

# Chapter One

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## Sustainability And Housing

The characteristics of our built environment are vital to the achievement of sustainability objectives. These include cutting greenhouse gas emissions, reductions in pollution and the conservation of resources, cohesive and inclusive communities, and a prosperous and secure economy. Housing in particular can make a significant contribution to sustainability because:

- it consumes large amounts of resource in its construction, maintenance and use
- it is a fixed asset with a long life and
- it is central to quality of life and has implications beyond housing affecting transport, health, employment and community.

The relationship between sustainability and housing is two-way. Incorporating principles of sustainability into housing development, maintenance and refurbishment will not only make a significant contribution to the achievement of general sustainability objectives, but will also provide important advances in the quality, durability and cost effectiveness of our housing.

There is a need for a change of culture with regard to housing development which places sustainability centre stage. This should include the developers (be they housing associations or for-profit companies), builders and land use planners and also the tenants and owners. Sustainability objectives will be achieved only if they are taken into account at all stages from design through construction to long term use and eventual disposal and recycling. Raising of awareness is important for all those involved.

## 1.1

# How Housing Can Contribute To Sustainability

### 1.1.1 Minimising climate change

The most widespread and potentially damaging environmental problem at present is global climate change as a result of the emission of greenhouse gases, notably CO<sub>2</sub>. The scientific consensus is that Scotland is expected to become windier and wetter, and that temperatures in Scotland will not rise as fast as in the south east of England. Gale frequencies over the country may increase by up to 30% by the year 2050<sup>1</sup>. This would be damaging to agriculture and the tourist industry and increase the risks of flooding. An alternative possibility is that the Gulf Stream may shift away from the British Isles bringing much colder and drier climatic conditions; this would also damage agriculture and increase demand for energy. As a result of the Kyoto Conference and the subsequent meeting in Buenos Aires, the UK Government has agreed to a legally binding international commitment to reduce emissions of the six main greenhouse gases by 12.5% compared to 1990 during the five-year period 2008-2012, and in addition an objective to cut 1990 level CO<sub>2</sub> emissions by 20% by 2010.

The main means of achieving these targets will be in the transport sector, notably by decreasing travel in general and car use in particular<sup>2</sup>. The housing sector also has an important role to play, both in terms of dwelling characteristics and the structure and location of residential developments. Housing consumes large quantities of energy in its production and use:

- between 40 and 50% of UK CO<sub>2</sub> emissions are attributable to buildings, two thirds of this to the domestic sector
- 10 per cent of UK CO<sub>2</sub> emissions are due to embodied energy used in the construction process
- Scottish housing emits 17.8 million tonnes of CO<sub>2</sub> per annum, an average of 8.5 tonnes per dwelling.

This is particularly important in Scotland given the severity of the climate and the poor performance of the existing housing stock. The 1996 Scottish House Condition Survey<sup>3</sup> revealed that:

- less than 10% of Scottish dwellings meet the modest standards of energy efficiency set by the current building regulations (a National Home Energy Rating of about 7)
- the average NHER for the stock as a whole was only 4.1
- 11,000 Scottish housing association dwellings had poor NHERs of 0, 1 or 2 (although overall housing association dwellings performed better than other tenures).

Did you know?  
Housing in Scotland emits almost 18 million tonnes of CO<sub>2</sub> each year. This is about 30% of all CO<sub>2</sub> emissions.

<sup>1</sup> Department of the Environment, Transport and the Regions (1998a)

<sup>2</sup> RCEP (1994)

<sup>3</sup> Scottish Homes (1997)

This is wasteful of energy and offers considerable potential for reducing greenhouse gas emissions through improvements in the energy efficiency of the Scottish housing stock. The Home Energy Conservation Act has set a target of a 30% reduction in home energy use which if achieved would represent approximately 7.5% of all emissions and a substantial part of the UK Government's target of 12.5 per cent.

**Did you know?**

The greatest concentration of airborne pollutants are found indoors, where on average adults spend 90% of their time.

### 1.1.2 Reducing the need for physical resources

In the UK as a whole, the construction industry uses six tonnes of material per person per year, which on a pro rata basis gives an annual total for Scotland of over 30 million tonnes.

Improvements in the way we design and build our dwellings offer opportunities to use materials more sparingly. At the end of a building's life, recycling and re-use would reduce the need for quarrying and other source activities and also the amount of landfill required on demolition. Only one per cent of construction material is re-used in Scotland and there are large sustainability gains to be made in terms of resource consumption and environmental impact through better practice. This includes refurbishment of existing buildings as well as greater use of recycled and re-used materials.

### 1.1.3 Reducing pollution and improving air quality and health

In addition to greenhouse gases energy use in the home produces other gases which have negative effects. These include SO<sub>2</sub> (which causes acid rain), NO<sub>x</sub> and CO (which are poisonous). Greater levels of energy efficiency will reduce the output of these pollutants. A combination of more airtight buildings and the increasing use of synthetic materials has resulted in a collection of ill health effects known as sick building syndrome resulting from indoor air pollution. These include headaches, nausea, eye and skin irritations and breathing difficulties. Careful choice of building materials can boost the use of renewable resources which reduces pollution levels both indoors and outdoors.

### 1.1.4 Creating sustainable settlements

The single biggest source of greenhouse gases is the transport sector and these particular emissions can be significantly reduced by planning and building in such a way that travel is reduced, and where necessary can be achieved by walking, cycling or public transport. Housing should be located close to employment and services and also to public transport. The co-operation of housing developers, land use planners and transport planners will be crucial to ensure that we build in such a way that accessibility is maximised and car dependency minimised. This has been spelt out in the Government's recent Scottish White Paper on integrated transport<sup>4</sup>. This will mean departing from old conventional wisdoms about the form of the built environment; building at higher densities will be preferable

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<sup>4</sup> Scottish Office (1998b)

to lower densities and mixed land uses will be preferred to single use zoning.

The number of households in Scotland is projected to increase by 250,000 by 2010 and this will create pressure on housing and land supply<sup>5</sup>. It is therefore important to make the maximum use of the land resources available. Building at higher densities will contribute but we will also require the use of greenfield sites to be minimised and brownfield sites to be maximised. Guidance has been issued to this effect<sup>6</sup>. In parts of Scotland at present up to 70% of new housing has been built on brownfield sites and this figure should be achieved more widely. More effective use can also be made of land and building resources by refurbishing existing buildings (including non-residential buildings) for new dwellings where this is cost effective.

Did you know?  
More than 90% of Scottish dwellings do not meet the minimum energy efficiency standard set out in the Building Regulations.

## 1.2

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### How Sustainable Development Benefits Housing

The previous sections described how housing can contribute to the achievement of sustainable development objectives. This is a two-way process because the most cost-effective way to develop and maintain a high quality housing stock in the long term is to incorporate principles of sustainability into all parts of the housing development process. Since new build comprises only a small fraction of the existing stock it is also important that refurbishment incorporates sustainability principles.

#### 1.2.1 Energy efficiency

The poor performance of the Scottish housing stock in terms of energy efficiency is not only wasteful of resources and the cause of harmful pollution, but also a contributory cause of poverty and poor health and is particularly damaging in Scotland because of the severe climate, especially in northern and exposed areas.

Higher energy efficiency can make a significant difference to quality of life, health and material standard of living, especially to poor households. Many Scottish households cannot afford to heat their houses properly, or go without other essentials to do so. A quarter of Scottish dwellings suffer from condensation or dampness, in part because of inadequate heating. This has well established harmful effects on health<sup>7</sup> and imposes an additional burden on deprived households. The improvement of domestic energy efficiency for lower income households can potentially enable them to heat their homes to a higher standard, reduce condensation and dampness, and release income for other purposes. It can make significant contributions to enhanced health and reduced poverty. Many Scottish Registered Social Landlords are addressing issues of fuel poverty by building to standards of insulation much higher than

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<sup>5</sup> Wilcox, S. et al (1998)

<sup>6</sup> Scottish Office (1996)

<sup>7</sup> Scottish Office (1999b)

determined by the Building Regulations.

### 1.2.2 Social inclusion

The problems of the large peripheral schemes of our major cities are testament to the importance of building communities rather than merely groupings of dwellings. A sustainable housing development would not only have environment friendly and energy efficient buildings, it would also have access to employment, schools, shops, places of entertainment, primary health care, and it would be accessible by public transport. It would also be mixed in terms of tenures, incomes and age groups. For a house to be a home it must be geographically located such that its inhabitants can use it as a base from which to enter society at large; it must facilitate social inclusion and not be a mechanism of social exclusion as much Scottish housing has been in the past.

Scale is an important dimension of sustainability. Housing developments should not be so large that they alienate the people who live in them. Residents should be given the opportunity to take responsibility for their environment whether they are tenants or owner occupiers, and this is only possible when they live in developments or management units which are small enough for this to be practicable.

Residential development which is designed to contribute to sustainability will provide not only warm, dry and healthy homes and reduce the need to travel, but also a setting which enhances quality of life from generation to generation and which integrates people into society at large. It will maximise the effectiveness of housing investment and be crucial to the building of cohesive communities.

### 1.2.3 Value for money and economic effectiveness

Making economies in the short term can often lead to poor value for money in the long term. Building cheaply may produce more dwellings for money spent, but in the long term may cost more. The essence of sustainability is a consideration of long term costs and benefits. Residential development according to sustainability principles may cost more in the short term, but will have a significant downward effect on overall, long term costs.

Extra expenditure on energy efficiency, for example, may increase capital costs but there is evidence that in the long term the savings in running costs will exceed the initial extra capital costs<sup>8</sup>. There is also evidence that building to a high environmental specification leads to lower maintenance and management costs<sup>9</sup>. Whole life costing can be used to estimate long term costs and allocate them to different people and agencies (landlord, tenant, developer). These techniques are essential to the effective application of sustainability to

Did you know?  
25% of all dwellings in Scotland suffer from condensation or dampness.

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<sup>8</sup> Ecologica Ltd (1996)

<sup>9</sup> Energy Efficiency Office (1993, 1994)

residential development and are explored in more detail in Chapter 8.

People's housing needs change as they age. It makes sense to produce homes which have flexible physical structures so that they can be adapted to changing uses over time. This may mean that people can stay in their homes longer, or that dwellings and residential areas generally can house different people over time. Planning for the long term - planning for sustainability - can increase the flexibility and effectiveness of the housing stock and lower long term costs. Guidance has already been issued on how to provide for housing of varying needs in a flexible manner<sup>10</sup>.

The remainder of this design guide provides information on how to incorporate sustainability into housing development in Scotland and provides reference to sources from which more detail can be obtained. It also includes case studies of environmentally friendly housing developments in Scotland and incorporates the experience gained from these developments.

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<sup>10</sup> Stationery Office (1999)