda. It examines emerging trends in sustainability assessment criteria and how these influence strategies available for office development.

We also consider some issues associated with delivering the expected level of performance.

The case study, based on a completed building in an out-of-town location, illustrates how a tenant can take an active role in enhancing a development's sustainability performance.



Scottish Natural Heritage's Great Glen House in Inverness used masonry, slate and flooring from its demolished predecessor on the site



BDP's headquarters building for Swiss pharmaceutical giant Roche in Welwyn Garden City includes a 'low energy' passive chilled beam

## 02 Commercial properties' emerging sustainability agenda

Rapid evolution of the sustainability agenda is being driven by a number of factors that have gained greater prominence and relevance in recent years.

None of these themes is new, nor do they represent a sea change in corporate behaviour. However, by coming together at a time when the case for global warming has broadly been accepted, there is an increasingly strong impetus behind building sustainability. The key themes are:

■ **Regulation.** There is growing awareness and interest in the impact of regulation associated with the construction, use and disposal of buildings on reputation and asset value. Implementation of the Energy Performance of Buildings Directive in the UK will provide a genuine opportunity for product differentiation over and above existing standards such as Part L of the Building Regulations. Developers are already modelling options for achieving reductions in carbon emissions beyond those required by Part L.

■ **Corporate responsibility.** The increasing scope and rigour of many organisations' corporate responsibility agendas represent a real opportunity to drive change. Recent British Council for Offices research points out the correlation between awareness of corporate responsibility issues and subsequent action in that arena. The development of environmental management systems as part of a corporate responsibility

policy provides further potential to influence property-related decisions in a number of ways:

- Creating the conditions and potentially the capability to benchmark occupational performance such as energy consumption
  - Embedding measurement of environmental performance into the supply chain. Developers can be expected to measure and mitigate construction impacts such as the sorting, recycling and disposal of construction waste
  - Creating impetus for continuing improvement and, as a result, potential for escalating the sustainability agenda ahead of regulation.
- **Staff productivity and retention.** Research on the performance of sustainable buildings has demonstrated its positive link with the performance of the workforce. However, a lack of hard data has made it difficult to construct a business case on this basis. The emergence of the corporate responsibility agenda as a factor in recruitment and a building's role in projecting these values is contributing to a more compelling case for investment in sustainability.
- **Operating costs.** Energy costs have emerged as an area of genuine concern. Investment, which contributes to the management of recurrent costs such as energy, water and waste disposal, has increasing credibility due to the alignment of financial and sustainability cases.

■ **Adaptability.** An emerging issue for occupiers, investors and local government is the recognition that current and planned buildings will have to respond to the consequences of global warming already built into the system. Potential problems include lower but more intense rainfall, higher summer temperatures and higher wind velocities.

Potential problems may include reduced water supplies, which could affect building operation, as well as comfort and convenience. Adaptation planning is being seriously considered by bodies such as the Greater London Authority and the Corporation of London. Furthermore, investors are increasingly aware of the "time bomb" of inflexible and expensive-to-run buildings that may be obsolete ahead of their planned physical lifespan.

In summary, greater public awareness and the corporate responsibility agenda are adding further corporate value to aspects of building sustainability that previously had to be judged solely on financial returns. As the capital cost premium of good practice sustainability typically ranges from 5 to 10%, this hurdle had been difficult to surmount.

As sustainability is increasingly associated with other aspects of corporate responsibility and business continuity, a building's environmental performance will become an increasingly important element of product differentiation for developers.

## 03 Sustainability strategies for commercial offices

Commercial office tenants are in the business of enabling their staff to deliver services as efficiently as possible. This priority will nearly always drive the occupier's requirements, with sustainability and security considerations as secondary priorities. Areas that sustainability-conscious occupiers expect to see addressed include:

- Energy consumption in use and associated carbon emissions
- Achievement of an enhanced BREEAM rating
- Use of sustainably sourced materials and consideration of embodied carbon, resource depletion, materials recycling and management of waste
- Water consumption in use
- Ability to implement green travel plans
- Impact of the development on watercourses and biodiversity.

Based on this criteria, developers have a number of opportunities to build features that achieve sustainability performance within the constraints of the developer's and occupier's operational objectives. These range from planning decisions affecting the overall orientation and location of a building to detailed issues such as materials selection or specification of fittings.

### Carbon reduction initiatives

- Building form and orientation. Consideration of shape, orientation and location to mitigate requirements for environmental control, such as selection of building orientation and plan depth to enable a passive ventilation strategy.
- Enhanced building fabric performance to address fabric heat loss, solar gain, air infiltration and thermal mass. The greatest opportunities to reduce carbon emissions are by enhancing solar shading and improving insulation levels. Enhancements to solar shading need to be balanced against users' preferences for high-quality daylighting and transparency

- Reduced energy consumption. The use of static cooling technologies is the main way to reduce energy required in providing air-conditioned space. However, many occupiers continue to prefer the flexibility of fan coil units. Other opportunities include reduced lighting loads and improvements in the efficiency of the main plant. Approaches based on mixed-mode cooling allow occupiers to tailor their cooling system to the needs of their businesses

- Renewable energy sources. On-site renewables such as photovoltaics or ground-sourced cooling can be installed, although the current rate of return on these systems means that wider aspects of value relating to corporate responsibility are needed to establish a business case.

### Materials selection, recycling and waste management

- Selection of materials using criteria including embodied greenhouse gas content and value of recycled content. A wide range of documentation is now available to support the appraisal and monitoring of materials selection, including the Green Guide to Specification and WRAP reference guides that encourage the specification of products manufactured from recycled materials

- Definition of requirements for site waste management plans using standards such as BRE's SMARTWaste

- Establishment of measurement and reporting procedures to encourage the take-up of sustainable specification and management policies across a building portfolio

- Provision of space within a building to facilitate collection and recycling of operational waste.

### Water consumption in use

- Specification of low-consumption appliances and fittings including spray and percussion taps

- Rainwater harvesting.

### Water course, habitat and biodiversity management

- Permeable pavings, including the installation of rainwater infiltration devices
- On-site rainwater attenuation features including green roofs, rainwater storage, reed beds or storage cells
- Habitat enhancement including green and brown roofs.

Given the range of options available and their impact on the performance of the building as well as its contribution to an occupier's wider sustainability agenda, it is difficult to tune the development to these needs without either affecting long-term flexibility or requiring additional and possibly unnecessary expenditure on features that a tenant is unable to use.

With both tenants and funds developing separate sustainability agendas relating to their particular operational and investment time horizons, developers are increasingly required to offer buildings that are developed to mitigate immediate construction impacts, retain their value in future letting markets and address the immediate needs of the potential occupier.

Pre-let arrangements are the most effective means of addressing these requirements, not only because they enable tenants to include their own specific requirements and avoid wasteful duplication of fit-out, but also because they strengthen a tenant's long-term commitment to a building, enhancing the quality of covenant in the eyes of investors.

To secure such pre-let opportunities, developers' schemes should be specified to deliver best-practice sustainability across a wide spectrum of building performance, which a tenant can subsequently enhance. Avoiding "unsustainable" solutions is fast becoming a key aspect of development strategy.

## 04 Developing to deliver sustainability aspirations

Sustainability outcomes are secured through a building's operation. However, studies such as the government-funded Probe series have demonstrated the potential for significant gaps between expected and achieved performance.

The long-term carbon performance of a building can be affected by actions taken during its life, but there is a great deal that the design and delivery team can do to put the

occupier in a strong position to manage and mitigate the effects of building operation. Areas that can be addressed include:

- Estimating energy consumption correctly in the first place, enabling effective control measures to be put in place. Errors can occur if assumptions are made about the effectiveness of control systems or if office equipment or night-time loads are omitted from energy calculations

- Maintaining the low-carbon design intent throughout the development process - ensuring that the carbon impact of design change is understood and that systems interfaces do not compromise performance
- Constructing to deliver the design intent, including managing the consequences of product substitution, maintaining build quality and effective and comprehensive testing and commissioning

- Fit-out using designs that take into account the intended operation of the building
  - Occupation and use of the building, including ensuring the usability of systems, adequate control and management, planned maintenance and the avoidance of user behaviours that prioritise service delivery over sustainability impacts.
- Although not all of these factors can be addressed by the design and construction team of the building, steps can be taken at the outset of a project that will give occupiers

- the best starting position from which to manage their carbon impacts, such as:
- Minimising energy loads in the first instance, by specifying to sensible standards and, where possible, by adopting passive environmental control measures
  - Developing design solutions that deliver the required loads efficiently and with simple controls, enabling occupiers to manage their building operations effectively
  - Making use of low-carbon and renewable energy where it is effective to do so

- Putting in place controls and monitoring that enable occupiers to act positively to manage the energy they use
- Building, commissioning and fitting out to realise the design intent. Extending commissioning into the use of the building to enable monitoring and fine-tuning of its operations to take place
- Feeding back performance data from completed projects into new schemes to manage expectations, and potentially to set new performance targets.

## 05 Case study

The case study is a three-storey office building with a gross internal floor area of 2,700m<sup>2</sup>. The scheme was constructed in a previously developed, out-of-town location.

The developer's original proposal was for a low-carbon, naturally ventilated building designed to meet the BREEAM Excellent standard. It entered into a pre-let agreement with a single tenant, which enabled the integrated team of developer, occupier, design team and contractor to deliver a scheme with further sustainability enhancements, including on-site renewable energy generation and rainwater capture.

Early involvement of the tenant also facilitated the consideration of advanced proposals for enhanced natural ventilation using roof-mounted, wind-driven fans. It was not possible to identify a reliable technological solution, but builders' work needed for the subsequent retrofit of

the system was included in tenant-funded enhancements.

### Base build

The office was designed as a concrete-framed naturally ventilated building, featuring a mix of high-performance glazed curtain walling with opening lights and masonry with conventional windows.

The solar control strategy was based on interstitial solar control blinds on the south elevation and an over-sailing, roof-level brise-soleil. Floorplates were designed with a 15m maximum width to facilitate cross-ventilation and an exposed concrete soffit to provide "coolth", supplemented by night-time purging via opening windows.

Office areas featured a 3.2m floor-to-slab height and a 400m deep floor void. These features allowed for stratified air movement in the office space to provide acceptable

comfort conditions and give sufficient clearance to permit a retrofit of fan-coil-based cooling systems if required

The scheme met performance standards set by the British Council for Offices (BCO), the BREEAM Excellent rating, the government-backed Econ 19 standard for offices and Part L. However, it was calculated that in hotter years, it would not meet the BCO standard that internal temperature should not exceed 25°C for more than 5% of occupied hours.

As a result, the project team took steps to identify measures that could potentially enhance the ventilation of the building without requiring a mechanical system.

For the ventilation strategy to work, a management regime based on night-time purging via clerestory windows was introduced, which had a knock-on effect on requirements for controls and

**Feilden Clegg Bradley's National Trust headquarters includes a range of sustainable features, such as natural ventilation and daylighting and recycled materials**



☐ specification of internal anti-glare blinds, which could not be allowed to impede air movement. Motorisation of the clerestory windows was finally included in the tenant's enhancement package.

During the design and specification phase, the tenant was briefed that, to avoid overheating, management measures would have to be put in place to keep small power, lighting and occupancy loads within design parameters totalling 22.5W/m<sup>2</sup>. These included restrictions on occupational density (a maximum of 1 person per 12.5m<sup>2</sup>), constraints on partitioning next to perimeter walls, specification of office equipment, such as flat-screen monitors, and limits on the use of task lighting (restrictions on intensity levels to 300lux and specification of timers).

The project team also assisted the occupier in developing a management regime so the building would be operated effectively.

### Tenant enhancements

Over and above the BREEAM standard achieved as part of the base build, the client identified a requirement to invest in measures that ensured the long-term performance of the ventilation strategy and took the opportunity to incorporate high-profile renewable energy and rainwater harvesting features into the building.

This was made possible by the tenant's commitment to a 15-year lease and through access to grant funding for a photovoltaic installation and solar water heating panels.

The total investment in sustainability enhancements was £340,000 – equivalent to about 6% of the total cost of the development, including fit-out. Of this sum, £184,000 was obtained via grants.

The key components of the client's sustainability enhancements are summarised in the table below.

### a Case study costs

| Sustainability feature  | £/m <sup>2</sup> gifa |
|---|-----------------------|
| Photovoltaic panels incorporated into brise-soleil canopy   | 117                   |
| Solar water heating panels  | 9                     |
| Rainwater harvesting to supply WCs  | 14                    |
| Motorised actuators to clerestory windows to automate night time cooling, including controls              | 34                    |
| Builders work in connection with future installation of wind-driven turbines to enhance ventilation flows | 4                     |

**Note:** Rates updated to 4th quarter 2006, based on South-east location

## Previously ...

- 1 Dec Cost model: hotels
- 8 Dec Cost update
- 15 Dec The tracker

## Coming up ...

- 19 Jan Specialists cost update
- 26 Jan The tracker; Building intelligence
- 2 Feb Market forecast

## Data toolkit

*Building's database of cost data is an essential resource for anyone in the business of procuring buildings. There is an extensive archive of cost models, market forecasts, whole-life costings, specialist costs, procurement and sustainability articles and many more besides. To gain access to all this information, see [www.building.co.uk/datatoolkit](http://www.building.co.uk/datatoolkit)*



Foster and Partners' Bishops Square in east London uses PV cells to generate 1.5% of its electricity