Six Guiding Principles to improve the Sustainability of the Housing Construction Industry.

This St. George Regeneration project includes affordable housing, office space and a hotel, as well as private housing.
At its meeting on 10th December 1999 the Board of the Housing Forum agreed to form a Sustainability Working Party to investigate and report upon the application of sustainability principles in housebuilding.

At the outset the Sustainability Working Party were very aware that such a diffuse subject as sustainability has the potential to generate discussion across a wide spectrum that might not in itself lead to clear recommendation and sound advice to the sector.

In recognition of this we agreed a finite life span, with the target of producing a report in July 2001, intended to allow all those involved in the procurement and development of housing to make informed choices about the sustainability of their product.

Our over-riding concern was to demystify sustainability to:

- Encourage those yet to embrace this agenda that sustainable construction can be low or no-cost.
- Offer support and guidance to those already on the sustainability journey.
- Identify the business benefits to those in the sector from engaging in best practice.

The production of this report, and the quality of its content would not have been realised without the contributions of those who sat on the Working Party, the input from a variety of guest speakers, and the industry, knowledge and diligence of our secretary, Daniel Waller.

The Raleigh Square project re-used existing buildings

1) Performance measurement and analysis is crucial to the continued implementation of improved sustainability. This report focuses upon two distinct and complementary systems of measurement which can be used to give both strategic and local assessments of organisational and project performance (SPeAR and Eco-Homes).

2) If assistance is required in the implementation of a sustainability improvement plan we have appended a list of not-for-profit and consultancy bodies active in the sustainability issues who are able and willing to assist.

3) Engagement with the academic community can be very worthwhile and we recommend a dual approach – users can access our list of institutions at the cutting edge of sustainability for knowledge gathering whilst using local academic contacts to assist in the delivery of the project. Many academic institutions would welcome the opportunity to collaborate on local sustainability projects that could contribute towards student’s casework and dissertations.

4) In sustainability one size does not fit all. Organisations are often reluctant to embrace sustainability because they feel ill informed in the face of such a complex challenge. In reality there are few rights and wrongs in sustainability and organisations may occasionally make decisions that are far from being fully sustainable, for valid reasons. Our discussions have been based around the belief in six guiding principles, which can be followed to improve the sustainability of housebuilding:

- Reduce carbon dioxide emissions.
- Minimise pollution.
- Consider whole life costs.
- Use resources to their maximum utility.
- Provide for integrated communities.
- Consult and engage existing communities.

5) Throughout the Housebuilding industry there are many organisations that have benefited from incorporating sustainability into their decision making process. It is not part of the Housing Forum’s brief to be prescriptive in terms of improving sustainability in housebuilding; it is part of our brief to inform, offer advice and encourage those who wish to continue to build or manage homes, but in a more sustainable manner.
Sustainable development is a much-debated term, a complex interaction of environmental, social and economic issues, factors which can impact at a variety of levels: personal, local, community, company or global. This guide is intended to improve the sustainability of all housing construction activities and end products, including those created through repair, renovation, maintenance and regeneration, and many of the ideas contained within this report, whilst written for the new-build sector are also applicable for those concerned with the existing housing stock.

Over the years the housing industry has evolved, seeking to make a profit whilst at the same time trying to meet changing expectations and needs of its customers and politicians at a national and local level. In the process it has been able to draw on a seemingly endless supply of resources from suppliers around the world.

Short term difficulties of supply and local arguments over planning aside; demand has been met with little concern about any environmental limitations on the industry. This situation is now changing. Concerns over energy use, resources and waste disposal will join issues of land use and the competition for skilled labour in an agenda that will require the housing industry to change. The need to become more efficient and produce better housing is going to be necessary if the industry is to meet both the needs of customers and the environmental agenda of the future.

We need to produce and manage homes with a reduced environmental impact and this is in many respects an easier task than creating the market for them. Most of the improvements in design, materials and technology have been tested and disseminated in the good practice guides of government and other campaigns. More work is necessary on some technologies and market scale installations are needed for areas such as renewable energy supplies.

The challenge is to persuade householders to see their responsibility for and the advantage to them of homes with a low environmental impact, as part of their personal contribution to sustainability at a local and global level. This will require action by many different, parties including central government, housebuilders often claim that they have to provide what the customer wants, but this is not seen as a constraint to innovation in other industries. The role of the housing industry should be to both promote and adopt change. It will need to demonstrate that environment friendly housing and construction is both practical on day to day basis and capable of meeting the needs and aspirations of the market. An example from the motor industry can be used to illustrate the process. Car seat belts were a recognised safety measure in the industry, long before motorists accepted them as necessary. The car industry did not wait until there was a queue outside the showrooms of buyers demanding seat belts. Progressive companies fitted belts in advance of demand and together with campaigners set about persuading buyers of the need for safety. Finally government set out legislation to enforce use with those that could not be persuaded by argument. House-builders need to take up the similar challenge of persuading people that they want environment friendly housing and that it will give them a better quality of life, as well being beneficial for us all.

In addition there are several notable direct benefits to housebuilders from improving the sustainability of their product:

- The planning process can be sped up and smoothed out – increasing predictability and reducing delays.
- Funding can be released from discerning clients – ‘Best Value’ and ‘Egan Compliance’.
- Improved customer and tenant satisfaction.
- Reduced whole life costs of the development.
- It can also serve to ‘future proof’ the development against increased environmental standards.

Much of the work of The Housing Forum and the contents of this report focus on new housing provision. In environmental terms it can be argued that existing housing is a greater problem. Certainly in terms of energy use older housing will contribute much more in the way of greenhouse gases than new properties. This is one of the reasons why the recent revisions of Approved Document ‘L’. Conservation of Fuel and Power have included an obligation to improve the energy efficiency of building fabric elements when work is being carried out on them. Further improvements can be achieved and other aspects of environmental impact, water use, materials etc. need similar consideration. The requirements of the Building Regulations are increasingly being extended to cover alterations to existing housing, but the improvements in new housing will help to establish the benchmarks by which older property will be judged and thus bring the existing housing stock closer to new build standards. Environment conscious householders will come increasingly to expect similar levels of performance and will in the future add such concerns to the usual considerations of price, location and appearance.
There are 6 Guiding Principles applying to improving the sustainability of the process and product of the housing construction industry. It is important to look at the issues in their global or national context in order to identify the roles and responsibilities that can have a positive impact on the sustainability of the housing construction industry.

1. Reduce Carbon Dioxide Emissions

Context:
The risk of global climate change is possibly the biggest environmental threat facing the global economy. Increasingly erratic weather and the possibility of permanent man-made climate change can destabilise national economies and result in parts of the world’s population being marginalised socially and economically. Whilst other parts may suffer noticeable changes to their standard of living, quality of life and disposable incomes, as a result of living in an environment which is less predictable and more subject to extremes.

In the large part, increased rates of Carbon Dioxide (CO₂) production and continued deforestation since the industrial revolution have been identified as being responsible for an increasing concentration of CO₂ in the atmosphere. Carbon Dioxide is not the only greenhouse gas (GHG) identified by the climate change secretariat for the Kyoto convention as contributing to the ‘greenhouse effect’ and thus to global climate change, however it is considered to form the bulk of the contribution and it is also a greenhouse gas that the housebuilding industry produces significant quantities of, as such it is a legitimate target for reductions.

The Royal Commission on Environmental Pollution (RCEP) has recently published its 22nd report - Energy – The Changing Climate. The key message of the RCEP’s report was that there is a moral imperative on the UK to take immediate and radical action to reduce its CO₂ emissions by 60% by the year 2050 in order to contribute to an effective global programme to combat climate change.

Opportunities in Housing Design:

The domestic (Housing) sector is responsible for around 28% of total energy use – of this 86% is used for space and water heating. This guide is intended to improve the sustainability of all housing construction activities and end products, including those created through repair, renovation, maintenance and regeneration, and many of the ideas contained within this report, whilst written for the new-build sector, are equally applicable for those concerned with the existing housing stock.

It is important to note that new-build housing does have a very important role to play in reducing overall CO₂ emissions as the costs of installing energy saving measures during construction are significantly less than any type of retro-fit installation. In addition many existing buildings have practical limits to the extent of energy conservation that can be applied, thus we should take advantage of the opportunity to build new homes with as efficient systems as possible.

There are, of course, other ways of reducing the output of Carbon Dioxide from the built environment. Renewable energy sources are becoming more financially attractive and have been used on a number of housing projects throughout the UK. Whilst this type of approach has been used with technical and some financial success, it is not widespread and it is deemed necessary for the ‘market’ to mature before these technologies are adopted wholesale.

There are other opportunities to reduce carbon dioxide emissions from housing that do not involve such high levels of risk and/or capital investment. Combined Heat and Power (CHP) offers unprecedented efficiencies of generation and can be fuelled through many sources. Carbon neutral systems have been devised that use wood chippings from fast growing coppice farms. Carbon Dioxide is absorbed as the coppice grow and is released in burning - a cycle that may take up to fifteen years. As the carbon is cycled quickly there is no overall increase in net carbon dioxide concentrations in the atmosphere. These sorts of systems can have problems – wood chip fired CHP can require regular deliveries of large quantities of woodchips potentially causing increased congestion on local roads - however successful management of the energy systems of a development can result in very high levels of energy efficiency and low energy demands, leading to very low carbon dioxide emissions.

Specifiers and designers can also impact upon the total energy usage of the development by choosing to use products that have a low embodied energy. Embodied Energy is the term used to refer to the energy that is used in the manufacture, transportation and eventual disposal of materials. It can be significantly reduced, whilst maintaining the quality of the product. The Building Research Establishment’s (BRE) Green Guide to Housing Specification enables comparison of different construction techniques and materials, in terms of embodied energy and other manufacture, transport and eventual disposal criteria.

Design can influence the potential for a dwelling to save energy but it is important to remember that actual energy use will be determined by the end-user. Behavioural factors can be highly influential in setting the actual energy use for a house or flat indiscriminately of technology and design built into the unit. Good instructions for efficient use must be included with the paperwork given to a new tenant or owner if savings envisaged are to be realised - in some circumstances it may be necessary to provide personal tuition if best use of the energy saving measures is to be achieved.

Opportunities in Housing Construction:

The process of Housebuilding does have an impact in terms of CO₂ production through energy use - energy is used to build houses. Whilst this use of energy is far less than the net energy usage of the development after occupation, energy conservation during construction can have immediate cost saving benefits to the contractor, in addition to environmental benefits to the wider community.

- Many of the savings to be gained are through ‘good housekeeping’ – making sure lights are switched off when not in use, plant is not left to idle and site hut heating and ventilation is used efficiently.
- The site manager can have an impact on the energy used by sub-contractors and materials suppliers in transport. Return visits by sub-contractors and half-loads of deliveries all represent inefficient use of transport energy. Traders should be programmed to maximise their efficiency of work – this will also maximise the efficiency of their transport energy use.
- Site managers can also help to minimise the overall energy used by the site by employing local trades and using local suppliers of materials. This will also have added benefits to the local economy improving overall sustainability.
Six Guiding Principles to improve the Sustainability of the Housing Construction Industry.

2. Minimise pollution

**Context:**
Pollution from the construction product and process can take many forms other than the pollution to the atmosphere of greenhouse gases. In the most extreme cases contractors could find themselves being prosecuted by the Environment Agency for breaches of the Environment Act (1995) and, if found guilty, fined. However pollution from construction sites can take many forms that may escape the notice of the relevant authorities, but can still damage the local environment. Many of the substances commonly used in housebuilding can also pose a pollution risk in their manufacture or in use.

**Opportunities in Housing Construction:**
Waste from materials wrappings, spilled petrol or diesel from plant and waste materials can all pose pollution risks that may not incur fines, yet can be damaging to the ecology of the site. Run-off of silt from sites can pose a risk to local wildlife. Avoidance of these hazards is mainly a matter of good site control: good waste minimisation and handling practices can prevent many transgressions – observance of COSHH (Care Of Substances Hazardous to Health) regulations with respect to materials will also prevent many accidental discharges. The Considerate Constructors’ scheme offers guidelines that can help many of these problems.

**Opportunities in Housing Design:**
Designers and specifiers have a real opportunity to ensure that the construction product creates as little environmental damage as possible. The BRE’s Green Guide to Housing Specification lists many commonly used building materials and describes their impact to the wider environment during manufacture (and transport) and their impact on the eventual users of the home. It allows specifiers and designers to compare products and make choices based on the environmental performance of the product's manufacture, use and eventual disposal.

The use, cleaning and distribution of water is a source of pollution from the home. Water management techniques including the installation of low-flow tap heads and reduced flush WCs, can help reduce demand for water. In addition porous hard standings can help water infiltrate soils and return to groundwater where it is naturally cleaned, and can be re-used, without incurring energy and management costs. The provision of permeable hard surfaces will also reduce pressure on sewerage systems, reducing the likelihood of flood. These types of solutions may not always suit local geology, but should be investigated.

3. Consider the Whole Life Costs of the development

**Context:**
It is important to integrate the capital expenditure committed to a project with the operational costs involved in operating and maintaining the product. Whilst this seems immediately relevant to organisations who are responsible for both types of expenditure, it has importance to the private sector as well – customers purchasing houses are not going to think highly of the Housebuilder if their home needs expensive maintenance soon after purchase, conversely, well thought out homes which incur little maintenance costs are likely to be recommended.

**Opportunities in Housing Design**
The overall maintenance costs and the cost of planned replacement of components will vary enormously according to the nature of its construction and the features incorporated in its design. Liaison between development and maintenance departments in social and public sector housing providers can provide a large source of data by which decisions can be made in order to minimise the costs of maintaining the development after practical completion. This data can be used as a convincing argument for increased capital expenditure on a project if this were to be offset against reduced maintenance cost projections over some years. If this data is not readily available, HAPM (Housing Association Property Mutual) have produced an excellent guide to expected lifetimes and maintenance intervals of a wide variety of common building materials.

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Six Guiding Principles to improve the Sustainability of the Housing Construction Industry.

4. Use resources to their maximum utility

Context:

Using resources to their maximum efficiency is often touted as a key mechanism for achieving increased sustainability. However, a drive to maximise efficiency may not always deliver the best product for the end-users of the housing product. It is important to look to the needs of the end-users and make decisions based on utility, not only efficiency.

Waste management is an obvious example of a system that can help to improve the profitability and lower the costs of the housebuilding process – wasted materials are paid for twice – once when purchased and again when disposed of. A strategy for waste management11 based on the waste hierarchy can help all teams members to design out waste, minimise waste creation on site and ensure any resulting waste is dealt with appropriately. This will result in a tidier, safer site where less of the total construction cost is being spent on activities that do not add value.

Opportunities for Housing Designers:

Designing and building a product that your customers, be they purchasers or tenants, actually want and need is crucial to the long term success of the development. High profile cases of developments that have been built and a few years later are demolished, have high void rates, or suffer stagnating values are too common, and could be avoided. Social housing providers are good at consulting existing tenants to find out what works well and what does not, learning from mistakes in the past to continuously improve the standard of their housing product. Private sector housebuilders will also regularly carry out internal customer satisfaction surveys to determine how purchasers feel about their new homes. Many factors influence the results of surveys in both of these sectors, including density of population, location in relation to amenities and facilities, the physical layout and density of development and the mix of tenure on the site. All of these factors represent resource utilisation variables – the key is to maximise the benefits to all of living in a particular development, considering the target user group(s) and examining their current and likely future needs.

Designers have increased opportunities to minimise waste through the creation of an integrated product. Modular construction, pre-fabrication and standardisation will all contribute to resource maximisation, as these approaches focus on efficiently using materials, land and labour to reduce costs and maximise opportunities from a given development.

Opportunities in Housing Construction:

Resource utility in the construction process can take many forms, efficient management of trades; materials and plant will all contribute to the success of the development in financial terms. Again, however, it is necessary to distinguish between maximising efficiency and maximising utility. Improved speed of construction at the expense of quality will result in a product that will result in problems and that may jeopardise the long-term viability of the development. Maximised utility is delivered through good site management, attention to detail and awareness of the value and potential of the resources available. The ‘SmartWaste’ approach developed by BRE has demonstrated considerable savings on a number of housing developments12.
5. Provide for integrated communities

Context:

It is believed that cohesive well-balanced communities are a result of a diverse demographic composition. The publication of Policy Planning Guidance 3 (PPG3) in March, 2000 asks planners to ensure that they:

“Plan to meet the housing requirements of the whole of the community, including those in need of affordable housing and special needs housing”

The document gives a strong indication that planning is to look in detail at proposals that do not offer some degree of mixed community. People of all life stages and levels of affluence can co-exist in one community and this will offer benefits to the community as a whole. Increased security is often a feature of communities that are integrated, as is a greater ‘sense of place’.

Opportunities in Housing Construction:

The greatest opportunity that a client has to provide an integrated community is in the process of site selection. Good links to transport nodes, leisure amenities and shopping facilities will increase the development’s long-term viability, and the likelihood of social inclusion. The development itself should contain a mix of house types, allowing people at many life stages (from first time independents to retired people) to live in the same community, and also encourage their interaction. The Housing Corporation/DETR publication Housing Quality Indicators is a useful tool in assessing the sustainability of site location.

Secured by Design can be seen as a useful proxy for improving development design and house layout. Research has shown that crime on Secured by Design (SBD) sites can be reduced by up to 50% compared to non-SBD for a marginal cost of as little as £90 for a three bedroom house.

Opportunities in Housing Design:

The construction process can help to formulate integrated communities, through involvement of local stakeholders in the construction process. The use of local labour, can help give a ‘pride in the job’, which will develop ownership of the development amongst local tradespeople. Using local builders, architects and building professionals, as well as local building materials and product suppliers, will help to maximise the income and profit retained and circulated within the local economy. This helps build economic and social self-reliance, as well as skills and confidence in the local community. Consultation with stakeholders will allow local people to develop links with the development prior to its occupation, which will help it to be accepted amongst the existing community. The resulting development and those who live on it are more likely to be accepted into the community, or, as is possible, provide a focal point for community development, where there was none before. Community buildings may be included within the development as this helps to create diverse and sustainable mixed communities. This improves security and safety in the community, as it becomes more than a dormitory area.

6. Consult and engage existing communities

A key part of sustainability is the ability to optimise environmental, economic and social demands. The social aspects are often the hardest to define and measure; yet they often hold the key to the ultimate success of a development. As mentioned in the previous section, involvement of local stakeholders and tradespeople in the construction of a development can have significant benefits to the developers and the local community. This can be taken further to involve existing community representatives in the community planning process, holding workshops and meetings prior to finalising designs for the development.

Opportunities in Housing Design:

The client, design team and consultants have an opportunity to involve the existing communities into their planning process. This is best done as early as possible as involvement develops most ownership if participants are engaged at the project’s inception. This can, at worst, deconstruct ignorance about the development which can lead to planning objections and at best provide insight into the local community’s rationale allowing the partnership to develop a new part of the community that is in tune with the existing one. The DETR reports on the following case study:

“In Darnall Renewal Area (Sheffield), the community have been extensively involved during the planning process. The starting point for residents’ consultation was the ‘Priority
Six Guiding Principles to improve the Sustainability of the Housing Construction Industry.

Part 2

the ‘e’-factor:

These techniques have been generically known as “Planning for Real” techniques, 

Opportunities in Housing Construction:

It is important to maintain a balance between site security for safety, and an openness showing that the development and developers have ‘nothing to hide’. Organised open days during the construction process are a good way of satisfying a community’s natural curiosity, whilst maintaining the efficiency of the site. The use of local labour and materials suppliers can bring a specialist knowledge to the project, which can help with planning issues, and is likely to help continuity of works. Liaison with local schools can help develop an understanding of the works and their place in the context of the community – it may also help satisfy childish curiosity leading to a reduced likelihood of vandalism or intrusion.

Which, whilst pertaining to a specific area of housing provision – renewal, shows how local interest and input can be sparked and used to benefit the development. These techniques have been generically known as “Planning for Real” techniques, and examples.

Part 3

Two Case Studies

‘The Learning Experience’:

Evidence from Millennium Mews, Liverpool - Riverside Housing Association

Like other RSL’s, instead of simply providing housing, Riverside Housing Association find themselves more and more at the rock face of community regeneration. The growing disparity between communities, an increasing demand for energy conscious homes and an under achieving construction industry have an immediate and compounding impact on Riverside’s resources. This project was designed as a response to tenants’ concerns about space standards, neighbourhood security and household running costs.

Recognising these problems is one thing but identifying a way through to a solution is another. Riverside know to their own cost that many of the homes which make up Liverpool’s existing housing stock are poorly insulated, badly designed and located in areas which are crime ridden and hard to revitalise.

Riverside identified the three key areas that required a balanced approach in the research. Thus the conclusions would lead to a more sustainable solution less dependent on future regeneration packages.

The issues relating to the three key areas were:

Concern to:

Tenants:

Falling grant, rising expectations, ageing stock, increased competition.

Riverside:

Unusual dwelling or small scheme could not address many of the issues related to the creation of communities. If the investigation was to make a lasting contribution to Riverside’s work it must be a thorough attempt to assess the whole range of sustainability issues. This thinking led Riverside to procure 35 innovative homes in two phases over a four-year period.

The Environment:

Global warming, treated water shortages, depletion of world’s natural resources, contaminated land.

Early in the project the team recognised that an isolated unusual dwelling or small scheme could not address many of the issues related to the creation of communities. If the investigation was to make a lasting contribution to Riverside’s work it must be a thorough attempt to assess the whole range of sustainability issues. Recognising these problems is one thing but identifying a way through to a solution is another. Riverside know to their own cost that many of the homes which make up Liverpool’s existing housing stock are poorly insulated, badly designed and located in areas which are crime ridden and hard to revitalise.

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Riverside:

Riverside’s tenants expressed a wish for more traditional designs, at least in appearance. We have not used new materials for the sake of novelty. However, over the past 12 months we have been able to identify which of the features that made the first phase such a success, that Riverside can afford in the near future. White Rock Court is largely a response to the lessons learned at Millennium Mews.
Riverside intend to use the new house types developed for White Rock Court as the basis for their new build program. Compared with the current range of standard house-types, they will be more flexible, secure and environmentally responsive.

The team involved in both Millennium Mews and White Rock Court were selected for their willingness to experiment with the innovative technologies and methods, as also members were local and had a proven track record.

In the first phase of Millennium Mews we evolved ways of working together as a means to deliver innovative solutions. In the process we learnt a lot about the need for leadership, compromise, conflict resolution, the limitations and advantages of group decision-making, communication channels and control of information. Riverside also learned the importance of supporting members of the team when things didn’t go according to plan and to solve problems as a team rather than resort to traditional, confrontational methods.

Some of the lessons from Good Shepherd Close to be used at White Rock Court

The system developed in Good Shepherd Close has been particularly successful and has been adopted by two timber-frame companies. It relies on a menu of common components throughout the range of house types. In taking the concept of standardised prefabrication further, common panel and component sizes can simplify production and reduce costs. John McCall Architects has succeeded in designing a good-looking range of house types with varied roof forms. It gives:

Very low U values:

The homes at Good Shepherd Close are almost too warm – thanks to thick wall insulation.

Healthy materials:
Low levels of formaldehyde in the structure and fittings – the kitchen unit manufacturer has changed its specification, as a response to experience gained at Good Shepherd Close.

Accessibility
GSC taught us a lot about targeting provision to people with mobility difficulties and the new plans for White Rock Court reflect this; we’re also developing a wheelchair-accessible house with a through-the-floor lift.

Lots of storage
High standards of storage in a more economical footprint, including loft space.

Improved site design and car parking
We were unhappy with the design of the corners of the site at GSC and the tenants wanted more car parking spaces – White Rock Court gives everyone a fully private front garden with parking space and visitor parking.

Continued team working, expanding on the existing team
The only effective way to deliver innovation is through the commitment and successful interaction of the individuals involved.

Our own prefabricated foundations
Riverside often builds on difficult ground conditions – at White Rock Court we will develop a system of prefabricated foundations that should become part of the standard house-type.

Integer transformed:
A Swan flies

In 1998 we saw the production of Sir John Egan’s report, ‘Rethinking Construction’, which identified the need for change in the Construction Industry to bring about improvements in both the processes used by the industry and the end product. At the same time, Local Agenda 21 was produced which aimed to clarify social landlords’ role in promoting sustainable development, with a focus on quality of life and the environment.

The Primrose Field project evolved as a result of this changing environment. Swan Housing were a funding partner of INTEGER®, who developed a prototype intelligent and green house at the BRE in Watford. Swan appointed Cole Thompson Architects (part of the INTEGER team) and worked with them to adapt the original brief into one suitable for social housing, mindful of both capital and future maintenance costs.

Primrose Field is a development of twelve 2-bedroom flats in Hallo, Essex, designed and built to a green and intelligent specification. The project was completed in December 2000.

The Project Objectives are to:

Reduce costs in use for tenants
Reduce maintenance costs for the Association
Improve the quality of life and social opportunities for tenants
Reduce the impact of the construction process and the building on the environment
Achieve the development within Housing Corporation Total Cost Indicators

In terms of achieving Sustainable Development, the key features are:

Prefabricated timber frame structure, including floor cassettes, wall panels, insulation and untreated Western Red cedar cladding. The benefits include:

• Reduction on-site waste
• A dry building, allowing other trades to progress
• Rapid construction
• High levels of thermal insulation
• Reduction in CO2 emissions
• Minimising future maintenance costs

Gas powered community heating system and grey-water recycling. The benefits include:

• Reduction in energy and water consumption
• Reduction in CO2 emissions
• Reduction in heating and water costs
• Reduction in maintenance costs

Future-proofed intelligent cabling system, including:

• Communications, entertainment and data cable infrastructure
• Removable cornices, allowing access to the main cable routes for future upgrading
• Door entry system linked to phones and TV sets, providing increased security.

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EcoHomes can be used to guide the detailed design and planning of residential developments. It provides a broad ranging environmental performance measurement tool and can make a major contribution to informing design decisions on specific projects. The Housing Corporation recommends that all schemes should be designed to achieve at least a ‘Good’ EcoHomes Rating under the method.

The relative importance of different sustainability issues for housing, as per the BRE EcoHomes scheme, is as follows:

- **Energy & transport**
- **Pollution**
- **Materials**
- **Water**
- **Land use & ecology**
- **Health & wellbeing**

Relative importance of sustainability issues

EcoHomes is a straightforward, flexible and independently verified environmental assessment method managed by BRE. It quantifies environmental performance, which is expressed on a scale of Pass to Excellent, as depicted over the page.

EcoHomes assesses environmental impacts for new and renovated homes including houses and apartments. It rewards developers who improve environmental performance through good design, rather than high capital cost solutions. Achieving an EcoHomes rating can give the following benefits:

- Demonstrating sustainability credentials to planning authorities to assist the planning process.
- Demonstrating “green” credentials to investors to minimise investment risk and increase the appeal to ethical investors.

In terms of achieving a sustainable community, this can be broken down into three areas:

**Environment**
- Existing mature trees and hedgerows are being retained with additional planting to soften the development and maximise the potential for wildlife.
- Individual back gardens for each flat, providing private and secure amenity space for tenants.
- A communal garden and seating area to the front of the development, to promote a sense of community.
- Reduced numbers of communal parking spaces, promoting a cleaner environment.

**Community**
A tenant co-operative has been established. This has brought together tenants interested in environmental and community issues and provides life and work skills training for tenants, including:

- Individual training in the key roles (Secretary, Treasurer and Bookkeeper).
- Work experience for these trainees.

**Local Environment**
The project meets the sustainability ideals in that it is close to local shops and services, has transport links to the town centre, and has local employment opportunities. A presentation to the local community also took place to explain the project and overcome initial objections.

**Summary**
The Primrose Field project promotes sustainability in terms of both, construction and community aspects. It works towards many of the targets set in the Egan report and through the use of Key Performance Indicators and benchmarking the success of the project will be measured. Swan Housing also aim to use the project to develop best practice for future projects to improve sustainability within the Development programme.
Sustainable development is exemplified as development, which achieves the greatest benefits and least disbenefits within the best balance of these four issues. It has been suggested that major development projects, in particular, should be subjected to some form of sustainability appraisal but no generally accepted methodology has emerged. Arup has responded to this situation by committing time and resources to developing a project appraisal methodology (Sustainable Project Appraisal Routine = SPeARTM), to be used as a tool for rapid review of the sustainability of projects.

**CHARACTERISTICS OF SPeARTM**

- A simple, logical and transparent methodology,
- A graphical illustration of the output, via the SPeARTM diagram at all project stages,
- Assess the 'sustainability' of a project at various stages of its development,
- Can demonstrate continual improvement in overall project sustainability as well as focussing on areas where attention needs to be concentrated to further improve project performance,
- The spreadsheet behind the production of the diagram ensures that all scoring decisions are fully audit traceable,
- SPeARTM demonstrates the close interaction between the indicators of sustainability; social, economic, environmental and natural resources.
- SPeARTM ensures that the DETR sustainable development objectives are central themes running through all projects.

**THE SPeARTM DIAGRAM**

The purpose of the sustainability diagram is to combine in a graphical format the diverse issues that need to be considered for sustainable design, including the social, economic, natural resource and environmental issues. Any diagram used for sustainability benchmarking must also be able to show negative as well as positive effects. Negative results could include the emission of pollutants from the development, the loss of ecological features on the site, or the loss of open space provision for a local community.

EcoHomes assessments can be carried out at the design stage in a similar way to a SAP or NHER ratings. Every house type on a site is considered, but the award is given for the whole development. This enables developers to use the result to promote whole sites - every house that is part of the development has the same rating.

EcoHomes considers the broad environmental concerns of climate change, resource use and impact on wildlife, and balances these against the need for a high quality of life, and a safe and healthy internal environment. All the issues in EcoHomes are optional, making it flexible and enabling developers to adopt the most appropriate aspects of sustainability for their particular development and market.

The issues assessed are grouped into the seven categories below:

- **Energy**
- **Transport**
- **Materials**
- **Water**
- **Ecology and land use**
- **Pollution**
- **Health and well being**

The Pre-assessment Checklist available from www.thehousingforum.org.uk will allow a preliminary evaluation of the likely rating that would be achieved. This checklist can be used to inform the earlier design stages and so optimise environmental performance.

**Background/Technical Credentials**

EcoHomes, sponsored by NHBC, is the homes version of BREEAM (the BRE Environmental Assessment Method). BREEAM provides benchmarks for the environmental performance of buildings. It is independent, authoritative and based on many years of construction and environmental research carried out by BRE, the construction industry and Government.

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An Introduction to Indicators: SPeAR™

DTIS SUSTAINABILITY INDICATORS:

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total output of the economy</td>
<td>Emissions of greenhouse gases</td>
</tr>
<tr>
<td>Total and social investment as a percentage of GDP</td>
<td>Days when air pollution is moderate or higher</td>
</tr>
<tr>
<td>Proportion of people of working age who are in work</td>
<td>Road Traffic</td>
</tr>
<tr>
<td>Indicators of success in tackling poverty and social exclusion</td>
<td>Rivers of good or fair quality</td>
</tr>
<tr>
<td>Expected years of health life</td>
<td>Populations of wild birds</td>
</tr>
<tr>
<td>Qualifications at age 19</td>
<td>New homes built on previously developed land</td>
</tr>
<tr>
<td>Homes judged unfit to live in</td>
<td>Waste arisings and management</td>
</tr>
<tr>
<td>Level of crime</td>
<td></td>
</tr>
</tbody>
</table>

NEGATIVE AND POSITIVE

In order to display both negative and positive results, an equator is shown in the centre of the diagram, which designates the neutral point. Positive results are displayed towards the centre, so the sustainable objectives are represented by the central part of the diagram, the most natural place where the eye looks in a circle. The ultimate aim of a project, therefore, should be to arrive at the centre of the circle.

SCORING

The scoring of the project will be fundamentally affected by the comparisons that can be made of the value of the existing site and that of the proposed scheme. This could apply to the change in the ecological value of a site as a consequence of the development. Loss of habitat for instance would result in a negative scoring. Conversely if an existing degraded site was restored with extensive measures for habitat creation, this could register as a positive scoring.

TIMING

It is recognised that the project briefing and concept stage is the most crucial period in shaping a future project’s sustainability credentials. Many opportunities for moves towards sustainability are lost because there is no opportunity in the early stages of a project to formulate clear sustainability objectives. Once the project has reached outline design stage it is often too late.

It is the intention that the use of SPeAR™ upstream in a project programme would propitiate a more integrated cross discipline design process. It is our expectation that this would enable the introduction of emerging and non-standard technologies and practices to project commissions, increasing the opportunity for innovation. The consequence of this would be to provide our clients with more options and successful project solutions with added commercial and sustainability value for enlightened clients.

OUR FRAMEWORK

The SPeAR™ approach has been developed on similar lines to the UK Government’s recent publications on the subject of sustainable development, this is to ensure that there is compatibility between the Government’s approach and the SPeAR™ process. In particular, the DETR’s publication A Better Quality of Life: A Strategy for Sustainable Development for the United Kingdom has identified 15 ‘headline indicators’ of sustainable development, shown above.

Within these fifteen indicators a total of about 150 more detailed objectives have been defined. These cover a very wide range of issues, as illustrated by the following examples selected from the 50:

- Truancies and exclusions from school
- Energy use per household
- Fish stocks around the UK

This diversity presents difficulties in the assessment process, so to develop a workable methodology we have focussed on indicators which we believe to be relevant to the type of development projects which make up ‘mainstream’ Arup work (buildings, bridges, other similar structures within the built environment). A much more focussed list of indicators would need to be assembled to assess more diverse projects or activities, such as industrial processes.

BENEFITS OF USING SPeAR

- allows the sustainability of a project to be measured and illustrated graphically at all project stages; demonstrating continual improvement;
- demonstrates the evolution of the project over time, as the design develops or as alternative strategies are adopted; allows comparison of the contribution to sustainable development of different design options;
- identifies where there may be room for improvement and so achieve optimum benefit; this can be shown in successive diagrams maximising opportunities to balance the needs of society, economy, natural resources and environment;
- logical and transparent methodology is fully adaptable to all types of construction and other projects;
- demonstrates the interaction between the various social, environmental, economic and natural resource indicators of sustainability;
- spreadsheet behind the production of the rose diagram ensures that all scoring decisions are fully audit traceable;
- prompts innovative thinking in injecting sustainability into project design.

Title to all intellectual property, trademarks and reports, drawings, specifications, methods, calculations, patents and other relevant documents, products or processes (“materials”) created and/or provided by Arup as they relate to the implementation of SPeAR® Housing, shall remain vested in Arup. Housing Forum Members alone shall have a licence to use the methods and all relevant materials noted above for the purpose of assessing a project for their own internal use. Members shall not use such materials in connection with any external promotional or project development uses unless the assessment is independently validated by Arup, and subject to payment of the appropriate fees.
Part 5

Signposts - Useful sources of Information and tools.

Indicators:

Indicators allow measurement of performance. The following organisations have produced sustainability indicators, which can be used on housing projects.

Construction Industry Sustainability Indicators.
CIRIA: Call 020 7222 8891
6 Storey’s Gate,
Westminster,
London
SW1P 3AU

Ecohomes - Contact BRE on 01923 664 462 or write to:
Centre for Sustainable Construction
BRE
Garston,
Watford,
WD2 7JR
ecohomes@bre.co.uk

European Institute for Urban Affairs: A toolkit of sustainability indicators - for The Housing Corporation.
Liverpool John Moores University,
S1 Rodney St.,
Liverpool
L1 9AT

Housing Quality Indicators
The Housing Corporation
149 Tottenham Court Rd.,
London
W1P 0BN

M4i Sustainability Indicator - For further information please call BRE (01923 664 000) or visit the M4i website:
www.m4i.org.uk or write to:
The Movement for Innovation,
BRE,
Garston,
Watford,
WD25 9UZ

SPeiR - For further instructions and validation please contact:
Ove Arup
Edgbaston House,
3 Duchess Place,
Edgbaston
Birmingham B16 8NH
0121 454 6261

Sustainable Housing Design Guide
Scottish Homes
Thistle House,
91 Haymarket Terrace,
Edinburgh,
EH12 5HE

Useful Contacts and Information:

Construction Industry Environmental Forum – A seminar and workshop programme.
6 Storey’s Gate,
Westminster,
London
SW1P 3AU
020 7222 8891
www.ciria.org

Construction Best Practice Programme (CBPP)
PO Box 147,
Bucknalls Lane,
Garston,
Watford,
WD25 9UZ
Helpdesk: 0845 605 55 56 www.cbpp.org.uk

The Construction Best Practice Programme’s main aims are to raise awareness of the benefits of adopting Best practice and to support the industry by providing guidance and advice. It has a wide range of services to promote and facilitate improvements in all aspects of management and business practices and resources on a number of themes including sustainability. These include company visits, CBPP Clubs and information freely available on the web-site or from the helpdesk.

Academic Agencies that can help:

Science and Technology Policy and Research Unit - University of Sussex
Mantell Building,
University of Sussex,
Falmer,
Brighton
BN1 9RF
01273 676 758

The Joseph Rowntree Foundation are a charitable organisation who have produced a number of design guides for good quality housing with improved sustainability.

Contact: Joseph Rowntree Foundation
The Homestead,
40 Water End,
York,
Y03 8DG

Non Government Organisations:

CRISP are a government funded research body – they have a selection of reports which can help in the implementation of sustainable housing proposals.
Contact: Jim Meikle or Martin Lockwood
CRISP (Construction Research and Innovation Strategy Panel)
C/o Davis Langdon Consultancy,
39 Kingsway,
London, WC2B 6TP
Tel: +44 (0)20 7379 3322

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www.m4i.org.uk or write to:
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BRE,
Garston,
Watford,
WD25 9UZ

SPeiR - For further instructions and validation please contact:
Ove Arup
Edgbaston House,
3 Duchess Place,
Edgbaston
Birmingham B16 8NH
0121 454 6261

Sustainable Housing Design Guide
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Contact: Joseph Rowntree Foundation
The Homestead,
40 Water End,
York,
Y03 8DG
Consultants:

Sustainable Planning/Community and unit design:
Bioregional Development Ltd.
Sutton Ecology Centre,
Honeywood Walk,
Carshalton,
Surrey,
SM5 3NX
www.bioregional.com

Building Research Establishment
Centre for Sustainable Construction,
Bucknall's Lane,
Garston,
Watford,
WD2 7JR
01923 664462

Richard Hodkinson Consultancy
Canada House
272 Field End Road
Eastcote, Ruislip
Middlesex
HA4 9NA
Tel: 020 8582 0306
Fax: 020 8866 3725
Email: richard@hodkinsonconsultancy.com

The Natural Step -
Ann Donahue
9 Imperial Square
Cheltenham, Gloucestershire GL50 1QB
UNITED KINGDOM
tel:0044-(0)-1242-262-744

Water and Energy Management:

ECD Energy and Environment Ltd.
11-15 Emerald St.
London,
WC1N 3QL
www.ecde.demon.co.uk
Tel +44 (020) 7405 3121

Social issues analysis:

New Economics Foundation
Ed Mayo
1st floor, Vine Court,
112-116 Whitechapel Rd.,
London, E1 1JE
020 7377 5696

Planning and Design services:

Documents:

Building a Better Quality of Life - A strategy for more sustainable construction
Available from;
DETR free literature,
PO Box 236
Wetherby,
West Yorkshire,
LS23 7NB
Tel:0870 1226 236

Or:
www.detr.gov.uk

Building a Sustainable Future: Homes for an autonomous community.
DETR General Information report No.:53
BRECSU,
BRE
Garston,
Watford,
WD25 9UZ
01923 664258

The Construction Best Practice Programme have produced a variety of literature aimed at introducing sustainability to construction professionals. The titles listed below are all available free of charge from their website – www.cbpp.org.uk or by calling the helpdesk on 0845 605 5556

"An Introduction to Sustainable Construction or How to meet environmental and social responsibilities and at the same time improve profitability."

"Action Sheet: Contractors – Actions for Sustainable Construction"

"Action Sheet: Designers – Actions for Sustainable Construction"

"Action Sheet: Public and Private Sector Clients – Actions for Sustainable Construction"

"Action Sheet: Suppliers – Actions for Sustainable Construction"

For general information on the current state of the UK debate on sustainable development
UK Round Table on Sustainable Development:
CBPP have also produced a number of case studies which illustrate the business benefits of improving the sustainability of construction.

The Green Guide to Housing Specification (BR390)
Ecohomes: The environmental rating for homes (BR389)
Contact BRE on 01923 664462 or write to:
Centre for Sustainable Construction
BRE
Garston, Watford, WD2 7JR

Lifetime Homes
Joseph Rowntree Foundation
The Homestead,
40 Water End,
York,
YO3 6LP

South Somerset District Council - Sustainability Strategy
4th Floor,
100 Temple Street,
Bristol BS1 6AE
www.southsomerset.gov.uk/general/sustain

The Big Picture,
Sustainable Buildings and Environments
Sustainable Economy Programme,
Forum for the Future - The Housing Corporation,
149 Tottenham Court Rd.
London,
W1P 0BN

The Green Guide to Housing Specification