

Reducing Co2 emissions through the Code for Sustainable Homes – The Challenge for Housing Associations in the UK.

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Abstract

The protection of the environment is one of the most debated issues across the globe “Because of the trans-boundary nature of pollution and the characteristic of the environment as a global public good, international co-operation is highly desirable” (Marsiliani, 2003, p.6). Houghton (2004) comments “Co2 levels within the Earth’s atmosphere have increased by 30% in the last two Centuries. Concentrations of greenhouse gasses in the atmosphere are at their highest in 800,000 years and global temperatures have risen by over 0.7°C since the 1700’s. More disturbingly 0.5° of this increase has occurred during the last Century”. Subsequently, Watson (2007) stated global temperature increases need to be limited to no more than 2°c compared to pre industrial levels to have a good chance of reducing the risks of dangerous climate change in the future.

Whilst exact details about the impacts of climate change on society still contain uncertainties, there is a clear body of economic and scientific evidence that continuing along the current path is no longer tenable and that urgent action is needed first to slow the growth in carbon emissions and then reverse it. Without bias there is a collective acceptance that more can be done to prevent energy wastage and more sustainable and innovative solutions can be found to provide more effectiveness and efficiency surrounding domestic house design and retro-fit maintenance.

Whatever you’re views and opinions the increase of temperatures over recent years as provided interesting data. Refer to figure 1 - Dramatic increase in temperature change within the last 30 years below.

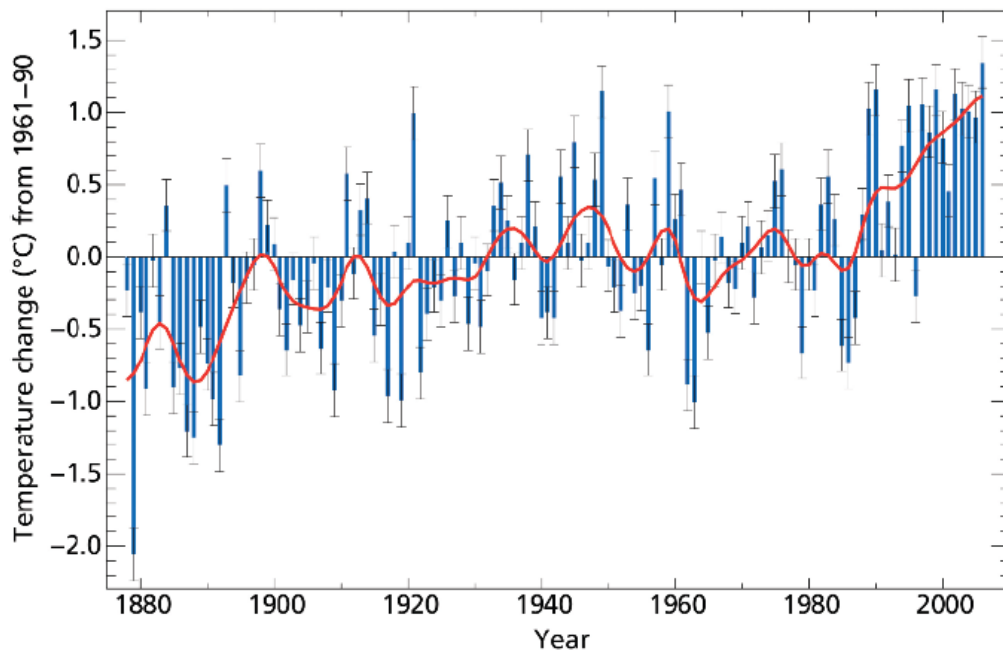


Fig 1. Changes since 1878 in annual average temperatures for Central England. (Zero Carbon Hub, 2010).

The construction industry and the ways buildings are operated contribute to almost half of the UK's carbon emissions; as such the industry has a commitment to protect and enhance the environment and to tackle climate change. The Stern Review published in October 2006 noted that in 2004 the UK emitted over 150 Million tons of Co₂ (MtCo₂) with the energy use in buildings accounting for nearly half these emissions. This figure then increased to 550 MtCo₂ in 2005 and more than 25% of this figure came from the energy used to heat, light and run our homes (Department of Communities and Local Government, 2006).

Energy used to operate homes accounts for around twenty-seven per cent of the UK's production of Carbon Dioxide emissions (Edwards, 2005). When combined, construction and operation of homes has a major environmental impact, Edwards estimates taking all the fossil fuel energy impacts together (building and domestic activities), housing is responsible for between a quarter and a third of total carbon emissions in the UK, and if transport to homes is included then housing design and layout accounts for forty per cent of national carbon emissions (Edwards, 2005, p.192). Materials used to construct homes have differing amounts of embodied energy; more energy is then used to assemble them into a finished building. Further resources are consumed by humans occupying homes in the form of space heating/cooling, water heating, water supply and electrical demand.

Further research highlights that energy used for heating continues to rise despite a reduction in 20 year average degree data. This is likely to be due to the increasing ownership of central heating and higher controlled internal temperatures. Hot water usage has seen a significant increase from 1990, possibly due to changes in lifestyles and the introduction of its use in space heating within dwellings. Electrical use has more than doubled since 1970 with a continuous increase year on year throughout the reviewed period. Cooking is the only energy use that has decreased slightly more likely due to changes in lifestyle (Fisher, Jessup *et al*, 2007).

One of the ways of tackling this challenge is for Built environment industry to utilize more sustainable thinking and think smarter by using product, materials, manufacturing and design criteria that considers low carbon initiatives.

Aims

The aim of this research is to examine the feasibility of Housing Associations located within the West Midlands towards reducing Co2 emissions by adoption of the Code for Sustainable Homes.

Objectives

1. To conduct a critical review of literature in relation to sustainable construction and how this has been implemented by Housing Associations thus far through Code for Sustainable Homes including cost information along with any impacting legislation on the construction industry as a whole.
2. To collect data through product research into innovative methods of achieving Code for Sustainable Homes that may be cost beneficial in use to a Housing Association.
3. To collect data through research into possible methods for Housing Associations to maximise sources of revenue to fund sustainable new build developments.
4. To collect data through research, questionnaires and interviews on the long term implications to the Housing Association of adopting Code for Sustainable Homes for new build homes.

The paper will then conclude on the effectiveness of this initiative in the UK as a whole.

Keywords

Climate change, Code for sustainable homes, Housing associations.

Climate change has been a source of much discussion at international level and in the media for many years now. Reports such as the United Kingdom's Government commissioned Stem Review of 2006 (HM Treasury, 2006) estimate that current levels of greenhouse gas emissions will lead to a rise in global temperatures of 2-5 degrees Celsius sometime within the next twenty to fifty years. The

consequences of climate change are many and varied but perhaps chief amongst them is the trend for less predictable weather patterns with many hotter summers, which are likely to then lead onto water shortages.

International Climate Change Treaties

Strategically a methodology adopted to achieve shared global support towards reducing Co2 emissions has seen a plethora of multilateral treaties. In today's modern world of excessive carbon production, it has become more of a pressing issue on international agendas. In 1992 the Earth Summit held in Rio de Janeiro, Brazil established the United Nations Framework Convention on Climate Change (UNFCCC). The treaty formed the objective to stabilise greenhouse gas concentrations in the atmosphere and envisaged future mandatory international agreements known as 'protocols' as the science and understanding of climate changed developed. The next major development in International climate change protocol was the 1997 Kyoto Protocol. The protocol targets the developed countries collectively to reduce 1990 carbon emissions by 5.2 per cent over the required period of 2008-2012.

More recently, the Copenhagen Accord of December 2009, which the DECC states (Department of Energy and Climate Change, 2009) it signals significant and promising changes in the world's approach to global warming under the United Nations Framework Convention on climate change.

Interestingly all the countries that took part in the Agreement account for 44% of global greenhouse gas emissions, each of which set a goal of limiting global warming to 2°C. On November 29th 2009, participants from 180 countries gathered in Cancun, Mexico, in a meeting that offered the last but one chance for parties to reach a legally-binding treaty to replace the Kyoto Protocol. Agreements were reached on 11th December 2009. The UNFCCC (2009) outlined the main outcomes from the meeting:

- Countries agreed to peak emissions and an overall 2°C target to limit temperature rise. This is significant, as it was promised in Copenhagen but not formally agreed.
- A system has been agreed to monitor how countries are living up to their promises to take action on emissions.
- Bringing details of what developed and developing countries are doing to tackle climate change, promised in Copenhagen, into the UN system so they can be assessed.
- Established the Green Climate Fund to help developing countries go low carbon and adapt to climate impacts.
- Agreed to slow halt and reverse destruction of trees.

The significance of these key agreements was that they form the basis for the largest collective effort the world has ever seen to reduce emissions in a mutually accountable way. (www.cancun.unfccc.int) Prime

Minister, David Cameron commented “The Cancun agreement is a very significant step forward in renewing the determination of the international community to tackle climate change through multilateral action”.

The long term goal remains, which is the UK governments legally binding target of reducing carbon emissions by 80% relative to 1990 levels by the year 2050 (DCLG, 2008) and to achieve this, for the construction industry it means we must develop more sustainable homes and use more eco-friendly mechanical and electrical goods.

The Code for Sustainable Homes

With targets set, such as the 80% reduction in carbon emissions by 2050 and for all new homes to be zero-carbon from 2016, the UK government has looked to introduce ways of policing this initiative and enforce policy to make this happen. Between now and 2050, it is predicted that one third of the housing stock built in the UK will be built using a design philosophy of sustainability. Even allowing for the global recession and the resultant reduction in house building, it is still accepted that sustainable housing could make a sizeable contribution to reducing overall Co2 emissions. So the central policy the UK government has adopted to meet these emissions targets is the Code for Sustainable Homes.

The Code was created by Government through the DCLG in close consultation with the Building research Establishment (BRE), the Construction Industry Research and Information Association (CIRIA) and the house building industry. Introduced in 2007 as part of the Government’s strategy to help reduce overall environmental impact. “it’s vital to ensure that homes are built in a way that minimises the use of energy and reduces these harmful emissions” (DCLG, 2006, p.2). The Code was in part a “response to the European Parliament’s Directive 2002/91/EC on energy performance of buildings” (Hall, 2008, p.16).

The Code for Sustainable Homes has been introduced to drive a step change in sustainable home building practice. The aim of the Code is to improve the overall sustainability of new homes by setting a single national standard for England, Wales and Northern Ireland within which the house building industry can design and construct homes to high environmental standards.

The main focus of the Code is to reduce the effects of climate change. It has a key role in enabling homeowners to reduce their Carbon emissions, prepare for the future climate and to lead a more sustainable lifestyle. The Code is a voluntary standard within built flexibility for developers to determine the most cost effective mix of criteria to cover in order to achieve the required standard, subject to a

limited number of mandatory requirements. It is however, used as a condition of funding for anybody who obtains Social Housing Grant (SHG) from the Homes and Communities Agency (HCA) through the National Affordable Housing Programme (NAHP), namely Housing Associations. The Code measures the sustainability of a home against nine design categories and rates the whole home as a complete package. Unlike the former Eco Homes which scored the site as a whole. Each category has a number of issues that have a potential impact on the environment. These issues are then assessed against a performance target and awarded one or more credits.

Research Methodology

Quantative data collection was adopted as the most appropriate research methodology and 25% of the questionnaires were returned

Three of the HA's were between 0-5000 in terms of properties owned, four between 5001-15000 and one HA between 15001-30000 properties. The number of properties developing per annum was an even split in the four categories up to 1000 homes. This was useful as it gave an even spread of the number of homes developed, allowing an even range of results to form. When asked if the Government cutbacks could affect the number of homes constructed, only one envisaged no reduction.

Two out of the eight HA's have said that they would build some units to Code Levels 5 and 6 prior to this being imposed them, reasons given were for environmental benefits and to pursue relationships with local authorities and the HCA. Interestingly, the two HA's who are looking to do this are also the HA's that are the highest number of homes at 501-1000. Seven HA's did not believe that it was reasonable to impose higher levels of Code on Housing Associations compared to the private sector.

The results suggest that the smaller HA's envisaging there will be a larger reduction of new homes constructed. When asked if costs of constructing to increased Code Levels 4, 5 and 6 could reduce the number of homes built, all apart from one HA envisaged some reduction or at present did not know. Three of the HA's envisaged a reduction as much as 50% in units able to construct as a consequence of increased costs of higher Code Level requirements.

When asked to state why it was not reasonable to impose higher levels of Code on Housing Associations, the most prominent answer was surrounding the negotiations on S106 schemes and competitiveness "Dual standards make it difficult for HA's to compete for land and negotiate compliance on S106 schemes". Other comments centered on the current financial constraints and believed everyone should be

constructing to Building Regulations. The majority of HA's said that around a 25% reduction in the build costs of Code Levels 5 and 6 would be required in order to not have an adverse effect on the number of homes constructed per annum. In particular, one HA commented that when they do schemes to Code Levels 5 and 6 they have to use cash out of their reserves.

Generally the thought was that if Code Levels 4, 5 and 6 were imposed on the private sector at the same time as the public sector, it would not really make a significant contribution to reducing the costs of sustainable materials and renewable heating technologies that are required in Code Level 4, 5 and 6 dwellings. The majority stating that they thought there could be only a little reduction in costs. This was interesting as HA's generally feel that costs need to be reduced, but do not see the above as the answer. All of the eight HA's said that they have seen or envisage higher maintenance costs as a result of installing renewable technologies to achieve the required

The general consensus was that HA's building to Code for Sustainable Homes was not going to have a significant impact on reducing carbon emissions by 80%, with many comments on why this was. The most consistent comment coming out of this question was that it is more important to deal effectively with existing housing stock as this is responsible for the vast majority of carbon emissions.

Recommendations

The research has exposed some important issues that must be considered when exploring the feasibility of sustainable construction in a period of recession and Government cutbacks. To allow this to happen, there are a number of recommendations made to Housing Associations:

- Housing Associations should be liaising with the NHBC to make them understand the need for recognition of non-standard construction techniques when providing a warranty. Expressing the issues that this causes in not doing so. Similarly, lenders should be approached to try and educate them on why the NHBC should not be the only form of recognised warranty.
- Seek to use cost effective innovative construction techniques, with the caveat of a reputable warranty being obtained for such techniques.

However, research from questionnaires and interviews showed that Housing Associations generally prefer construction techniques that they are familiar with and almost suggests that Housing Associations do not want to experiment with the fear of the unknown. The rising Co2 levels and the damage this is causing is

an issue that no one can ignore, least of all the construction industry. It is also clear that there is a huge demand for affordable housing; the results of the economic downturn are only just beginning to be felt, with some 5 million people predicted to be on housing waiting lists. With both of these issues in mind, there is a definite need for sustainable housing and one of the ways of achieving this is through Housing Associations constructing new homes. The use of innovative construction techniques for new homes and management of maintenance costs of building such homes could all contribute to significant savings in construction and maintenance costs to the Housing Association.

However it is important to recognise that Housing Association's sustainable construction alone will not be able to achieve sustainability targets set by climate treaties.

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