



*A Client's Guide
to Sustainable Social Housing*

a draft for development



Gaia Research

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Every effort has been made to credit source material.

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" I am determined that government in Scotland takes a lead in making sure the Scotland being built today meets the needs of tomorrow's generations. Too often the environment is dismissed as the concern of those who are not confronted with bread and butter issues. But the reality is the people who have the most urgent environmental concerns are those who daily cope with the consequences of a poor quality of life, conditioned by their environment."

Jack McConnell, Meeting the Needs 2002

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1 INTRODUCTION

1. This publication is one of a series of four client guides to sustainable buildings.¹ These guides resulted from a fast track and low budget process - a tiny fraction of the investment they seek to influence. As well as this one focussed on social housing others have been written on offices, schools and private housing. There is some commonality between the publications but each has a sector focus, sector specific case studies and referencing to assist in delivering best practice.²
2. It has not been possible within the budget and time constraints to develop very far or to embrace the wealth of experience that exists in the client and design community. The guides are therefore produced as drafts for development with the knowledge that they require considerable adaptation before they are adequate to meet current needs. It is hoped that they will generate discussion and exchange of information and that the case study information can be expanded significantly and with critical appraisal. Anyone wishing to use this document as the basis of a consultation process with stakeholders, design teams, contractors or fellow professionals is invited to do so. It would be particularly useful to gather and share information on useful networks of expertise and best practice.
3. Buildings are designed to respond to social and/or business needs and they inevitably have social, economic and environmental impact. This series of guides is intended to assist clients to ensure that the influence at all three levels is as far as possible a positive one. The overall aim is to maximise the long term value of a building in meeting the needs, requirements and aspirations of users and the wider community and maximise the positive impact on the environment.
4. The current standard of social house building is highly variable but most pays little tribute to sustainable development objectives. There is a need to identify and embrace those elements and available guidance that can enable better houses to be delivered and to ensure that the benefits and opportunities are disseminated.

¹ Available at www.gaiagroup.org

² Additional Case Studies available in Scottish House: A review of recent experience in Building Individual and small groups of house, available at <http://www.scotland.gov.uk/cru/kd01/orange/shar-00.asp>

5. The information here is based on the author's recent experience of writing an extensive training course in Sustainable Design for clients, architects, engineers and cost professionals.³ The training course covers key themes of sustainable design on a modular basis and includes thorough referencing. Producing these "sector based" client guides provides an opportunity to integrate the issues around generic building typologies but does not seek to replicate the training programme which is far more extensive and provides more detailed technical guidance and background information.

Sustainability, as presently defined by government initiatives, challenges industry to produce higher levels of output, while enhancing the quality of life for employees and other stakeholders, using lower levels of input and generating less waste & pollution. This is intended to ensure "non-declining human welfare over time" and that a non-declining stock of capital assets, including environmental assets, exists to meet the needs of industry, individual consumers & society in the future.⁴

6. Key Issues faced by the client are

Stewardship	Resource Effectiveness	Biodiversity
Pollution	Communities	Health

7. It is relatively easy to establish the key issues to address for a sustainable project and there is an abundance of existing guidance, but delivering on aspirations often proves to be extremely difficult. Success relies on a complex interaction of design, designed manageability, client commitment and user understanding. Importantly no client, architect or contractor can deliver a sustainable building without attention to the process from inception through to handover and subsequent management. Much of this guide deals with this aspect. It aims to inspire all involved to pursue the sustainable design of social housing, act as a starting point for clients to develop a robust brief and assist them to establish the

³ Sustainable Construction CPD – Modules 1-15 www.gaiagroup.org

⁴ Sustainable Construction CPD – Module 5 Environmental Legislation & Policy Gaia Research 2002

knowledge base and the process that will support real delivery. It also aims to encourage investigation of the extensive examples of innovative approaches to meeting housing need in Europe, and to encourage consideration of a wider range of options than currently available. Trends in layout, community involvement and application of beyond mandatory standards are encouraging.

8. The guides are produced at a time when there is a strong focus on sustainable construction in Scotland and a powerful political trend namely the commitment in 2002 to put sustainable development at the centre of policy.⁵ The Scottish Executive's focus on community, citizenship, value, respect and quality are all vital aspects of sustainability. The Building Scotland Act (2003) made 'furthering sustainable development' a requirement and this too will influence future policy.⁶ The Scottish Executive also has a commitment to design quality through a policy on architecture.⁷ Policies being developed now are likely to lead to substantial pressure on all involved in built development to improve their sustainability performance.
9. This document does not seek to repeat current arguments and policy objectives, but to support and compliment them with additional guidance to assist in delivery and to draw on these aspects to promote an integrated approach. The quality aspirations set out in current policies should be recognised as vital to successfully delivering a sustainable built environment.
10. Comments or suggestions of projects for inclusion in later updates please send to research@gaiagroup.org All named contributions will be acknowledged. We will also host a discussion forum and we invite your participation.⁸

⁵ Meeting the Needs www.Scotland.gov.uk/library5/rural/mtnsd.pdf

⁶ Building Scotland Act 2003

www.scotland-legislation.hmsso.gov.uk/legislation/scotland/acts2003/20030008.htm

⁷ Scottish Executive A Policy for Architecture for Scotland

www.scotland.gov.uk/architecture/exec_summary.asp

⁸ www.gaiagroup.org/Research/Forums



2 PRINCIPLES OF SUSTAINABLE PRIVATE HOUSING DESIGN

What is Sustainable Building Design?

1. Sustainable building design is applied good sense - an aspiration to build to the highest quality and functional standard, with maximum environmental and social benefit and with cost assessments that reflect the whole building life cycle such that investment can be properly maintained.
2. Achieving sustainability requires us to live within the limits of the earth's capacity to provide the materials for our activities and to absorb the waste and pollution that our activities generate.
3. Sustainable building design means applying of a set of design parameters which have often had insufficient attention in the past:- functional requirements - now and in the future, user needs and aspirations, resource consumption, material sourcing, location and access, impacts on stakeholders including building users and the local community, life cycle operation and costs, maintainability, building life and end-of-life, pollution, waste, biodiversity and health.
4. The process of procurement, design, tendering, construction and handover is a vitally important aspect of delivering buildings that can be sustained. Many projects suffer from a failure to think through design consequences in cost and management terms. There are many examples where this results in crucial aspects being edited, and undermining of project aspirations, late in the process. This is not inevitable but requires strong commitment, planning and considerable expertise if aspirations are to be achieved.⁹
5. The intended outcome is buildings that: -
 - a.minimise adverse social, environmental and economic impacts by being efficient to operate, effective in their use of resources, minimizing waste & pollution and protecting occupant health and the wider environment during construction, operation, re-use and at the end of their useful life.
 - b.enhance positive social and economic impacts by providing an environment that is fit for purpose, more responsive to individual, business and community needs and aspirations, more flexible and functional, maintainable and cheaper to run, and more respectful of the environment on which we all ultimately depend.

⁹ Sustainable Construction CPD – Module 9 Site Issues & Construction Processes Gaia Research 2002

The wide-ranging changes in attitudes towards the environmental and the social impact of construction, and consequential changes in policies and legislation, that have been taking place in society over recent years have been prompted by a range of factors, including:

- the disturbing results of research into global warming, climate change, depletion of the ozone layer, and widespread pollution of water, land and air;
- the increased awareness of these and other environmental issues and their increasing presence and importance on the political agenda – locally, nationally and internationally - especially since the UN Conference on Environment and Development in Rio, 1992 and its Agenda 21 declaration;
- increasing recognition that buildings and the natural environment are essential to the maintenance of our human life and to improving quality of life;
- increasing realisation that the built environment has a crucial impact on the physical and economic health and well-being of individuals, communities and organisations;
- increasing realisation that the construction, fit out, operation and ultimate demolition of buildings is a huge factor in human impact on the environment both directly; through material and energy consumption and the consequent pollution and waste, and also through the pressures on inefficient or avoidable infrastructure;
- increasing realisation that it is important to design in ways that best employ financial resources in the long term. This means looking at whole life costs and building functionality as fundamental aspects of design;
- increasing concern about indoor air quality, personal environmental control and other adverse factors within buildings, highlighted in the specific aspect of increasing child asthma and allergy but also the number of incidences of non-specific ‘Sick Building Syndrome’;
- increasing concern that a sustainable construction industry cannot be seen in isolation from supply, construction processes and manufacturing or from the proper management and maintenance of buildings in use. Sustainable construction has to be seen as a process rather than a product delivered at handover;
- the action of individuals, professionals and communities in challenging imposition of inappropriate development projects on communities rather than development that meets the identified needs of communities;
- the increased understanding that achieving a sustainable built environment brings real quantifiable benefits.

Why is sustainable building design important?

The widespread political and social concern for the environment has been one of the most significant changes of recent years. Until recently environmentally responsible building and manufacturing was largely seen as a peripheral activity. To many in architectural circles it was seen as a style to be resisted. In economic terms it was perceived as being wasteful of capital. In social terms it was perceived as elitist. Changes in society and policy have made it evident that these perceptions were profoundly wrong.

Increasingly environmental concern has been identified as intertwined with social and financial consideration as vital components of sustainable development. It is not a style or wasteful or elitist but an approach that is intended to ensure development that results in increasing 'quality of life' for all. This is now fully acknowledged by national and international policy. Sustainable building design is not just an important aspiration it is a vital one and a legal, financial, social and environmental imperative. The alternatives '*unsustainable development*' or '*no development at all*' are manifestly less attractive.

The pressures on the industry to address the three strands of sustainability (economics, social equity and environmental protection & enhancement) have led and are continuing to lead to government and corporate policy changes, and to more-stringent legislation. The industry is developing practices that can lead to built development projects that are significantly more efficient and affordable, more fit for purpose, much more socially acceptable, and much less damaging to the environment than before.

An important consideration is concerned with change management. There is a need to ensure that investment made today is relevant to future needs and aspirations including social, technological and regulatory changes. International commitments to sustainable development, echoed by the Scottish Executive, mean that substantial changes are planned in respect of regulations, legislation and fiscal policy to assist in meeting policy objectives. These are intended to promote the right sort of development rather than development for its own sake.

Sustainable buildings provide a potentially promising way to help address a range of challenges facing Scotland including:

- the high cost of infrastructure and security of energy supply;
- increasing cost of waste disposal;
- continued European pressure to cut pollution;
- the rising incidence of allergies and asthma, especially in children and the elderly;
- continued European pressure to improve indoor air quality through regulation;
- growing concern over the cost of global warming;
- increasing expenses of maintaining and operating public building;
- pressures on biodiversity;
- pending increases in water charges;
- manufacturing of sustainable building products for import substitution and export;
- employment in long term healthy and productive industry.

Features of sustainable social housing

- Have interesting, mould-breaking and attractive design forms.
- Result from a well-understood and organization-wide proactive commitment to engage in sustainable construction as a positive social and economic driver.
- Integrate with existing communities and create possibilities for new communities to evolve through consideration of shared and communal facilities and mixed use development.
- Do not endanger the health of the occupants, or any other parties, through exposure to pollutants, the use of toxic materials or providing host environments to harmful organisms.
- Are responsive to the needs, requirements and aspirations of all members of the local community.
- Enhance biodiversity locally by landscaping based on best practice guidance and globally by not using materials from threatened species or environments
- Do not cause unnecessary waste of energy, water or materials due to short life, poor design, inefficiency or poor construction and manufacturing procedures.
- Incorporate best practice in energy efficiency, building health and longevity by excellent standards of insulation, proper detailing to minimise air infiltration, designed ventilation and good control.
- Use only those materials that are benign in manufacture, use and disposal.
- Are affordable to run and simple to manage and maintain in a benign manner.
- Do not consume a disproportionate amount of resources, including land during construction, use or disposal
- Use renewable and recycled and recyclable resources wherever possible.
- Have a green travel plan at inception to create minimum dependence on polluting forms of transport and encourage access to, and the development of, safe, non-polluting and sustainable forms of transport.
- Are flexible to facilitate changes in response to demographics and technology and which allow expansion or contraction in the future, where appropriate.

Why a sustainable design guide for social housing?

Buildings and the built environment have a crucial impact on the physical and economic health and well-being of individuals, communities and organisations. Where buildings contribute to disaffection, alienation and undermine community and where they create excessive financial liability, they are clearly not only undesirable but unsustainable. Delivering sustainable homes is crucial to the future of individuals and communities.

Amongst bulk providers there is largely a lack of interest and engagement in delivering best practice, quality environments, diversity and the integration that might contribute to sustainable design objectives. The nature of the market means that these qualities, which exist in abundance outside the bulk market, are rarely given an opportunity to be demonstrated beyond the one-off house.

There is little or no requirement on developers to address social or environmental need and little joined up thinking in planning and sustainability issues. There is a low regulatory threshold and little application of voluntary standards in excess of the mandatory ones that are visible and competitive market drivers throughout Europe. Standards may be improving but less than adequate social housing continues to be developed in abundance and with no cognisance on the part of regulators of the opportunities for significant improvement.

There are real financial, social and qualitative advantages to be gained from building in a more sustainable manner. Flexible, healthy, efficient, maintainable and manageable buildings can drastically reduce adverse environmental impact, deliver financial benefits from resource productivity and maintain long-term investment. If undertaken properly there is ample opportunity for providers to take advantage of resource economies and waste avoidance and to pass these benefits onto clients.

Clients looking to ensure that their housing provides ongoing benefit into the future rather than the unwelcome burden that much of our current stock represents need to recognise that much more is possible. Most house building falls far short of the standards of insulation, air quality and moisture management that are readily achievable. Many communities and clients are looking beyond the current overriding obsession with first cost because evidence increasingly points to it imposing unacceptable burdens on health, energy consumption and quality of life.

Approaches to housing provision in place in other countries actively seek to create sustainable communities by consideration of space use, interaction, intra-generational equity, the natural environment, resource effectiveness and flexibility.¹⁰ Those that place client involvement at the core of development strategies rather than leaving decisions to a few centralised and private organisations are proving extremely successful in building communities. Housing clients should seek to become familiar with these in order to expand on the limited range of options available.

¹⁰ Sustainable Construction CPD – Module 15 Urban Ecology Gaia Research 2004



3 ACHIEVING SUSTAINABLE DESIGN

Client's role in sustainable procurement

There is a significant resource of information on setting objectives and aspirations for sustainable housing. The guidance is highlighted in the appendix and detailed references on particular aspects are provided in each of the Gaia CPD modules.

A lot of guidance also relates to the activity involved in the construction process to ensure that this is undertaken in an environmentally sound manner. Initiatives such as “considerate constructors” are helpful in promoting the requisite attitude and methods for undertaking the construction process in a manner that is attentive to neighbours rights and needs and provides good guidance on site management.¹¹

Significantly less attention has been given to problems of tender strategies, cost cutting and handover which have the potential to undermine the project aspirations, and to which sustainability objectives are often particularly vulnerable.

This dearth of information on the delivery of sustainability objectives of projects is surprising, given the far reaching and long-term impact. Documents such as the Environmental Code of Practice, its Feedback Case Studies and the Green Guide to the Architects' Job Book are perhaps the most thoroughly developed to date in terms of dealing with sustainable construction as a process and not a product. Module 9 in Gaia's Sustainable Design Series also covers the process issues from tender through to handover, in a succinct manner.

¹¹ www.considerateconstructorscheme.org.uk

Establish or Review your Sustainable Development Policy

"I see an important irony in a situation where clients of construction, who mostly do not have Environmental Policy Statements and Environmental Management Systems, let alone Sustainability Policies, engage designers and other consultants who do not have EPs or EMSs. Between them, they make THE KEY decisions that affect lifetime environmental performance. Then, when they come to the construction stage, they specify that the contractor should have an EMS! In PFI and other contractor-led consortia, this is now leading to situations where designers are being asked how they are going to deliver the contractor's Environmental Policy!" - R. Venables - CRANE Environmental

The first step in the process of achieving a successful built development project is to confirm the necessary commitment on the part of the Client or those with the requisite authority within the Client Group.

Client commitment, expertise and direction is particularly important in the early stages to inform strategic thinking.

This would be a good time to establish or review and update the client organisation's Sustainability Policy

Writing a sustainable development policy need not impose additional burdens. It can be a good time to integrate existing strategies towards finance, people and the environment. A sustainable development policy for example can unify otherwise disparate commitments to community, investment, health, well-being, training, the environment and purchasing. Look at the organisation as a whole and any existing policies with which your sustainable development policy might be integrated.

The adoption of a formal management system is appropriate to a moderately sized house provider. It should contain a central vision that can be easily understood and communicated to all stakeholders and be predicated on a real understanding of the issues.

The commitments should include adequate provision and structures in place to communicate the policy and to provide the appropriate training.

It will be useful to be aware of government policy and any commitments made by relevant professional bodies.

Once the sustainable development policy is established or brought up to date then you will be in a position to develop a Policy Statement that can be used to inform the Project development.

Become an informed client

The transition to a culture of more sustainable construction is more likely to be reinforced by knowledge of the issues, the appropriate questions to ask and, importantly, the proper time to ask them. An informed client is essential to the success of any project.

To become an informed client you need to thoroughly understand what sustainable development is and the direction of economic, social and environmental policy that will impact on your project.

All clients should give consideration to undertaking in depth training on sustainable design issues and should expect design teams to have undergone or commit to training. The Gaia CPD series involves a thorough review of the issues and additional guidance is available in the referenced publications and web sites.

Visit best practice exemplar projects and become involved in discussion networks on best practice.¹²

Talk to a wide variety of people experienced in procurement, design and construction and to specialists in sustainable design.

As a client or client body you should be aware of the legal and other responsibilities that might inform your approach. Recognise that as a result of international and government policy, the regulatory framework is changing and there may be significant financial and legal implications for building operators that need consideration at the outset.

As the client you have the responsibility of communicating to all involved the nature of a sustainable development approach, and the benefits, responsibilities and issues involved. Identifying and firmly agreeing responsibilities at an early stage for example, is likely to be the most significant component of success.

As a client you should recognise the importance of vigilance at all stages if the project is to have a successful outcome. You should identify appropriate tools and techniques for use as the project progresses to ensure that best practice is adhered to, in particular a good process guidance tool.¹³

Commit to maintaining sustainable design on the agenda throughout the design and construction process if necessary in the form of a sustainability advisor to the client.

¹² Public Sector forum on Sustainable Development

¹³ Sustainable Construction CPD – Module 14 Appraisal Tools & Techniques Gaia Research 2004.

Gaia Research CPD series: Sustainable Construction CPD

Module 1: Materials Selection: ... aims to give the reader a sound and broad grasp of the issues and priorities affecting materials selection in the design of places, buildings, services and objects and a realistic perspective on the range of issues which will affect decision making.

Module 2: Lighting and Daylighting: ... is designed to enable the professional to be better able to make informed decisions about lighting & daylighting design. It directs the reader to contemporary tools and guidance which will assist in implementing best practice.

Module 3: Water and Sewage Management: ... considers the flow of water through buildings. It looks at its efficient use, the appropriate treatment of the wastewater discharged and the potential for reuse. It also considers rain falling on and around buildings, the potential for reuse and appropriate discharge.

Module 4: Heating: ... aims to enable the reader to deliver high quality buildings which have a low heating demand. It emphasises the role of minimising demand at the outset through passive measures.

Module 5: Environmental Policy and Legislation: ... aims to highlight the key policy drivers for the creation of more-sustainable construction and the legislative requirements that need to be met.

Module 6: Cooling and Ventilation Strategies: seeks to highlight the principal issues and sources of guidance to ensure that buildings are as comfortable and healthy as they might be while minimising reliance on unnecessary energy for ventilation & cooling. The issue of healthy indoor environments is of increasing importance.

Module 7: Renewable Energy Technologies:give guidance on how to make best use of the available opportunities and how to go about designing and specifying appropriate renewables systems. They are increasingly part of the design pallet and have increasing support from government, but are still new to the majority of designers and clients.

Module 8: Sustainability Drivers: ... provides a review of the principle milestones which have brought about the shift in attitudes towards sustainable design of the built environment.

Module 9: Construction Processes, Site Issues and Handover: ...best practice guidance on tender evaluation, site practice, management and handover. A much neglected area which is fundamental to delivering client aspirations.

Module 10: Low Impact Construction:looks at recent innovative initiatives to design using very low impact materials such as straw, earth, hemp and timber.

Module 11: Electrical Installations

... intended to help designers to develop strategies for low impact electrical services design and to implement them effectively. A subject that meets

Module 12: Post Occupancy Evaluation: ...A thorough and concise review of methods of obtaining feedback from buildings in use and the history of development of the techniques with a series of case studies largely taken from the PROBE studies.

Module 13: Cost Issues: ...This module undertakes a comprehensive review of the cost implications of 'green' building.

Module 14: Appraisal Tools & Techniques: ... the use of expert guidance, designed processes, tools and formal & informal environmental management processes to deliver efficient, healthy, responsible buildings.

Module 15: Urban Ecology: ...considers the sustainable design of the built environment of our cities and countryside.

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Assess in-house skills and consider external advice

Before carrying out an initial analysis of a building project, the client needs to assess its own capacity and skills base.

Discussions with professional advisers at the earliest stage can assist in determining and defining design priorities and setting project objectives.

Assess in house skills and determine whether additional advice is necessary to train those involved, prepare the brief, appraise the tenders and carry the sustainability aspirations through to completion, or other services.

Considering the ability of yourself or others to integrate sustainability considerations and manage them through a project may have an influence on the various types of appointment, the associated roles and responsibilities and any specialist consultants and/or requirements.

A crucial issue in considering sustainable building design is to recognise that considerable attention is required throughout the procurement and design process if the appropriate outcome is to be achieved. Yet further attention is needed to ensure that the investment is maintained in optimum condition after handover. You will need to take advice.

Sustainable development is a specialist skill and clients should give serious consideration to appointing an independent sustainable design advisor, whose remit is to support the client and design team with appropriate advice.

Every client procuring a new building should consider the opportunity to champion sustainable design and be open to innovative approaches that promote continual improvement.

It will help you and your advisor members to visit projects with similar objectives and to have a thorough and open discussion of achievements and failings.

Sustainable design is intended to deliver a number of specific benefits to clients

- A better managed construction process
- Improved integration between planning, construction and other policy objectives
- Improved build quality
- Smoother handover and operation
- Improved performance and work satisfaction
- Reduced building related ill- health
- Improved occupant comfort
- Future proofing against legislation
- Reduced long term legal and financial liability
- Improved access and reduced travel times
- Improved flexibility in building design to extend building life
- Improved effectiveness in use of financial resources
- Reduced costs in use
- Reduced capital cost
- Improved maintainability

In addition clients need to recognise their wider responsibilities to meeting govt and social objectives: -

- Reduced construction waste
- More effective use of products and materials
- Reduced adverse impact on water, air and land resources
- Reduced infrastructure
- Improved community benefits
- Improved feedback
- Reduced pressures on biodiversity
- Recognition through a number of specific awards

Identify and communicate the benefits of sustainable design

It is a good idea to draw up a list of specific opportunities and benefits to the client, the user, the community and the contractors and keep these at the forefront of your thinking as a design develops. These might include cost-in-use, user satisfaction, community enhancement, improved health & productivity and reduced liability.

The benefits include some factors that are relatively easy to quantify, such as power, energy and water savings and avoidance of waste (on average 25-30%, 25-40% and 50-75% respectively). More significant still are the estimates of reduction in sickness and ill-health resulting from better indoor environments through avoidance of off-gassing materials, better ventilation, personal control and good daylighting. There is however little UK data to provide a comprehensive analysis of the actual costs and financial benefits of sustainable buildings. To date best estimates from US studies indicate that an average 0-2% increase in capital cost of a building leads to a 20% payback over the building life.

The financial benefits are still rarely adequately attractive to most investors but are likely to increase as the balance of taxation continues to reflect concerns for adverse social and environmental impacts. The direction of current policy makes it clear that this looking for short term gains is not good sense.

Market awareness, legislation and government & private sector policy have provided incentives to improve construction practice and to set in place procedures for continual improvement. This has resulted in development of a range of tools and methodologies to promote, assist and measure achievements in sustainable construction. They cover different professions and stages in the construction process as well as widely different elements. Most have a useful role to play at some level.

There are also excellent exemplars of tools and techniques in increasingly common use outside of the UK and some of these are likely to guide UK practice in future either through EU regulatory standards or commercial interests.

Ensure that yourselves and the design team are fully aware of the issues.

Remember that standard practice lags significantly behind what is possible and changes will reinforce this over the life of your project. Aim for the best possible standards. Every client procuring a new building should champion sustainable design and be open to innovative approaches that promote continual improvement.

Maintaining the Investment

There is a lot of evidence to suggest that sustainable buildings are more expensive than standard construction. Estimates based on American projects certified under LEED- a US based rating scheme similar in principal to the UK BREEAM - indicate 0-3%, for the lower and up to 10% for the higher ratings. Elements of this include increased design time, and the cost of higher performance products and benign materials.¹⁴

In truth all building design involves a balance between up-front expense, on going running costs and maintenance, eventual decommissioning and dismantling.

There is growing evidence that sustainable buildings provide significant social, financial and environmental benefits over their life that conventional buildings do not. Design decisions should reflect this lifecycle but we are currently at an early stage in our ability to do this.

Even in PPP projects there is evidence of an overemphasis on capital costs because we are culturally driven to seek short-term gains at the expense of the longer term. As a consequence life cycle benefits of maintenance, productivity and resource effectiveness are overlooked in favour of short-term capital cost savings or stock solutions.

The running of a facility must be considered at the outset and hence the building operation strategy needs to be well-documented throughout the design process.

We know that building presents certain risks to health and well-being and that individuals and organisations are in future likely to be much more pro-active in asserting their rights and making clients and designers accountable. Simple measures can reduce these risks.

We know some of the principal causes of waste and hazard that are likely to impact on costs and these can be designed out.

Importantly, a large number of beneficial features have little or no additional capital cost e.g., site and window orientation and strategic approaches to the layout plan and form to reduce cable and pipe runs.

Passive solutions and design solutions aimed at low maintenance strategies are less likely to incur high costs than highly serviced environments. NB: Beware "no maintenance" strategies that invariably mean that something is unmaintainable!

Other sustainable options such as high levels of insulation or passive design may cost more in the design phase but can be offset by the reduced cost of a smaller mechanical system or by designing it out altogether.

¹⁴ Sustainable Design CPD – Module 13 Cost Issues Gaia Research 2004

Set out the project aims through consultation with stakeholders

Consult the affected stakeholder communities to inform the process. Ideally occupants should be engaged from the beginning and in such a way that they can take ownership of the completed project. If that is not possible then the outcome from post-occupancy studies should form part of the briefing.

Be sure to undertake any consultation professionally so as to raise aspirations but not expectations that cannot be delivered.

You may wish to think radically about tenants current and future needs. Be prepared to rethink assumptions about homes and the home environment. The impact of social and demographic changes, in combination with new technology, are profound. The evolution of the new work environment calls for radical rethinking and responses in how we deliver housing.

With changes in technology and lifestyle attitudes there are new opportunities presenting themselves. This is being exhibited in more mixed use developments and more flexibility to suit part time and freelance working. Looking for multi-functional uses is increasingly the norm.

It is important and will be useful to identify if your current stock is being used effectively and whether there is opportunity to identify beneficial changes. You may want to keep this in mind as the project develops.

Remember that you are looking to develop solutions that work well for the long term. This is more likely to be achieved if the buildings and environment enhances the well-being of individuals or communities, is functional, efficient and healthy, internally and in their impact on the wider world.

Housing development should incorporate self-management from the outset.

Clients should establish their views and aspirations, and their aims will become the reference point throughout the design and construction stages, and can be used to test the overall success of the project over the longer term.

The appropriate approach with an emphasis on sustainability should assist in providing a framework for:

- establishing, developing and communicating client priorities & value systems;
- setting the sustainable design strategy;
- communicating with stakeholders to define the functional needs, requirements and aspirations for all those affected;
- enabling user and management participation at an early stage in the design process;
- improving briefing procedures;
- preparing tender documentation such that sustainable design is tied down;
- establishing supply chain management where specifications involve real or perceived innovation;
- engaging bidders cognisant of the issues and benefits of sustainable design;
- selecting the design team who understand sustainable design in practice;
- maintaining the sustainable design strategy throughout the project;
- setting appropriate fee structures;
- developing teamwork and robust communication;
- allowing adequate time for design development of engineered solutions involving passive design & good ergonomic control;
- implementing responsible site procedures;
- ensuring that commissioning and handover is undertaken properly;
- reducing waste;
- minimising pollution in all forms;
- avoiding use of toxic substances;
- maximising positive impacts on biodiversity;
- establishing formal feedback mechanisms including post-occupancy evaluation

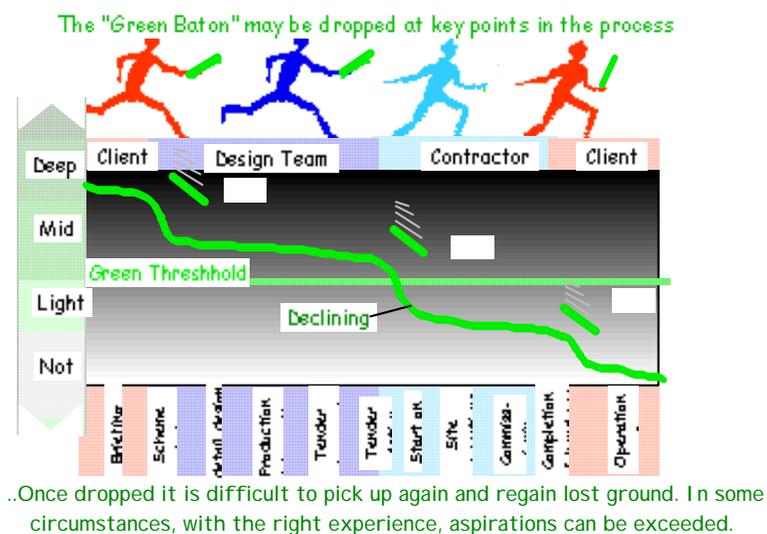
Develop the brief in accordance with best practice

The client should set out their sustainable design objectives clearly using an appropriate briefing guide. This will benefit from discussion of options.

Having identified the key issues, investigate the appropriate benchmarks so as to make explicit the sustainable development objectives and make them visible, quantifiable, life cycle and evidence based. Getting the right balance between flexibility and pinning down the deliverables will need experience.

Setting targets against current norms is not adequate and will not deliver the best possible life cycle benefits.¹⁵ Innovation should be encouraged.

The requirements should be reinforced through all subsequent stages of the process. There is a high risk of the “sustainability baton” being dropped throughout the process and particularly as responsibilities are transferred from the Client to the Design Team to the Contractor and back to the Client.



The effect of compromises will inevitably depend on the aspirations at the start-out. A project with low expectations will be lucky to have green credentials at all by the time it gets to its delivery point

¹⁵ Action Energy www.actionenergy.org.uk

Key sustainable design issues

The client and the stakeholder community will have their view on the issues and of their relative importance but these are provided as guidance.

Management of the Process

The design and delivery process is crucial to proper implementation of sustainable building design.
Implement a management system or adopt a process guide.
Have in place process tools that extend from consultation, through outline design, site issues, commissioning, handover and post occupancy evaluation. Take advice on your legal responsibilities e.g., duty of care for waste during construction and building life.
Become familiar with recent prosecutions so that you are aware of the scope of issues to be addressed.
Ensure that your advisors show commitment to legal compliance evidenced by method statements
Ensure a commitment to responsible procurement and purchasing in your sustainable development policy
Ensure that those engaged understand the sustainable design strategy and their role in ensuring its delivery
All professional service providers should show evidence of their approach and of past performance.
Take a rigorous approach to exploring the commitment of the design team and contractors.
Employ specialist advice in undertaking appraisal of their commitment, aspirations and experience.
Commitment to training of themselves and their subcontractors should be evidenced
Make sure that you understand the design and that alternative approaches have been properly considered.
Ask questions and demand straightforward answers – nothing should be too complicated to understand.
The brief should be fully understood by the design team and the results must be measurable.

Creating healthy environments

Consider the impact of the indoor environment on the well-being of users.
Occupants appreciate a view and daylight especially if they are largely working from one place. Consider at the outset the impact on the layout, building depth and schedule of accommodation.
Avoid materials that contain VOC's or other pollutants.
Put in place a cleaning regime that uses non polluting materials
Locate noisy equipment away from sensitive areas
Extract any pollutants or heat locally .
Controls – People like to have control of their environment. A certain amount of centralisation is acceptable if the occupants are consulted and understand the reasons.
Make links to outside to encourage outdoor enjoyment and recreation.

Promoting biodiversity

Materials should be used with minimum adverse impact on biodiversity
A full investigation should appraise the opportunities for enhancing biodiversity
Maximise habitat creation and minimise disruption - Bird and bat boxes
Creation of zones: wildlife / human / traffic and wildlife corridors and create self-sustaining habitats
Use SUDS to create variety of habitats (seasonal, wet / dry / semi-dry)
Maintain a low maintenance regime
Treat pollutants locally
Choice of plant / seed varieties for range of microhabitats & feeding opportunities
Use native species for main structure planting shelterbelts, to form new local woodland
Alternatives to hard landscape (porous paving / car block / gabions)

Supporting communities

Consult internally and externally
The project should enhance the local environment by quality design and provision of improved facilities.
The local community/ communities should be consulted and their concerns respected.
Consider the throughputs from the building and how it might impact on local communities
Avoid nuisance during construction or post completion.
Look to sourcing materials and skills locally

Minimise Pollution

All materials and products should have minimal adverse environmental impact at all levels from sourcing to end of use. The answers to this are rarely simple but some principles are possible.

Products should be fit for their purpose and present no health risk over their lifecycle.

They should be controllable, maintainable for long efficient use and facilitate safe recycling in all or part and ultimately safe disposal.

They should have minimum dependence on non-renewable resources over their lifecycle.

Systems should be validated in their own right in respect of their value and cost-effectiveness.

Materials should have minimum embodied toxicity and have long maintainable life with ultimately safe and efficient recycling or disposal.

Materials such as paints and finishes should be free of chemicals.

Avoid treatment of timber through design to prevent water retention.

Use local materials if possible and as close to their natural state as possible.

Locate building near to low-impact transport networks.

Consider the availability of the public transport infrastructure and encourage use of public transport and cycle, pedestrian safe access and storage and facilities that will encourage like shower provision

Mixed use and high density development can reduce the need to travel and bring lifestyle advantages

Avoid out of town retail or business facilities

Traffic calming

Consider joint uses between the project and the local community – such as café space or library facilities

Discourage through traffic or commuter parking

Use landscape design as an integral part of minimising the adverse impacts of transport and enhancing the positive elements such as cycle ways and pedestrianisation.

Resource Effectiveness

Energy & Water

It makes environmental and economic sense to minimise energy and water consumption and sewage outfall to reduce infrastructure and minimise costs in use associated with energy, water and sewage charges.

There are many opportunities to improve energy and water utilisation and to offset demand.

Considerations should be based on usability and whole life costs.

Conservation is always the best first option. Negawatts and negalitres are invariably the low hanging fruit.

E.g., site treatment and re-use of water, low consumption fittings, low flush and waterless fittings.

Toilet effluent is manageable

Avoid forms of recycling that raise the overall costs and introduce need for chemical treatment.

Rainwater harvesting can be used to offset demand and contribute as part of an enhanced suds strategy

SUDS offer excellent potential to improve landscape design quality and enhance biodiversity

All proper precautions re- legionella are now well documented.

Consider form, orientation and landscape and opt for passive solutions wherever possible. Mechanical systems should support passive systems not substitute for them.

Look for local sources of heating and cooling such as incineration or aquifer cooling

Controls, management are also vital

Materials Waste

Recycled materials should be considered but embodied toxicity may be an issue

Design for dismantling

Recover materials on site

Use pre fabrication if appropriate

Understand your legal responsibilities with respect to waste.

Understand the cost of waste and the benefits of waste avoidance.

Build on existing sites rather than on green fields

Recycle as much as possible

Include waste minimisation in design criteria

Design in waste management to the completed building

Write the tender documentation

Make sustainable design a fundamental criteria for selection of successful bidders.

Clearly and thoroughly define and demand sustainable design or you will not get it.

Use available benchmarking, measurable criteria and evidence based awards based on very best practice targets to address site practice, design quality, process planning for commissioning and handover, feedback and post occupancy evaluation.¹⁶

Make feedback a fundamental requirement against established and firm targets.

Setting targets against current norms is not adequate and will not deliver the best possible life cycle benefits.¹⁷ Innovation should be encouraged.

Reinforce targets through all stages of the process using appropriate tools and techniques

Ensure that time is allowed to develop an appropriate design based on a single system.

Ensure that the tender documentation makes explicit the need for process management to be maintained throughout the design and construction period and that bidders will sign up to the Considerate Constructors Scheme.

Ensure that time is allowed for commissioning and handover and that appropriate information is gathered.

Specify all the testing regimes and ensure they are costed out.

Careful handover is central to efficient building operation. The commissioning, servicing, cleaning, maintaining and operations strategies should be described in a user manual. The contract should contain clauses relating to appropriate levels of staff training and there should be a clear plan to indicate how this information will be communicated at handover.

¹⁶ Sustainable Construction CPD – Module 14 Appraisal Tools & Techniques Gaia Research 2004

¹⁷ Action Energy www.actionenergy.org.uk

Seek evidence that the tendering bodies are aware of the benefits of sustainable design

It is critically important to ensure that the design team members understand the significance of pursuing a sustainable development strategy, and are committed to it.

Sustainable design is now perceived as a business edge and inexperienced, ill-informed and unscrupulous designers and contractors will read this document and offer a variation on the content by return. Beware those talking the talk they will not be able to deliver.

Seek supportable evidence of achievements through professional practice, built development, benchmark standards achieved, professional recognition or other means. Ensure that they have adequate commitment, skills and experience to deliver including expertise in sustainable design.

All members of the team (designer, contractor) should:-

- show a genuine commitment to sustainability
- provide evidence of appropriate training
- show real experience of delivering sustainable design
- show a working knowledge of best practice nationally and internationally, and a commitment to raising standards through networking.

Determine any additional training needs that tendering bodies might need. Few of them will have adequate knowledge or training to really deliver best practice.

Each tenant and community is unique and the design responses should reflect this.

Look for an integrated design team approach with an emphasis on a single design response rather than disparate elements, especially expensive 'sustainability add-ons' that simply increase cost and servicing needs.

Look for straightforward simple solutions that work well rather than add ons especially where they add capital cost and have high or unknown maintenance implications.¹⁸

¹⁸ Eco-minimalism – Getting the Priorities Right by Liddell H.L. & Grant N.
www.gaiagroup.org/Architects/eco-min.pdf

Maintain a watching brief

If the project is well established with suitable targets and agreements then this should form the basis of a constructive agenda.

Design changes are inevitable and should be reviewed in terms of their impact on sustainable design to ensure that they are neutral or beneficial.

Establishing controls within the routine of the site operations will be beneficial:-

- Unique or unusual elements, materials, products or services systems should by this stage have been fully explained - however a site has a large and ever increasing workforce and key issues should be part of the induction process for new site staff (this is required for Health & Safety and could be included with it).
- Environmental issues regarding the building being delivered and the construction-related activities on site, should be a permanent agenda item.
- Within reason all relevant sub-contractors should have explanations of key environmental elements, and have the important installation aspects highlighted.
- Monitoring, checking & testing routines should be established at the outset.
- The design team should ensure that they are informed and present at all key checkpoints.

It is good practice for a handbook & operational manuals, to be maintained through the site operations in a manner that allows it to be presented in a manner that the client can navigate. The new CIBSE Log Books provide an opportunity for a coordinated approach.

It is particularly important to be attentive to build quality and attention should be paid to the commissioning operations - not just of innovative technology - but also of the routine ones, as they can also undermine a system. It will become clear at this point how important it was to specify all the testing regimes at the tender period and for these to have been costed out and accounted for.

A social context should have been established by which the community can be self managing and has an outlet to resolve issues that arise.¹⁹

¹⁹ The Sustainable Neighbourhood Audit Technique is one mechanism.

Ensure that handover is undertaken properly

The interface between completion of a project on site, handover and ongoing operation & maintenance is a key point in the procurement process. If Client, Design Team and Contractor have been attentive to the issues and requirements then the building will be delivered as intended. However, the first period of occupation involves a learning curve as well. A lack of understanding of controls, regimes or design parameters can reduce their efficiency or undermine them altogether. This is where sustainability as a process and not a product is really demonstrated.

As the client you need to understand the various cycles of building management and the difference between routine O&M and contractual issues relating to snagging and defects.

The point of formal handover should be very soft. With training and involvement of users and O&M staff before handover and a “hand holding” exercise by the design team and specialist technology / materials installers afterwards.

It is not unusual in the last minute rush to handover for training to be more rudimentary than it should be. It is not adequate for one representative of a specific aspect of a building to talk to one representative of the user. Training should involve as many potential operational staff as possible, and refresher inputs should also be considered.

Check that products are of the specified quality, and that they work as specified and operate according to the manufacturer’s recommendations is essential.

Once the building is under operation there is value in the design team maintaining a direct interest - and this should be properly resourced. This acts as a two-way dialogue as the design team gain the benefit of feedback as to how the building is performing.

The critical point in the cycle of procurement is when the building becomes the full responsibility of the operators.

Monitor key aspects of a buildings’ resource usage (energy, water, waste materials, etc.) as part of the sustainable development policy. This will help to identify problems at an early stage.

The local community should be in a position to manage the sustainability agenda.

Effective feedback on how a building is operating technically, in terms of human mechanics, spatial organisation, ease of management and communication, has a large potential for resource saving.



4 EXAMPLES

Toll House Gardens

Gaia Architects



Domestic environments are known to be a source of breathing related problems which can be exacerbated by poor construction and ventilation. A collaborative project - supported through the DTI & an RIBA research award - was initiated in 2001. Its aim is to develop an affordable low allergy building specification which avoids where possible known & suspected building related allergens and minimises the conditions in which they can have an adverse impact. One in 7 children now suffer from asthma and an affordable specification would be a major step forward in barrier free design and improve quality of life for a large number of sufferers and their families.

The specification has paid attention to the global environmental condition, with a specification which aids moisture management and to local control which eliminates cold bridging, reduces the number of areas where dust mites might readily populate, aids good ventilation & prevents occurrence of high moisture environments. The ventilation strategies are of particular interest in respect of their efficacy, affordability & energy efficiency. Dynamic Insulation has been employed where it has been feasible (5 houses) and this allows comparison with a Baxi Whole House ventilation system (5 houses) and standard provision in the other houses. Sensitisation is associated with the presence of a number of chemicals. These have been eliminated from the design.

The houses will be monitored for known triggers and the ability of the environment to resist their build up. Operational factors such as pet ownership and cleaning regimes, will be taken into account.

Leslie Court

Gaia Architects



The form of the buildings became ever more related to passive solar gain and a preference for large south and small north facing windows. Phase 7 formed a sun-scoop using a permaculture garden design. The extent of landscaping is rich and varied, and allows for larger areas of soft and porous surfacing. The next phase under development contains low allergy materials and finishes. The ventilation will use dynamic insulation.

It is often thought that ecological design is not a high priority for communities whose prime concern is to rid themselves of slum conditions. However, in this project the continuity of design and management teams over two decades has built up a trust and dialogue where the cooperative has been open and positive to such principles. The most significant aspect lies in the major social improvements, which are essential as part of the total picture of sustainability.

The extent of eco-design specification of materials (and other principles) increased with each phase of development. This started in the late 80's with attention to non-toxic timber treatment - both zero and borax treatment methods - to replace CCA. Later phases (mid 90's) added breathing wall techniques with use of high levels of cellulose fibre insulation, timber flooring rather than chipboard, organic paints and finishes and an encouragement for tenants not to use carpet or vinyl finishes. The single most important aspect of the project is that the 'Green' specification elements were delivered within the Scottish Homes cost yardsticks.

The scheme was commended in the 2003 World Habitat Award - the only scheme in the UK to ever achieve this recognition.

Shettleston

John Gilbert Architects



This scheme sought to use as many recycled or reclaimed materials as possible, sourced within budget and time constraints. The housing scheme comprises a three-storey block of flats, a row of houses and cottage flats. The block of flats face south and the L-shaped plan forms a semi-private enclosed garden and children's play area.

The scheme also benefits from geothermal heating, with old mine workings below the development providing constant temperature water for a heat pump. Top-up heating is provided by solar water panels and tenant controlled immersion heaters. Passive ventilation is used throughout and solar pre-heated ventilation is used to pressurise the dwellings. The varied housing in the development includes 1, 2 and 3 bedroom properties, with flexible internal layouts - allowing the occupants to adapt their homes to suit the changes throughout their lifetimes. Whilst significant, being made of reclaimed or recycled materials, the process was found to be time consuming and not always cheaper.

Hemp Houses for Suffolk Housing Society, Bury St Edmunds, England

Modece Architects



A French company, Isochanvre (www.isochanvre.com) have developed, in partnership with Suffolk Housing Society and Modece Architects, two prototype hemp/lime houses in Suffolk which have been monitored by BRE against two otherwise identical conventional houses.

The imported hemp fibres used are ‘mineralised’ in a commercially secret process to render them rot-proof, non-flammable and inedible to rodents.

The BRE Report concludes that the hemp/lime homes are more expensive than conventional houses with comparable waste minimisation, thermal and durability performance, while acoustic performance was poorer but condensation generation was less.

Schafbruhl

Joachim Eble Architects



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This project is notable for the fact that it delivered a relatively high density development with a very human scale, without resorting to the tower block layout of the neighbouring housing which has the same density.

This was one of the very first major residential ecological design projects in the world. It has vetted materials throughout - based on Baubiologie principles. The majority of the construction is of brick (lower walls and floors) and all finishes are of low emission materials (lime plaster, organic paints, natural timber board floor finish, etc). The landscape strategy is particularly impressive - especially now that the courtyards are mature. The use of porous surfaces and the 100% pedestrianisation of the whole project interior.

Blaabaerstien Housing Association, Nesodden

Architect: Rosland (late 1970's).



The project consists of approximately 200 houses of various sizes and occupied by people of average income. It is terraced housing of moderate to low-density on a rocky hillside that backs onto a forest. The development is integrated excellently in natural terrain. Schools and shops are a 5 min walk. Cars are relegated to perimeter (you can drive in to deliver fridges, children and granny but the understanding is that cars are not left). The car parking is in communal underground garages - an easy option on a hillside. The housing is subdivided into groups of about 20 units around courtyards/playgrounds. It is very social.

An exemplar for private or social housing anywhere.

Refurbishment



In the 1970's and 80's industrial style residential buildings were erected all over Europe. In 1997 The Danish Ministry of Housing documented 10 examples of such buildings which had been given new exterior shells, additional insulation, cladding and roofs which added new qualities and brought the buildings in line with modern standards. New cladding means that a number of technical problems are solved at one time:- the insulation of external walls is brought into line with present-day standards; leaky joints are sealed; moisture-sensitive surfaces are protected; and badly-aged plates and concrete surfaces are concealed. In the process windows and external doors are generally replaced.

In many of the projects described, a new room was been introduced where open balconies were replaced by glass verandas. These can be used for a much longer period of the year than open balconies, and, if used correctly, can act as passive solar heating units. In many cases very narrow balconies have been extended in connection with the construction of glass verandas, and high concrete parapets have been removed.

Flat roofs, without overhangs have caused many technical problems in buildings and these were generally replaced by sloping roofs with large overhangs. Construction of additional roof apartments have often funded the new roof construction. Additional insulation and the sealing of facades and roofs have a positive impact on energy consumption and on the indoor climate in individual flats, including significantly increased comfort.



5 FURTHER INFORMATION

Policy Background

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- *A Policy on Architecture for Scotland* Scottish Executive, 2001 www.scotland.gov.uk/library3/construction/apoa-00.asp
- *Client Pack, Construction Works Procurement Guidance* Scottish Executive www.scotland.gov.uk/building/client.asp

Guidance on Housing Design

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- *The BedZED files, Building for a Future*, Volume 13, No 3, Winter 2003/04
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- *Environmental Handbook Vol.2. Construction Phase* CIRIA 1994
- Halliday SP *The Green Guide to the Architects' Job Book* RIBA Publications 2000

Organisations

- **AECB** (Association for Environment Conscious Building) covers a wide range of expertise from architecture to specialist subcontractors. They produce a publication listing the range of services available from members. www.aecb.net
- **SEDA (Scottish Ecological Design Association)** covers primarily design concerns but does also have builders in its membership and is heavily buildings oriented. www.seda2.org
- **Centre for Alternative Technology** Fact Sheets and demonstration projects www.cat.org.uk
- **The Gaia Group** - sustainable design and on other modules in this series. www.gaiagroup.org
- **Considerate Constructors Scheme Information Pack** considerate.constructors@dial.pipex.co.uk
- **Conservation Architects Scheme Information Pack** www.rias.org.uk
- **Construction Resources** www.ecoconstruct.com
- **National Recycling Forum** www.nrf.org.uk/buy-recycled
- **RIAS (Royal Incorporation of Architects in Scotland)** www.rias.org.uk
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- UK trust helping people to build their own homes using the Segal method with an emphasis on low impact healthy materials.
- www.iea.org/standby Lebot B., **Reducing Standby Power Waste to Less than 1 Watt: A relevant Global Strategy that Delivers**
- Greenpeace have a website 'PVC Alternatives Database' the website explains issues about PVC. It lists PVC products and alternatives, by country or by product <http://archive.greenpeace.org/~toxics/pvcdatabase/>
- The Energy Saving Trust- government funded and provides a wealth of information to householders, in particular. The Trust's website is well written and useful for both the commercial sector and individual households. 0207 222 0101, www.est.org.uk
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