The Introduction of Code of Sustainable Homes for the UK; Potentials and Problems

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Abstract   This paper examines the Code for Sustainable Homes (CSH) in the UK, which came as a result of the development in the international sustainability policy. The production of the CSH initiated by the Building Research Environmental Assessment Method Centre (BREEAM) is studied and how CSH has been utilized since its publication in April 2008.

The Codes of Sustainable Homes are applied in two stages; the design stage and the construction stage; consequently this paper will assess the nine major components or criteria of the code and their use in new developments. It will not however examine newly constructed buildings. The paper will conclude with a review of the positive outcomes of the code on the environment and ways to better improve it. This will include the codes used alongside European Union (EU) strategies aimed at achieving sustainability targets.

Keywords   Codes of Sustainable Homes (CSH), UK, Sustainability
Introduction

Sustainability has taken many forms since the beginning of human history; however, more emphasis has been placed on it since the 1980s following the United Nations call to conserve Earth’s resources. With this growing global attention, a number of world summits were held including the Rio de Janeiro Earth summit and Kyoto conference. Consequently, sustainable architecture started to attract government and multi-agency attention as a potential contribution to conserving the Earth's non-renewable resources.

The British Code for Sustainable Homes (CSH) was first introduced in 2007 as a discretionary national standard developed as a step towards achieving sustainable building practice for new homes. A number of government institutions were consulted during the process of preparing CSH including British Research Establishment (BRE), Construction Industry Research and Information Association (CIRIA) and Senior Steering Groups consisting of Government, industry and NGO representatives. The main objective of the CSH is to achieve sustainable home building while driving continuous improvement and greater innovation in the building industry.

CSH also represents a continuation of the system of Energy Performance Certificates as will be explained in subsequent parts of this paper. It is part of the Energy Performance of Buildings Directive (EPBD) (Communities and Local Government, 2006).

Sustainable architecture

The language of sustainability emerged from forestry practices in the 18th and 19th century Europe, when foresters recognised the need to replace the harvested timber to maintain the woodland (Davoudi and Layard, 2001). After the industrial revolution, man’s capability to inflict harm to the environment rose to an unprecedented level (Jardins, 2001). At that time Lethaby reported that two processes have changed the surface of the Earth: agriculture and architecture (Lethaby, 1912). And in the recent years, the building industry is considered the least sustainable industry as it consumes approximately fifty percent of the Earth’s non-renewable resources (Edwards and Hyett, 2001). This includes one quarter of the world’s wood harvest, one sixth of the Earth’s fresh water supplies (Jenks and Burgess, 2000) and forty percent of the energy use in most countries (World Business Council for Sustainable Development, 2006: 7). A study found that four-
fifths of the energy consumption of buildings occurs in the operational phase\(^1\).

Sustainable architecture has developed in response to environmental concerns. Perhaps the most significant event that marked this new interest in conserving the Earth’s resources and its healthy condition is the Brundtland Commission report known as Our Common Future in 1987 which included the well known definition of sustainable development as: Development which meets the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland, 1987: 47).

Adams (2009: 3) cited that as much as the definition of sustainable development is attractive, it is better as a slogan rather than a basis for a theory. This does not necessarily mean that sustainability did not exist through human history. In fact, old monuments such as Durham Cathedral and Escombe church (UK), parts of old Cairo wall and Omayyad Mosque (Damascus) speak of ancient sustainable building practices by recycling building materials.

There are variable definitions of sustainable architecture, but the most noted one is environmentally conscious design techniques, derived from the UN aim for achieving sustainability as well as building regulations. Sustainable architecture places consideration on major issues of concern including achieving sustainable energy, using sustainable building materials in construction, efficient waste management, structures and materials re-use and social sustainability in architecture. The climate surrounding the building being designed is considered the most important element in sustainable architecture. It is almost impossible to design a house that is energy efficient without knowing the temperature, solar radiation, wind velocity, precipitation, etc. Although the aims of sustainable architecture are to maintain a good healthy environment and sustain the Earth’s resources, some critics point at practical drawbacks while achieving it. Sometimes sustainable building construction is accused of causing environmental damage instead of conserving the environment since it involves the transformation of natural building materials permanently. The building materials are moved from their natural locations to the factories in which they are completely changed in accordance to the building materials requirements. This process yields three consequences: conserving, wasting or depleting non renewable Earth’s resources, polluting the environment.
with unrecyclable buildings wastes at the end of buildings’ life cycles and/or take a long time to disintegrate back to a natural substance. Also, because some sustainable construction practices are costly such as using skilled labour, many building firms rely on machinery in the building process which might not really look sustainable (Eisenberg, 2002: 223).

Knox reported that badly designed buildings inflict unnecessarily high demands on the environment and are a poor legacy for future occupants and future generations, due to excessive running and maintenance costs and dwindling value over time. If they are demolished or overhauled prematurely they represent a wasteful use of capital, human resources and embodied energy and water. He adds that designers could be very selective in reducing waste and pollution as most important decisions reducing the impact of a building are taken at its earliest stages of conception and design. At present, many of these are of limited vision: there is a brief, location, selection of the design team, clarification of the client or user requirements, building management, future operational plans, and design approach. Unfortunately, the tendency has been for the architect to design a prestigious and iconic piece where the engineer is then expected to service it. As a consequence, the building rarely lives up to the design intentions but instead, reflects the fee structure of the mechanical electrical engineer, generally based on percentage of equipment. Imperfect buildings result from poor communication between the disciplines and their deferring priorities (Knox, 2005). Halliday (1997) emphasized the critical role of passive design, knowledge and procedure based rather than technology based solutions, interdisciplinary design, user consultations, local resource and infrastructure management and design for reuse and recycling as the norm. Although he dismisses the possibility of finding solutions with one hundred percent energy efficiency, he stresses the importance of the institutions providing appropriate and valid support from all fields of ecological design based on knowledge, understanding and observation of natural processes.

**Sustainable building codes of the UK and the EU**

In the UK, building codes and building regulations aim towards achieving national building standards, although the building codes are more specific to homes construction and the building regulations, they are used for general buildings such as factories and large industrial structures. In 2008 both
building codes and building regulations became mandatory and prior to May 2008 only building regulations were mandatory. The UK building regulations are the source of technical building information. The code of practice relates to specific aspects of the design and production of the building and civil engineering construction in harmony with the EU standards. According to Holes (1997) early versions of the UK building regulations consisted of lengthy descriptive and prescriptive technical solutions for buildings’ performance requirement. The 1991 Building regulations are solely concerned with health, safety, energy conservation and the welfare of disabled people. Approved Documents were published later concerned with technical solutions in certain circumstances, with the designers given the option of demonstrating to those people responsible for building control that they followed the rules in the relevant codes of practice, or that some other appropriate approach was adopted (Ibid: 168). The influence of the EU increased gradually including the acceptance of the certification standards of other nations when specifying construction products, such as renumbering the British Standards with a series beginning with BS EN ISO 9000 (Holes, 1997).

Building codes will become legally binding in 2010 where all private new-built dwellings will have to have at minimum a rating of level 3 against the code. From 2013, code for sustainable homes level 4 is expected to be the standard achieved by all publicly – funded new housing. The Government aims to reach CSH level 6 by 2016 (RIBA, 2009: 6). The codes are set to protect the public health, safety and general welfare. Therefore they are seen as part of UN Declaration of Human Rights: ‘The right to adequate standard living’.

The building codes differ from the Building Regulations and Building Specification in the details and to what extent they are legally binding. With the introduction of Co-ordinated Project Information (CPI) by the Co-ordinating Committee for Project Information (CCPI), the building specifications became a key role player in the tender and contract documentation, from which all other information (e.g., drawings, bills of quantities) would follow (Chappell and Willis, 2005). The building specifications help the contractor’s estimation, quantity surveyor and the contractor’s agent and clerk of works to read and understand the drawing in conjunction with the competitive tender and enabling the architect to carry out the work through following the contract instructions and specifications (ibid, 231).
History of sustainable building codes of the UK

Like many countries around the world, the British Building Codes started as a reactive procedure rather than a proactive procedure. They followed natural disasters which led to property damage and death. For example, after the 1666 London Black Death (fire) wiped out many neighbourhoods and claimed hundreds of lives, the British government set new building codes that regulated many aspects of buildings’ designs and construction processes. The regulations covered health and safety issues as well as building dimensions and materials. New laws were introduced to the urban planning of London. Another example is the introduction of new clauses to British law regulating the calculation of the effect of wind pressure on the building’s structures at certain heights. The procedure was introduced after the 1879 Tay Bridge Disaster which entailed partial collapse of the bridge because of wind and gust only six months after opening (Perry, 1981).

The 1979 oil crises that affected the western world in particular, led to the decision to review building regulations at the realization that oil production exceeded the supply. The purpose of this review was to introduce new regulations which were meant to achieve higher energy efficiency (Odell, 2001). The 2007 and 2008 oil crises placed more stress on the need for the British energy targets to meet the future targets of the EU towards energy efficient building construction.

UK and the EU regulations

As the UK is a member state of the European Union, its laws and regulations are required to comply with EU legislation and directives. During the 1990s many countries restructured their energy industry as a result of European pressure alongside other factors. On 1 July 2004 new directives were launched that defined an internal energy market including the building construction legislative framework with directives, principles, procedures and deadlines established in a clear, consistent and comprehensive way. The new EU target is to achieve a fully competitive, integrated and efficient internal energy market (Cameron, 2005). The European Union realises that the buildings are the largest consuming sector of energy (40%), therefore achieving sustainable development in that region should focus especially on achieving energy efficient building strategies.

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The British government’s ambition for the Code for Sustainable Home (CSH) is to make it the single national standard for the design and construction of sustainable homes, so that it drives improvements in home building practice in the UK. The code was not developed in a vacuum, but in fact was based on official documents, and mainly Eco Homes (Yates et al., 2004). *Code for Sustainable Homes: A step-change in sustainable home building practice* (Communities & Local Government, 2006) is a continuation of previous codes implemented on 2004. The Code implementation is managed by the BRE. The documents from which the code was derived were also based on extensive research and experience.

The code became legally binding in May 2008. New amendments were made in the CSH based on feedback received from Code for Sustainable Home assessors, developers and wider industry stakeholders, and new version published in October 2008. The Code service providers offer a range of services including assessor training, registration and monitoring, quality assurance of assessments, certification, investigation and resolution of complaints, and maintenance of records (BRE Global, 2007).

The Code Assessments are carried out in two stages:

1- Design Stage (DS) when the building is at a design phase prior to construction.

2- Post Construction Stage (PCS) at the end of the construction phase in which evidence is shown of realising all the information provided in the design stage such as the use of energy efficient products or certain building materials, etc.

The assessment is based on nine categories of sustainable design that include the following:

1- Energy and CO₂, 2- Water, 3- Materials, 4- Surface Water Run-off, 5- Waste, 6- Pollution, 7- Health and Well-being, 8- Management, and 9- Ecology (see Figure 1).
Each of the nine categories is further subdivided into smaller elements and is ranked from one to six according to efficiency. The six levels of efficiency actually presents indicators of the levels of energy efficiency and carbon dioxide emissions standards. For example, Category 1 is further subdivided into the following subcategories: Energy and CO$_2$ emissions:

1- Dwelling emission rate (M), 2- Building fabric, 3- Internal lighting, 4- Drying space, 5- Energy labelled white goods, 6- External lighting, 7- Low or zero carbon (LZC) technologies, 8- Cycle storage, 9- Home office.

Each of the subcategories above is allocated marks from one to six depending on the procedures taken during the design and construction stages. The Final Certificate for achieving targets of Code for Sustainable Homes illustrates the rating from level 1 to level 6 at the end of the two stages. Every given level for each category includes reason behind giving such rating, see Figure (2). Each category also holds a different weighing factor depending on how important it is considered.
Table 1 below illustrates that each category carries a different weighting. For example as energy and CO₂ emissions are presumed the most important contributors in achieving sustainability at a global scale, they are placed in Category 1 and given the maximum percentage 36.4%. Because the UK does not actually address the surface water run-off problem, this category is allocated a minimum percentage 2.2, whilst ecology is given 12% to help conserve both the fauna and flora of the UK at a time so many living species are becoming endangered.

Table 1 the nine sustainability categories and their weight factor.

<table>
<thead>
<tr>
<th>Categories of Environmental Impacts</th>
<th>Weight factor (% points contribution)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category 1 Energy and CO₂ Emissions</td>
<td>36.4%</td>
</tr>
<tr>
<td>Category 2 Water</td>
<td>9.0%</td>
</tr>
<tr>
<td>Category 3 Materials</td>
<td>7.2%</td>
</tr>
<tr>
<td>Category 4 Surface Water-Run-off</td>
<td>2.2%</td>
</tr>
<tr>
<td>Category 5 Waste</td>
<td>6.4%</td>
</tr>
<tr>
<td>Category 6 Pollution</td>
<td>2.8%</td>
</tr>
<tr>
<td>Category 7 Health and Wellbeing</td>
<td>14.0%</td>
</tr>
<tr>
<td>Category 8 Management</td>
<td>10.0%</td>
</tr>
<tr>
<td>Category 9 Ecology</td>
<td>12.0%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>
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The percentages given to each category reflect a level of importance defined through extensive research and discussions. It is interesting to examine the justification made for and against allocating a certain percentage for each category. Questions such as why is waste valued less (6.4%) than water (9.0%)? In fact why is waste given a separate category instead of merging it within the pollution category? Aren’t they both somehow interlinked?

The criteria for setting the nine categories are not clear since the percentage for each category does not go with its ranking. For example Category 1 is given the maximum percentage (36.4%), whilst Category 9, Ecology is given average percentage (12%) in comparison with other Categories. Therefore it is assumed that categories do not signify anything other than identifying different groups. Perhaps this categorization came at this preliminary stage to ensure effective results at a national scale until further results are brought forward?

CSH and the EU Directive on Energy Performance of Buildings

UK building codes comply with the EU Directive on Energy Performance of Buildings (Directive 2002/91/EC) Article 1\(^5\) requirements which cover the following:

1. A framework for methodology calculating the integrated energy performance of buildings.

2. Applications of the minimum requirements of energy performance in new buildings while considering that technology progresses every five years.

3. Application of the minimum energy performance requirements on existing buildings under major renovation.

4. Energy certification of buildings when they are constructed/sold/rented.

5. Inspection of boilers and air conditioning systems in new buildings and those in which boilers are more than 15 years old.
CSH: Summary of Changes to the Technical Guidance- October 2008

In October 2008, communities and local government published a new document online entitled (Code for Sustainable Homes: summary for changes to the technical guidance). Publishing the new document just a few months after its first release reflects the extent to which the government is serious about implementing sustainable building construction in the UK. The new document, legally binding after publication for people intending to sell or rent their houses, includes some changes within the original text published previously in April 2008.

The document review resulted in a variety of changes. For example, it specifies the geographical locations where the compliance is necessary at all times within the UK map (England and Wales). Also, certain words and terms were amended where necessary to make it more precise in order to avoid confusion while carrying legal responsibility. Adding legally binding sentences; e.g. new term inserted ‘Where Building Regulations apply compliance is necessary at all times’. Technical terms were replaced; e.g. the term ‘houses’ was replaced by ‘dwellings’. Products’ terms were replaced for more accuracy; e.g. delete (Dual Flush Cisterns) and insert (Low Flush WC). Furthermore, specifications for certain utilities or products were added such as requiring the manufacturer’s information on confirming the types of light fittings and efficacy in lumens per circuit watt for all lamps except for CFL and TFL.

The rather brief description of the changes that took place in the new CSH document reflect how British Communities and Local Government consider the issue of achieving sustainable housing as critical and therefore it seeks to monitor the process and develop it rapidly. All the changes carried out came after applying the original document’s requirements and facing some procedural uncertainties which called for making new amendments to its content.

Discussion and Conclusion

This paper has discussed the current British Code for Sustainable Home (CSH) which became effective on May 2009 in England and Wales. It
displayed how CSH branches from the EU targets which are inspired by the UN and international aim for realizing sustainable development all through the world.

The UK is still in the process of implementing the CSH, whereas other EU countries have been much more successful in achieving their energy efficiency targets (e.g. Netherlands) or have made more effective energy regulations (e.g. Hungary). However, it could be claimed that the UK succeeded in progressing towards realizing sustainable architecture. As Britons are found to move houses every 5-7 years, this process may contribute in accelerating the steps towards CSH implementation and achieving higher levels. Although British officials agree that its progress falls short of international targets; for example by 2010/11 the government will miss a target to cut 12.5% of carbon emissions, progress has been better than many countries around the world including China, India and the USA. The enforcement of the Code for Sustainable Homes is active in the UK where it is not in other countries. The UK building codes and regulations branch from the international and regional targets, moving faster towards sustainability in comparison with many countries around the world. The changes made to the CSH shortly after its release actually speaks of serious commitments to realizing its efficiency. The code was applied immediately in the building construction industry, closely monitored by the Department of Communities and Local Governments and was evaluated in the short run resulting in changes being made to it and it being made available online for the public use.

Given that changes were made to the CSH shortly after enforcing it, more time is needed for full assessment for the whole process, as many factors contribute in the success of the whole process.

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3 See http://www.planningportal.gov.uk.
6 Source: http://www.building.co.uk (last accessed 14/June/2009).
References

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