REDUCING CARBON EMISSION IN MANAGING PUBLIC RESIDENTIAL PROJECTS

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Building Regulation, Reducing carbon emission, Public residential sector, code of Sustainable houses, Sustainable development

Declaration

Except where stated otherwise, this dissertation is based entirely on the author's own work

Abstract

This thesis seeks to evaluate the effectiveness of roles and policies regulating the relationship between householders and their responsibility and sustainable environmental threats on behalf of public residential sector. The most important threats facing the UK environment is rapidly increasing of Carbon dioxide emission and its huge damage effects on life style as part of the Government believes that climate change is one of the gravest threats facing global and local concerns. As a goal to operate greenest effectively in the future, by achieving more energy efficient for existing social housing stock, creating the ambitions for a low carbon and eco friendly economy, and to ensure that the Building Regulations are proportionate and remain fit-for-purpose, responding appropriately to changes in technology, science, building practices and construction techniques.

By gathering information in small scale of quantitative and qualitative research, this is the method to conduct this research. Using quantitative research style; a statistics issues from Government, organisations, corresponded with social housing providers. All the given data are identified and discussed. While using qualitative research style; case studies, interviews, and questionnaires were sent to Housing Associations, Housing Departments of RSLs/ ALMOs/ Local Authorities and Property Agencies, these questionnaires are used to investigate the objectives of this paper distributed via emails, online forms from website: http://www.surveymonkey.com within ten days (stating from 25th of August 2010). The questionnaires showed that not all people are aware of the main topic as part of discussions of the Government parties and conferences. A copy of the questionnaire can be seen in appendix 1.

Getting three case studies involved in building regulations to reduce carbon dioxide emission and dealing with renewable energy as an evidence for the paper, while the interview was semi-structured around the questionnaire response which was received prior to the interview, the response is depend on his experiences and point of views.

As Lundberg (1999) said “the research focus develops through interaction between data collection, data analysis and theory”. The data collected from the previous study and analysing of the case studies, questionnaires, and interview, which are evaluate both research methods, the conclusions are obtained and provided to support the main argument of this research.

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Chapter 1:

Introduction, Aim, Objectives, Hypotheses and research questions

1.1.INTRODUCTION

Environmental concerns, particularly around the twin themes of energy efficiency and fuel poverty have increasingly come to the fore as a key element of housing policy in recent years in all part of the UK. This is just one key element of wider concerns about climate change. Housing policy is an important dimension of that wider environmental policy agenda, as domestic energy consumption is a major contributor towards the creation of greenhouse gases (CIH, 2008). Atmospheric levels of carbon dioxide (CO_2) have increased steadily since the beginning of the industrial revolution and these levels are projected to increase even more rapidly as the global economy grows. Significant climate changes are very likely associated with increased atmospheric concentrations of certain gases, most significantly CO_2. The human and ecological cost of climate changes forecast in the absence of mitigation measures is sufficiently large, and the time scales of both intervention and resultant climate change response are sufficiently long, that prudent action is warranted now.

The UK housing sector currently emits 40 million tonnes of carbon dioxide annually. This is 27% of the UK carbon emissions in total. (Miliband, 2006). With predicted growth of thin households and increase of population this is likely to increase over the coming years. Miliband (2006) even claims that energy use is projected to rise by 6% in 2010. To end this, the Government has set a target for achieving zero carbon housing developments by 2016 (Williams, 2003). "*To tackle climate change you don't have to reduce your quality of life, but you do have to change the way you live*". - Ken Livingstone- Former Mayor of London 2000 - 2008 (Foreword to the Mayor's Climate Change Action Plan, 2007).

The Climate Change Bill of 2007 sets challenging targets for carbon reductions across the UK. Clearly, buildings would need to deliver significant reductions as part of this overall target. The publication of the Code for Sustainable Homes set out targets to achieve radical emissions reductions from new homes. This project was commissioned to add to the understanding of whether similar targets in the domestic sector can be set and achieved and on what timescale.

The UK in terms of sustainability is quite interesting, over the last decade, there has been much talk of sustainable development, but little attempt to explain what it

actually means; sustainability is a concept which can be exemplified and categorized into environmental, economic, and social sustainability

It is recognized that the considerable renewable resources of the UK, although they are very large (one of the largest in Europe), are nonetheless limited and therefore the use of local resources should be prioritized before the use of national off-site sources. Testing of when this should be prioritized should form part of the work on a resource estimation tool. "*Because it has adopted a less interventionist approach and relied largely on the market and industry to deliver new housing products and energy technologies. There has been heavy dependence on the private sector (energy suppliers and house-builders) and individuals to increase deployment, yet the incentives to do so and market demand are limited*" (Williams, 2003).

1.2. Aims:

In the last decades, the UK governments tried to make the building regulations for newly building constructions more sustainable, since the mid-1970s with Conservative manifesto and after, which has initiated information campaigns to make households aware of their energy use by reducing cost to convince people to change their energy consumption. In addition, the building regulations were introduced in the building sector with minimum insulation levels were gradually replaced by more extensive types of regulations consisting of heat loss or heat demand calculations and by using sustainable materials beside limitation of waste generated by construction activities consequently, this search aims to:

- Analyse the key driver of reducing domestic CO_2 emissions and to measure of willingness to bear marginal management due to public residential projects.

- Analyse how social sustainability has been applied with a variety of urban arenas.

1.3. Objective:

- **Evaluate** the effect of reducing Carbon emission on the residential tenants.
- **Focus on** the mitigation of reducing CO_2, by following up the efforts of which the councils and their partners are working together to identify and respond to vulnerabilities and opportunities arising from climate change.
- **Establish** the benefits that the society will be gain after achieving the whole goals of the emission.

1.4. Hypotheses

- Having a bigger impact on reducing carbon dioxide (CO_2) emissions in particular to meet the Royal Commission on Environmental Pollution's

target to reduce CO_2 emissions by 60 per cent by 2050 to the 1990 levels. This meant working out how could reduce its CO_2 emissions from one million tonnes to 400,000 tonnes annually.

- To encourage improvements in energy efficiency by generating a shift in awareness and driving changes in behaviour and infrastructure for the society.

1.5. Research question

By putting into consideration, in the context of changing government directions;

At any level can the government encourage the society, especially tenants in existing housing by using carrot and stick to reduce carbon dioxide emissions?

Chapter 2:

The relation between the Environment, Sustainable Development and Social Sustainability

2.1. Introduction

A small talk about the weather at any time must lead us and turn into concern about the climate. Droughts, floods, heat waves and sudden chills extraordinary in living memory afflicted people used to a satisfying mixed climate. That has now begun to change. Worry about the climate has been added to other worries about the future. Vulnerability to climate change is increasingly recognized as a critical element in economic, politic and life style of humankind, it has been seen more and more in depletion of natural resources, pollution of the environment, growth and healthy of the humankind, and demand for higher living standards. To deal with all these facts, it is very important to know that "climate change" isn't new. Before history science the first microbes, travelling in a bubbling primeval ocean, the relationship between Earth and Sun, that nuclear power station 93 million miles away, any interference with the energy supply across space, any change in the way that energy is received on Earth. As true facts, life on Earth has had to either adapt to change in the climate or die. Although these changes took millions to thousands of years across the history of Earth, but the new now is a dramatically increasingly changing climate driven by an enhanced greenhouse effect, humankind's uncontrolled experiment on the planet whereby we pump by manufacturing and creating more and more greenhouse gas into the atmosphere to double or triple its concentration and then see what happens especially in the future (Dave R., 2005).

Dave R., (2005) noticed that the amounts of carbon dioxide have risen by almost 30%, while methane – a greenhouse gas produced by rice-growing, landfills and burping cows – has leapt to more than double pre- 1800 concentrations. The quantities of these greenhouse gases in our atmosphere are set to carry on increasing. Carbon dioxide concentrations, for instance, are expected to more than double by 2100. As a result, global temperatures will rise by between 2 and 5º C, having

already gone up by about half a degree during the 20th century. The climate-change motivation is argued in three steps:

One: human fossil fuel burning causes carbon dioxide concentrations to rise;

Two: carbon dioxide is a greenhouse gas;

Three: increasing the greenhouse effect increases average global temperatures (and has many other effects).

2.2. History of climate change in late centuries

Crispin T., (1977) wrote in his book that one of the important reasons for climate change made by human activities was the Industrial Revolution which started on early in the 18th century might detained affect over working practices and lifestyles. James Watt improved his steam engine, while the first practical steam engine was invented in 1698. In 1721 a signal start of the industrial era was began while the first "factory" was in operation. By the late 18th century technological innovations, including the steam engine and the "Spinning Jenny" were transforming production methods and working practices. The steam engine's main application was the pumping of water out of coal mines, while the coal is burned; it produced and released units of billions of tons of CO_2. Many industries depends on coal like; making iron, ships, and other machinery, also coal used to heat buildings and of course to power the pumps. More iron meant burning more coal and so rising carbon dioxide emissions. The new generation of steam engines in the 18th century were coal-powered themselves and pumped mineshafts dry to allow yet more coal extraction. Coal scraped up from inside the hills of England and Wales, and when the Revolution started, the amount of carbon sitting in coal under Britain was very huge. During the 30 years from 1769 to 1800, Britain's annual coal production doubled. After another 30 years (1830), it had doubled again. The next doubling of production-rate happened within 20 years (1850) and another. (See www.withouthotair.com). With the spread of industrialization across Europe and North America, rapid human-made global warming was born. Along with rapid population increase in the 18th century a big rise in consumerism happened. Indeed, the most important driver of the late 18th century iron-smelting boom was not industrial demand for machine parts, pans and fireplaces.

2.3. Reasons of greenhouse gases

Greenhouse gas emissions rose rapidly during the 18th century per capita. In England, for example, the rate of development and emissions grew hand in hand. And individual emissions rose from around one tons per year to 1800, while in the 19th and 20th centuries' greenhouse gas emissions now stand at around 11 tons each year. Globally From 1769 till now, world annual coal production increased more than 800-fold. Other fossil fuels are being extracted too. Under the umbrella of The United Nations, the international community began to wake up to put roles and decisions to take the responsibility for the increasing of emissions and global temperatures such as those set out in the Kyoto Protocol at 1997, by more than 160 nations was drawn up to set targets to reduce 5.2% greenhouse gas emissions cut. While the scientific consensus requirement to reduce about 60% (which is undeniably big) by 2050 to calm down our climate and head off disastrous impacts. Here are the bare facts about the climate change (Crispin T., 1977):

- The main reason recorded for warming the planet is Greenhouse gases, and the concentrations of greenhouse gas in our atmosphere are now higher than at any time in the last 420,000 years, and;

- Since the industrial revolution greenhouse gas concentrations have risen by around 50%, and in the last 100 years, universal temperatures have been raised about 0.6º C.

Dave R., (2005) remarked between 10 to 20 tons of carbon dioxide, methane and nitrous oxide a year for most of us. In the UK, more than 3.5 million homes could flood this century three times the number currently under threat. The individual's climate impact make up by:

- At the top of all is transportation which effect on our lifestyle chart at close to half of all our greenhouse gas emissions. Using the car in all our moving for work and pleasure make up a major part of the climate burden for the average developed-world family. Our deepening affair with driving becomes a significant part of most people's emission budgets.

- The next big hitter accounting for over a third of emissions is energy using at home. By using heating, cooling and consumption electricity in our homes, refrigerators, freezers these appliance-related emissions are increasing, lighting every part of our places, filling our kitchens with ice-cream makers, cooking and clothes washing, our living rooms with huge plasma TV screens and our shelves with music centres and computers.

- Food is responsible for 10- 20% of our impact on the climate and transportation of food is one of the main source of total greenhouse gas pie. In addition to this the methane emissions from belching cows and the miasma of nitrous oxide rising from fertilizer-soaked farmland.

- Waste (including old food and newspapers transported to landfill sites rot down) is responsible for between 5% and 10% of our greenhouse gas emissions. Even when these waste materials are produced, it consumed energy to be as shape as it is, and so represents even more greenhouse gas.

2.4. The concept of sustainable development and carbon emissions

Brian E., and David T., (2008) state that sustainable development is a term widely used by politicians all over the world, and the concept of sustainable development essentially means keeping current development within sustainable levels, thus protecting the needs and resources of both the environment and human population, this concept embraces a compact between society's future needs, but simply there is a triangular structure of interdependencies at a strategic or global level with housing at the centre. The Rio conference on the environment (1992), the Habitat Convention in Constantinople (1996) and the Kyoto conference on global warming (1997) are all landmark agreements impact upon housing. In the longer term, according to the classical definition given by the (UN Documents, 1987), development is sustainable if it "meets the needs of the present without compromising the ability of future generations to meet their own needs." In 1992 leaders at the Earth Summit in Rio de Janeiro developed these concepts further and created agreements to face the main topic "climate change" in many areas such as deforestation, desertification, and poverty. When the economic activities of some groups of people continue to

endanger the well-being of people living in other parts of the world, the fairness would be impossible to achieve in the absence of present-day social equity. This way of thinking lead us to the meaning of "intergenerational", and approach "Sustainable development" as a term of "equitable and balanced". Sustainable Development is eventually planned to reduce the excesses of human exploitation of the earth's natural resources. Governments and the International Community are responsible to take up this challenge with varying degrees of success. Many activists claim that key opportunities have been missed to regulate on these issues, and carbon emissions for example, have been allowed to escalate and increase. The most significant lack of international progress is one of important result of the failure of Governments to agree with the development of regional and sect-oral sustainability plans, in term of the Kyoto.

2.5. What is sustainable housing?

Shelter is one of the most important requirements of human needs to develop and support human settlements by services and facilities to encouragement sustainable communities. Tatyana P., (2004) mentioned that the 1990s have seen the strategy for sustainable development extended into specific policies for sustainable housing and sustainable construction. While the process of Sustainability must, in the field of housing, address five different fields:

- The conservation of natural resource (land, energy, water).
- The sensible re-use of man-made resource.
- Maintenance of ecosystems and their regenerative potential.
- Equity between generations, people and classes.
- Provision of health, safety and security.

On the other hand, the main goal for the government's broad social agenda; housing is an important element; it overlaps with employment, health, education, crime and many other aspects of people's lives. It is the duty on any government to offer everyone the opportunity of a civilized home and to encourage social unity, well-being and self-dependence. Therefore, in the UK, David M., and others (2006) state that the targets for any government in term of sustainable development are to commit to securing improvements in the quality of housing and housing management and living in harmony with the environment by creating a low energy ecological housing

which has become a key component of sustainable development. The Governments plan operates on four principles to unite people; their needs and human ecology with the environment. These principles are:

- Living within Environmental limits
- Ensuring a strong, healthy, and just society
- Achieving a sustainable economy
- Promoting good Governance

2.6. Factors of sustainable housing

Brian E., and David T., (2008) recorded that housing is sustainable, when everyone has the opportunity for a decent home to promote social cohesion, and for the person who a member of this society to be well-being and self-dependence. Sustainable housing should ensure a better quality of life, not just now but for future generations as well. It should combine protection of the environment, sensible use of nature resources, economic growth and social progress. About 26% of our carbon dioxide emissions - some 41 million tons of carbon- are accounted for the domestic sector, and a typical 1930s house in Britain produces 8 tons of CO_2 per year in heating and lighting, although this has been reduced to about 4 tons in 1998 through. For these reasons, architectures and decision makers must work to evaluate all factors of the design of high quality sustainable housing, higher insulation standards and the exploitation of renewable energy. On the other hand, there are many factors of sustainable housing which are very important to put spotlights on them:

- Housing and health: There are strong connections between poor housing and health – particularly links between cold and damp housing and physical well-being.

- Energy efficiency: providing better environments for people to reduce the impact on the natural environment living. A range of measures to be taken such as; designing a good energy efficient homes, tackling exiting housing that has poor energy efficiency, community heating schemes and, through the Energy Saving Trust, public education and the promotion of energy efficient products.

- Transport: has a major impact on carbon dioxide emissions by tackling overcrowding and reducing pollution.

2.7. Understanding of social sustainable concept affecting on sustainable housing

Brian E., and David T., (2008) state that sustainability provides the principles of creating healthy, comfortable, hopeful communities. While sustainable housing is consider as one of the most important elements of sustainable development. That means that; no society is balanced with nature unless housing is sustainable. Because of housing is a part of technical, social, political and economic issues in the society, social sustainability in housing requires flexibility needs in order to avoid the need for families to move. The duty of professional institutes is to provide a decent desirable housing, well maintained, free of crime and of low energy design in address of residential energy consumption. Designers and estate managers must give concerns to tenants; crime, job opportunities, heating bills, rubbish and vandalism. As a part of these problems, the government's campaign to raise urban densities by using the DETR (1999), a report from Planning for Sustainable Development (PSD) which suggests "*housing densities should rise significantly from around 120 habitable rooms per hectare (HRH) to 275 HRH. In some urban areas even densities approaching 1,000 HRH are possible, though taking other factors into account (such as crime micro – climate and access) a norm of 500-550 HRH is preferable*".

While every year less than 1% of exiting building stick is replaced, which means that; most efforts is directed towards the design of new housing. As we need to upgrade existing housing especially to address the present infrastructure of housing which effect on sustainable housing in the UK. This is true of BRE advice, the Building Regulation and professional attention. It would be useful if more small extensions or alternations were controlled in order to extend the scope and impact of the Building Regulations, particularly to the DIY arena. Tony M. et al (2010).

2.8. Government aiming for reforms

Great steps forward have been made in field of energy performance of new constructions at the last decades in the UK by making its building regulations more

sustainable. Since the mid-1970s the governments put many plans which have initiated information campaigns to make households take great concerns of their energy use, and to persuade people to change their energy use by initiate their concerns in reducing energy cost. This rapidly increasing of the price of energy has inspired home owners to invest in measures reduced changed, the use of energy sources and find other alternatives. On the other hand, building regulations -in term of building sector- were introduced with minimum insulation levels by using sustainable materials for the facade, floors, roof and glazing, and to limit the waste generated by construction activities especially for newly built constructions. Governments put many papers to improve the society needs with domestic sectors and to achieve the sustainable house demand for present and future aspects, such as;

2.8.1. The 2001 planning Green Paper for housing

DTLR, (2002) recorded that housing supply has increased in the last few years and is now at its highest level since the 1980s. There is a new housing target for 2016 of 240,000 additional homes a year planned by the Government to meet the growing demand. The level of housing supply needs to increase over time and a total of three million new homes are needed by 2020, two million of them by 2016. The Government will meet its commitment by improving the housing fabric of the society, and this will help ensure that; the UK have enough homes for our growing population. Proposing 5 new eco-town schemes, each case the community would be designed to reach zero carbon standards, and those schemes are one of the invitations for local authorities and developers, with the entire community designed to be able to reach zero carbon standards. Each scheme could provide between 5,000 and 20,000 new homes. The Prime Minister has since announced that there will be 10 Eco-Towns, and that there will be at least one in each region.

2.8.2. The Local Government White Paper 2006:

CLG, (Jul 2008) state that the purpose of this White Paper sets out a radical agenda for change, and "*to enable effective local government services to step up to this role by creating better places, to give local citizens and communities a greater encouragement over their lives, and to enable communities to have a say in the issues that matter most to them. It does this by: promoting more responsive services;*

promoting empowered and cohesive communities; advocating a stronger role for local authorities as community leaders; and promoting stronger and more stable local authority leadership". In addition, this paper gives local citizens more opportunities to get involved by supporting them with more information about how services perform in their area and meet the standards of the best and the best to improve further.

2.8.3. Planning Policy Statement 3 (PPS3)

CLG, (Jun.2010) state that "Planning Policy Statements" (PPS) set out the Government's national policies on aspects of planning in England for delivering the Government's housing objectives. A principal aim of the new PPS3 is to support the Government's response to the Barker Review of Housing Supply and the necessary step-change in housing delivery, through a new, more reactive approach to land supply at the local level. This PPS reflects the Government's commitment to improving the affordability and supply of housing in all communities, including rural areas, providing high quality housing that contributes to the creation and maintenance of sustainable communities.

2.9. Improving energy efficiency in existing and future dwellings

Laure I., and Frits M., (2008) determine that while the rate of redevelopment of housing stock in the existing housing stock in the UK is under 1% per year, much of poorer end the housing stock (mostly built in the 1960s) does not lend itself to cost effective energy performance, and it can be enhanced with a payback period of five to eight years. Some measures are tried and tested, they include; higher insulation levels; and enhancement to boiler efficiency. The government has developed a range intended to improve energy efficiency in both new and existing homes. Meanwhile, to improve the energy efficiency of new and existing dwellings and new housing policies, sustainable standards have been developed, and because these policies are a (more or less) devolved function and have been developed in slightly different ways in England, Scotland, Wales and Northern Ireland. Since May 2008, the government in England has set out a demanding time table over the years to 2016 to improve the energy of newly build homes, putting new building regulations called 'Part L', which

has become baseline for measuring the 'Code level' established by the new 'code for sustainable Homes' to achieve the minimum standards requirement for energy efficiency, it also includes required standards for reducing water consumption. The "Code" uses a start rating from one to six across nine environmental categories for each level of the "Code". These newly built homes must meet Code Level 3 from 2010, while Code Level 4 will be required to meet from 2013, and Code Level 6 will be required to achieve the maximum– the zero Carbon homes standard from 2016.

2.10. Utilising sustainable renewable sources of energy

To realise how much we need in our life for energy, some researches in the USA has shown that every glass of orange juice consumed requires two glasses of oil to get it to the breakfast table. Future targets for CO_2 reduction have some problems like; the sheer scale of new accommodation required, saving on the existing stock is inundated by anticipated growth in households, the number of new houses almost unprecedented and expectations of lifestyle are rising, and it push to release CO_2 to the atmosphere in the UK. These problems put pressure on energy, water and other resources often in unexpected ways. To avoid CO_2 emissions in a new housing project, it will have to utilize renewable energy in term of sustainable energy, which can be used to provide electricity, mechanical power, heat or fuel. On the other hand, the renewable energy equipment will be larger than it would otherwise need to be, and it will make the project more feasible. The usage of the renewable energy in buildings can be extracted elsewhere, locally and used locally, at the site of the building(s), and it can be extracted at the building or by the building envelope. Some of these technologies which available online:

http://www.lowcarbonbuildings.org.uk/Microgeneration-for-your-home/Planning-permission , these technologies are:

- Solar energy: this system can be used to provide useful energy for securities, and it has many designs principally as a source of heat and light:
  - Passive solar design (PSD): the integrated design of energy using for heating requirements of individual houses that trap solar gains passively, also PSD depends on an integrated design approach that positions the majority of glazing and the most frequently used rooms on the southerly

side of the house. Using energy in the UK can be reduced by around 1,000kWh/year through the adoption of the simple passive solar design measures.

- Active solar systems: Solar collectors for delivering hot water are usually on a south facade and inclined roof. According to the weather of the UK, with a few square meters in area, solar water heating systems can provides tow thirds of the hot water requirements for a house hold, there are two basic types of solar flat collectors:
    - The flat plate collector (FPC): this system contains of a black coated absorber, a glazed front and insulated rear. FPC can be integrated into roof construction.
    - The evacuated tube collector (ETC): this system contains of an absorber consisting of a pipe inside an evacuated glass tube which greatly improves efficiency.
- Photovoltaic solar cell: (PV) solar electricity generation using solid state solar cells has been around since the 1950s, but until recently it was so expensive that it could only be considered for use in remote locations or space craft, even though PV-generated electricity is still much more expensive than conventional sources. However, the cost has fallen by a factor of around 200 over two decades, and when it comes to building costs clients often make choices not entirely based on economic criteria. PV can be integrated into buildings in the form of roof or wall cladding, roof tiles, glazing, roof lights and as solar shading devices. It's unlike an expensive kitchen or car, it can generate revenue or saving in the future. The principle renewable energy technology capable of generating electricity in the urban environment electricity.

- Wind energy: in the UK, wind turbines energy is probably the most promising suitable renewable energy technologies for use. This kind of renewable energy is available in a range of sizes from very small devices capable of producing a few watts to large turbines with rated outputs of over 1.5MW. In the UK, most of them are installed in commercial wind power stations consisting of groups of turbines each rated at about 400KW or above.

- Water power: other kind of renewable energy and it is much more site dependent than solar or wind energy, but wind energy and is not as widely distributed. Nonetheless if a fast moving stream or large river is situated in close closeness to an anticipated housing project, then there may be potential for water power utilization which can be installed of a water turbines but it depends on the 'head' (the height between the dam and the turbine) is available or not.
- Geothermal energy: there is the potential to tap into geothermal aquifers in the spa town and certain other areas, these places can provide heat for district heating systems. In Southampton there is an 1800m deep bore hole at a city centre site provides hot water at 70^0C and a district heat main delivers heat to the Civic Centre, Central Baths and several other buildings within a 2km radius of the bore hole.
- Bio-fuels: this king of energy include fuels derived from organic municipal wastes, sewage, farm animal wastes, energy crops or crop estimated to be over 200 TWH/year. By providing an available sufficient space, bio-fuels can be stored for use when required more a different than other forms of renewable energy.

2.11. Water conservation and housing

Brian, E., and David, T., (2008) figured that water is a key factor of quality of life to achieve sustainable development as an essential component of healthy living. Due to climate change the exact date of fluctuations in rainfall, and new and predictably environmentally damaging water resources will be needed in the next century. Currently the average consumption of water is 150 litres per person per day. However, the percentage consumption of water goes mainly towards the public water supply (51%) but significantly to power generation (36%) and other industries including agriculture (13%). On the other hand, water is wastefully used often in the home, and opportunities for recycling or rainwater collection are not taken, and test projections indicate further and substantial reductions in leakage, these reductions are not sufficient to offset projected growth in house hold demand. While the rate of household demand of water consumption use of rising and with present level of system leakage according to the number, size and location of the 4.1 million new

households needed by 2016. The nation can be planned by three main strategies which are available to balance supply and demand but each is constrained to some extent by cost, regulation and consumer resistance:

- Develop new water resources (reservoirs, desalination plants, boreholes)
- Increase demand management (water metering, low water using appliances, efficiency campaigns)
- Adopt a combination of the above.

2.12. Eco-Towns one of the improving example for sustainable housing

TCPA, (Nov. 2009) reported that the proposition of 'ECO-town' is that energy efficiency and on-site energy supply (including, where relevant, connections to heat networks) which will meet a minimum "carbon compliance" standard and it should be the first priority by supporting and directing the development of a new sustainable low socially inclusive density town. Home in the ECO-town will be cheaper to run because of high energy efficiency requirements such as; less vulnerable to rising gas and electricity prices, and it will have better controls, including smart meters occupants, so that people can more easily manage and reduce energy use. DCLG, (Jul. 2009) stated that homes will meet the new requirements and it should;

a) Achieve Building for Life Silver Standard and Level 4 of the Code for Sustainable Homes at a minimum.
b) Meet lifetime homes standards and space standards.
c) Have real time energy monitoring systems; real time public transport information and high speed broadband access, including next generation broadband where possible.
d) Provide for at least 30 per cent affordable housing (which includes social-rented and intermediate housing).
e) Demonstrate high levels of energy efficiency in the fabric of the building.
f) Achieve, through a combination of energy efficiency and low and zero carbon energy generation on the site of the housing development and any heat supplied from low and zero carbon heat systems of at least 70 per cent relative to current Building Regulations 'Part L' (2006).

Chapter 3:

Housing policies and public residential sector

3.1. Introduction

Hogwood and Gunn (1981) stated that the main objectives of housing policies are addressed such as a decent home delivered for every family achieving their needs at a price within their incomes. Housing policies might be effective and sustained through the life of governments of different political directions and a range of social and economic conditions, but governments also attached greater importance to extending housing choice and improving the effectiveness of housing management.

Housing has a number of unique characteristics which is so different from other public policies. Although as a kind of product has a long life, a highly durable (which reflects past patterns of economic development), flexible and reflection of investment of 60-100 years earlier as a key elements of the housing situation. However, housing also has a fixed location and the cost is so high relative to current income. Housing policy includes many kinds of designed measures to modify the quality or quantity of housings, its price and ownership, access to it and management of it, and all of these modifications are in different areas and in specific period of time. Many countries have different approaches to housing and housing policy. However, these different patterns of housing do not simply reflect countries for; stage of economic growth, development, and the logic of industrialism or the operation of the market. At the early stage in the UK the interruption between housing and current place of employment is mainly outstanding because of industrialisation and urbanization. On the other hand, neighbourhoods have gone through a number of transitions in term of the population living there. The difficulties of this condition are much bigger than was the case 50 years ago and in comparison with those in recently developed countries.

In the UK, housing can be consider in the twenty-first century an important provider to social benefit and continues to involve a wide range of organizations and

professions in the state. There are main four tenures in the society of the UK: owner-occupation, council renting, housing association renting and private renting, and at election time; because of buildings and places where people live is a political issue, manifestos set out politicians policies for dealing with the problems they believe are important for their party. Policies of this sort engage many other actors in translating manifestos and turning them into actions. Policy therefore implies a procedure, involving the original acknowledgment of a problem to be addressed, and it assume massive importance in supporting debates on housing but have logical boundaries (Hogwood and Gunn, 1981).

In the twentieth century the UK differed from many other countries in that it developed strong capacities in central and local government. The institutional capacity developed in one period had a real impact later, enabling local authorities to meet the housing needs of the third of population by 1979. On the other hand, changing in housing needs are required by the innovation of different aspects of the policy process in respect of the physical condition of the house stock, space standards, changing demographic patterns and overloading. While from time to time, progress in housing policy has also been affected rapidly by dramatic events such as wars and economic recessions.

3.2. National policy on building regulations

Thompson et al (1991) mentioned that the reflection of wider trends in governance is the result of the national housing policy structures including market mechanisms and local and regional networks of agencies. These trends have different aims, objectives and preoccupations in relation to housing. The key driver in changes in housing policy is to identify this policy and to regulate it in formal documents. However, these changes which affected by economic, political, demographic and social environment, have had a deep effect on building regulations, and it's realised that the importance of both policy and non-policy drivers of change and their nonstop contact suggests the need for a holistic justification of housing and housing policy.

Communities and Local Government (CLG, 2009) is responsible for national policy on building regulations and their changes in most new buildings and many alterations of existing buildings in England and Wales, whether domestic, commercial or

industrial. These building Regulations are written to be part of an important part of the UK government's strategy for reducing carbon emissions. The Department for communities and Local Government (CLG) will lead to regulatory necessity for achieving zero carbon building as part of its responsibility, and to monitor certain schemes to apply a variety of specified types of building work.

3.3. History of housing policy in the UK since 1975

Gauldie (1974) stated that housing policy in the UK links its development to nineteenth-century where the industrial revolution started and new urban planning achieved this era. MacLennan (1995) concludes that over the last quarter century the work for the Housing Policy Review was undertaken, and there had been '*major successes for UK housing policies*'. However, he notes that '*there are deepening problems for those on the margins of society and the economy'* and these *'policies have reinforced these margins*'. Peter, W (1997) wrote in his book *"the British housing system has undergone profound change in the last thirty years (as has the polity, economy, and society) as it has moved from one dominated by private renting to one based around home owning (and even then important regional and local variations remain)".*

Mark M et al (2005) noticed that England's population increasingly grew and the number of households larger than proportional since 1975 till now, which led to more pressures on the housing system especially with the South and London in particular. Many reasons for these rapidly increasing occurred, one of these is social changes; the population became more different ethnically especially in London, rising in divorce and greater sexual freedom, created more single parent households. Other reason is the country became much more prosperous as real incomes doubled. However, and as a result of housing market outcomes, this wealth was distributed unequally which occurred in the 1980s and 1990s, although at a slower rate, as higher incomes increased more rapidly, the labour market became more polarised and new tax system was reorganized. In addition, number of 'dual earner' households was grown, reflecting the increase of female employment, and 'no earner' households, reflecting the loss of mainly semi and unskilled jobs, particularly among men. In the 1970s as a result of inflationary pressures, poor economic performance, and pressures of direct and indirect of affected housing, the

Government's was determined the needs to respond the housing system. As a solution, the Government's was forced to external borrowing from International Monetary Fund (IMF) and faced by IMF interventions. This adverse environment led to a high level of regulation and also provided the opportunity for restructuring local authority housing as capital values increased and the real cost of borrowing fell. As a result for that, by 1976, the number of dwellings exceeded the number of households by over 3.5%.

House of Commons, (1981b), stated that in 1979 and after, when the Conservative government came to power, the emphasis shifted to the control of government spending, that encourage the government to withdraw from traditional areas of provision like financial and economic deregulation. However, the policy of the Government took place within the wider context of financial market liberalisation; and in increased regulation and the reduction in opportunity in the local authority sector. These priorities strongly influenced housing policy and were reflected most clearly in the shifting patterns of housing subsidy to increasing opportunities for owner-occupation. Meanwhile, a local authority sector supported by central government revenue subsidies, gave the possibility to restructuring of housing subsidies policies such as; the "Right to Buy" and "Stock Transfers", the use of widely owned land and the growing development of the local authority sector to finance asset restructuring instead of new housing; and the increasingly harsh restrictions on the supply of land through the planning system. The overall impact of these policies together marked a huge asset restructuring as well as significant changes in governance structures and risk allocation. In the 1990s, as a result of an unpleasant economic environment once again impeded progress and pushed to pressures, some of these pressures was harshly to deteriorate the supply awareness of the housing system with respect to both new supply and investment in the existing stock, it continued as the deregulated private rented sector started to respond to new opportunities and the role of private finance in social housing increased. Thereafter, however, this in turn had direct and indirect impacts on housing across the income and tenure scale. Combined with other key policies, this has left a legacy which has modified the role of the social rented sector; produced new trade-offs between choice and risk; changed the distribution of wealth; restructured housing opportunity; and produced marked regional and neighbourhood patterns.

3.4. Housing policy and CO_2 emissions

A report from ODPM (2006) mentioned that the impact of different levels of housing development on the environment emphasises the level to which these are associated with population and household growth in different regions and within regions. However, the report admitted that in recent years, great progress has been made in improving the sustainability of buildings and their contents through a range of initiatives. But, still homes in the UK is the main reason for, more than a quarter carbon emissions came from using energy and using 50% more than their needs of water. Housing is a complex area in priority themes, incorporates a variety of disciplines and makes up the urban environment. These including issues are; architecture, planning and location, design, economics, technology, construction techniques, the resources used to build the house (materials, water, energy, and transport), social science, human behaviour, the waste produced (during construction and the house over its lifetime by occupants, and finally, the waste and resources involved with demolition. Additionally there are the associated impacts arising from the wider infrastructure (transports and transportation, parking, drainage and provision of services). Many policies were published, such as;

- Peter W (1997) recorded that in the 1995 Department of the Environment Annual Report and then in the Housing White Paper, the government refers to 'sustainable home ownership' to find a new stable position for the tenure with, one presumes, much lower levels of government assistance. However, housing needs continues changing over the life cycle the basic requirement for safe, comfortable and reasonable homes remains throughout. Housing policy needs to be sensitive to homes and lives and people live over a span of many years.

- ODPM (2005) put the draft Code for Sustainable Homes and it does not substitute for building regulations, including:

    - The Code is a new voluntary approach to improving the sustainability of new homes, by reaching the energy efficiency and saving water;

- Also to meet the base level of the Code, new homes will be required to meet standards water efficiency (such as a rated appliances or dual flush toilets).
- To gain one of five star ratings, the Code will provide buyers of new homes with information on the sustainability and running costs of their homes.
- Homes at first level will use 20 per cent less energy and water compared to homes built in 2002. While, the highest level will require carbon-neutral development, using cutting edge technology such as micro-generation.
- The Code as a whole sets more demanding building standards even at the entry level, it is just a comprehensive nature (addressing some things not in regulation).
- To point the way to the future of building regulations, the Code wants to make improvements to building standards simpler, more transparent and less piecemeal.

- At 2006, the Energy Performance of Buildings Directive (EPBD) drove the amendment to "Part L" to adopt a methodology for calculating the energy performance of buildings. For 2010 it is planned to preserve the high level procedure introduced in 2006, of meeting five criteria for new build observance by representing that:

  - the carbon dioxide (CO_2) performance target is achieved;
  - the design does not fall outside limits of design flexibility;
  - the building does not suffer from excessive solar gains;
  - the building as constructed delivers the calculated CO2 performance; and
  - Information has been provided to enable the building to be operated efficiently.

3.5. Strategic and Planning housing policy objectives

CLG (2010) state that since 1997, housing has improved for all householders and everyone has seen the value of this progression such as;

- Homeowners have seen the increasing value of their properties.
- Social tenants have seen enormous improvements in the quality of their homes. And;
- Combined action has slashed homelessness and directly helped 77,000 households to buy their first homes.
- Over the past ten years, the society has achieved a great deal through the investment in housing.

All of these benefits have been achieved in a climate of economic expansion and strength. Over one million more home owners over the last ten years have been led by low inflation and low interest rates. The huge amount of social investment means social housing now has over one million fewer non-suitable homes and the number of private sector helpless households living in non-decent homes has been reduced by over 300,000. The investment has also helped get better requirements for homes in some previously miserable urban areas. But instead of all these opportunities, the challenges of climate change require more efforts to create better life that means we need to provide greener, better-designed housing for the future. CLG (2010) put the role for the Government's key housing policy objectives through development plans and planning decisions to provide the context for planning for housing, this context is to ensure that everyone has the opportunity of living in a decent home, and they can afford where and when they want to live in any community. Meanwhile, Friends of the Earth (2006) mentioned that working on these objectives or goals; dealing with well-designed and built to a high standard, and by asking into account need and demand, the Government is seeking to:

- Reach multi useful choices of high quality homes, both affordable and market housing, to address the community and its requirements.
- Broaden opportunities, ensuring high quality housing and a sufficient quantity of housing, for home ownership, especially for those who cannot deal with market housing, in particular those who are vulnerable or in need.
- Increase the supply of housing as one of the demands to improve affordability across the housing market.

- Deliver a developed housing in suitable locations, and offer a good range of community facilities and with good access to jobs, key services and infrastructure.
- Manage a flexible, responsive supply of land, in a way that makes efficient and effective use of land, including re-use of previously-developed land, where appropriate.
- Create sustainable, inclusive, mixed communities in all areas to support a wide variety of households in all areas, both urban and rural.

3.6. Difference between public and private sector

Peter W (1997) declare that the difference between private and public sectors is shown in the results of the Joseph Rowntree study. As an example; "*in the financial 1991/92, private sector properties sold for up to £100,000 had a slightly large net floor area than those built by housing association (on average 70m² as opposed to 67m²). What is more important, however, private developers provided a much wider range of sizes. 75% of housing association dwellings had a size between 5% above the Parker Morris minimum and 14.9% below Parker Morris. The equivalent proportion for private housing was 52%. Only 2.9% of housing association dwellings had a size of more than 10% above Parker Morris. Whereas the equivalent proportion for the privately built accommodation was 17.7%. There was a pronounced 'bunching' of housing association properties up to 10% below Parker Morris*".

3.7. Why does public sector lead to reduce Carbon emissions?

Friends of the Earth point out in their website: http://www.foe.co.uk/resource/consultation_responses/ccpr_foe_submission.pdf , that housing policy will be critical for delivery of the Government's targets on climate change, particularly in terms of standards and targets for energy efficiency and micro-renewables. "*Housing accounts for around a third of the UK's carbon emissions. If we don't prevent dangerous levels of climate change there will be massive economic costs.*" Several witnesses argued that the Government should

demonstrate a strong commitment to tackling climate change. Nick Skellett from the South East Council Leaders suggested that "*It would be helpful if ODPM was a signatory to the Climate Change Public Service Agreement"*. Then he add *"The problem is that there is a tendency at the present time for them to push the number of houses, the price and the cost of houses, without looking at the quality and environmental protection provided by that housing. DEFRA and the Department for Transport are signatories to the Public Service Agreement on keeping CO_2 emissions to a certain level*" (House of Commons, 2006).

3.8. Could rates of population growth effect on housing policy in all over the UK?

House of Commons (2006) declared that over the last 15 years the annual supply of housing has declined significantly to the level that the number of new homes has only just kept up with the increasing number of households. Numbers of dwellings rose by about 1.53 million while the number of households increased by about 1.524 million between 1991 and 2001. Instead of that, the remaining number of homes over households has fallen from 4% in 1981 to 2.3% in 1991 to 2% in 2001, and by 2003 it had fallen to 1.7% (the household growth figures are based on assumptions about the composition of households). While the next projections are based on trends, with some of the underlying factors subject to wide annual variations. There is a major increase in single person households as same as, the case with migration, which are projected to make up 38% of all households by 2026 compared to only 27% in 2001. Meanwhile, the new figures suggest that net migration will make up about 1.4 million (29%) of the new households between 2003 and 2026, but in recent years there have been enormous variations in the number of migrants and the size of their families, as its one of the reason that match a new housing requirements with household growth as a basis for policy decisions, while these variations in factors affecting household growth projections are kept under review as policy is implemented.

The Office of National Statistics is introducing an incorporated household survey providing detailed information about housing, employment, ethnicity, education and health between censuses. The information from the new integrated household survey is used to update household growth projections frequently. The planned increase in the number of households varies considerably from one region to another. The number of households is projected to rise by 25% between 2001 and 2026, in overall in England. Increased life expectancy, migration, both internationally and between regions, the growth in single households particularly those comprising older people over 55 and the housing market are considered from several factors that are contributed to household growth. However, each of these could affect future housing demand (House of Commons, 2006).

3.9. Comparison between Labours and Conservatives housing policy in there manifesto

Conservatives mentioned in their manifesto which available on their website in term of housing policy, and before the election started "*Britain's housing market has been stuck in a vicious spiral of boom and bust".* They declared also that *"Britain needs social housing that promotes opportunity, social mobility and pride in neighbourhoods".* As part of their housing policy they mentioned *" We will reform the planning system to put real power in the hands of local people, protect the environment and work with communities to build more family homes*". For more data about Conservatives housing policy available online: http://www.conservatives.com/Policy/Where_we_stand/Housing.aspx.

While Labours put their images for housing policy: "*Labour believes everyone should have access to a decent home, at an affordable price, in the area where they want to live, whether in an urban, suburban or rural area".* Labours admitted that *"However we recognise that Britain is facing an under-supply of new housing to meet growing demand, and are working now to deliver more new housing to rent and to buy"*, while as part of their housing policy, they mentioned "*We have brought forward funding to help build 110,000 new affordable homes over the next two years, this year we will see the largest council house building programme for two decades. Our Housing Pledge investment alone has created or protected 45,000 jobs and will create 3,000 apprenticeships".* For more data about Labours housing policy

available online: http://www.telegraph.co.uk/news/election-2010/7164930/Labour-manifesto-2010-general-election-party-policy.html.

To put a compromise between Labour and Conservatives manifestos in important subjects; Housing policy and energy efficiency, get these tables from website: http://www.moneysupermarket.com/newsandcommunity/guides/your-finances-how-the-political-parties-compare_0008920_2.aspx, see table 1.

Labour	**Conservatives**
In Property Policies:	
• The government has scrapped stamp duty on homes worth up to £250,000 for first time buyers. The exemption will apply for two years. This will be paid for by increasing stamp duty on properties worth over £1m to 5%. This will be indefinite and take effect from April 6, 2011. Source: HM Treasury	• The Conservatives have said they will raise the stamp duty threshold for first time buyers to £250,000. This would take nine out of ten first time buyers out of stamp duty altogether. Source: Conservative Party manifesto 2010 • The Conservatives have said they will not oppose the 5% stamp duty increase on homes over £1 million. Source: Reuters • The Conservatives are committed to abolishing Home Information Packs to save costs and help ease transactions in the housing market. Source: conservatives.com
In Energy Efficiency	
• While Labour's boiler scrap-page scheme has now ended in England, April 1 saw the launch of a new scrap-page scheme for the over-60s	• The Conservatives plan to offer every household in the UK a 'Green Deal.' This will be an opportunity to have their homes fitted with up to £6,500 of energy efficiency improvements, financed by energy providers and paid for from part of the resulting

in Wales. Source: boilerscappagescheme.co.uk • The government has also announced that it will ensure that every home has a smart meter by 2020. These meters provide homes with more information about their energy consumption and should enable people to cut their energy bills by reducing waste and seeking out the best tariff for them. Source: labour.org.uk	savings in energy bills. • The Conservatives plan to introduce smart meters to every home by 2016. Source: Conservative Party manifesto 2010 • Additionally, the Conservatives would seek to enhance consumers control over their energy usage by requiring that energy bills provide information about how to move onto a suppliers' cheapest tariff and how their energy usage compares with similar households. • Finally, they would pass the competition policy and consumer protection powers of gem to the Office of Fair Trading. Source: Conservative Party manifesto 2010

Table 1: comparison between Labour and Conservative housing policy

3.10. Analysing the impact of reduction carbon now and what will be happen in the future

Peter W (1997) stated that one of important analysis to any risk(s), as part of housing policies facing dangerous impact from climate change in the UK, is to predict all risks and find out how to erase the consequences or at least by using of insurance or other techniques to reduce its effect on society life cycle. Providers and consumers might face several risks, such as; a housing system with less support, higher real costs, more dependence upon private finance, more movement and modification to housing conditions and greater competition. However, the standards of recently completed schemes in the housing association sector pose more problems than standards in the private sector. Other resident and future risks effecting on the domestic housing market; national economic are now more open to global economic forces as part of globalization economic subjects. There will be inevitable tensions between the different dimensions of sustainability in housing policy, and broader environmental concerns.

House of Commons (2006) states housing requirements will not meet all standardized national strategy in whole of the UK, every area have their needs which reflected in different strategies. Housing policy must adopt greater recognition of the need for flexibility and greater technical ability pace of change. While the Government risks undermining the regeneration of those areas with additional housing and low demand, making the planning system more responsive to housing demand, and increasing the building on Greenfield sites. Finally central government itself should move further towards an enabling role, supporting and sustaining rather than directing and controlling.

3.11. Benefits to deliver Carbon reduction by the Government and communities

SDC (2010), declared in its report that there has been particular interest comes from the Government in the potential to retrofit existing buildings on an area basis to deliver carbon reductions. The Government must lead to achieve targets for reducing

emissions from buildings, local authorities would enrol people in bulk purchase schemes to help them improve the energy efficiency of their buildings. People would be free to opt out of the scheme; however, it would enable them to have the work undertaken, often at a discounted cost, with no effort other than letting contractors into their home. Benefits from delivering area based schemes are more widely understood such as:

- Encourage sustainable behaviour change: communities are able to create new social norms provision of advice through trusted sources, to change long-term behaviour,

- Increase uptake of works: area-based schemes have greater potential for engagement through intensive marketing,

- Reduce costs: economies of scale from bulk purchase of materials and shared external costs and information will bring savings compared to works on individual homes,

- Build capacity in local firms and create local jobs: which can support local businesses, and it can also benefit from offering additional services as part of the works,

- Make the benefits of retrofit visible: coordinated improvements can improve streetscape, particularly where works extend beyond buildings to incorporate improvements to public realm and green infrastructure,

- Reach target groups: to prove more effective as target to those in fuel poverty,

- Overcome barriers for householders – delivery through a coordinated programme can remove or minimise many of the ‘hassle’ factors,

- Improve the viability and effectiveness of some technologies: working at scale will enable the use of technologies which are not viable for individual homes,

- Provide opportunities to integrate delivery of different infrastructure upgrades: integrating upgrades of different elements can minimise costs and disruption of works, maximise use (and re-use) of existing resources and engage and enable communities.

3.12. The key barriers to identified

SDC (2010), declared also in its report that a number of key barriers preventing integrated, local delivery of infrastructure upgrades are:

- Sustainable policies and regulation do not have sufficient flexibility to enable integrated delivery on the ground,

- Limited understanding of non-financial benefits,

- Complexity of ownership and regulatory requirements

- Lack of understanding of how best to engage with communities

- Lack of skills and flexible budgeting and public sector finance

Chapter 4:

Questionnaire and analysis

4.1. Introduction

This research tries to understand how the UK Government deals with public residential sector to reach the sustainability in reducing Carbon emission as a target of energy efficient in housing environment. As a direct target, by collating building regulations, and dealing with householders to encourage them to get their awareness of their energy consumption with minimum insulation levels.

The target group is member of householders dealing with public domestic sector like: housing associations, property services, landlords, tenants, government authorises.

4.2. Questionnaires

An adaptive computerized administration questionnaire was used from 25th of August to 3rd of September 2010 and distributed via email; and an online forum used by selected respondents, which was applied from free version of SurveyMonkey (www.surveymonkey.com). Responses were recorded and summarised in Appendix 1. The full form was sent to 75 people, 33 valid responses were taken into account. The questions were put according to the objectives of this paper:

- First objective is to evaluate the residential tenants according to their position and the relationship between them and the effect of reducing Carbon emission, the first three questions (Question 1, 2, 3 and 8) are concern to this objective.

- Second objective is to focus on mitigation of reducing CO2, by guiding participants indirectly to one of this paper's topic which is renewable energy and its technologies, to understand how far for the government's policies reach the society especially the householders, and what is the strengths,

weaknesses, opportunities and threatens for dealing with building regulations. Questions 2, 4, 5, 6, and 7 are aim to discussing these goals.

- Third objective is to establish the benefits that the society will be gain after achieving the whole goals of the emission. Questions 9 and 10 measure the understanding of energy efficiency and environmental policies for the householders to institute the reimbursements and benefits.

4.3.Analysing the questionnaires

4.3.1. Question No. 1:

This question is to determine participates and people involve working in dwelling sector, and from 33 valid answers there are 32 individual answers and 1 has double answer. As it shown in the figure1, the majority of this question are working in Housing association with 41.18%, Local Authority with 23.53%, Tenant Forum with 26.47%, Government with 2.94%, Homes and Communities Agency with 2.94%, and others 2.94%.

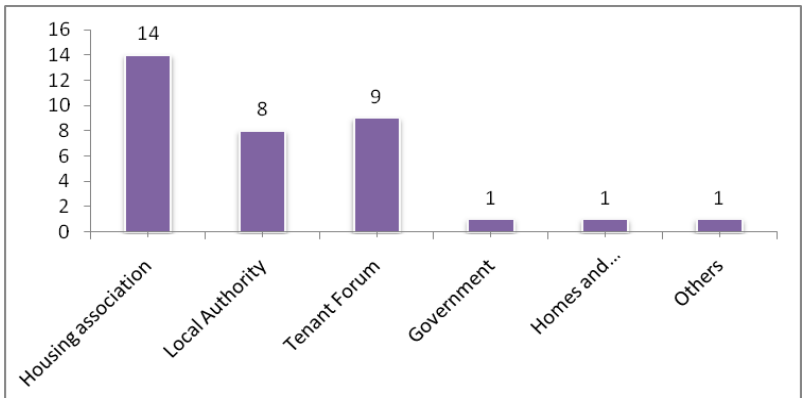

Figure 1 kind of participates involved in the questionnaire

4.3.2. Question No.2:

In this question, looking for people have knowledge with renewable technologies in field of domestic sector, from 33 persons shared this survey, 28 of them with 84.85% have experience in law carbon technology from less than a year til more than 5 years, distributed like it shown in figure 2, less than 1 year with 42.42%, from 2 to 5 years experiences with 24.25%, more than 5 years experiences with 18.18% and with no experience has 15.15%. So that feedback from respondents shown that low carbon technology was new to majority of respondents.

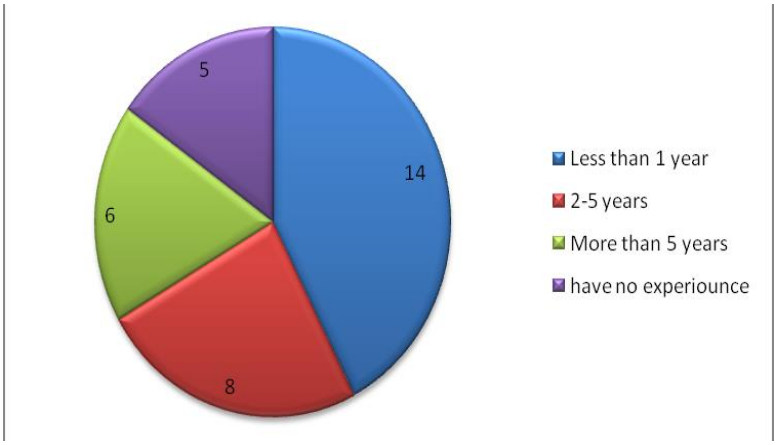

Figure 2 experience in renewable technologies

4.3.3. Question No.3:

This question is to determine who is working in public sector and who is working in private sector, there are 12 persons working in public sector with 36.36% and 19 persons working in private sector with 57.58%. The other 2 persons ; one of them is working in government but he/she didn't mention which part of government borough and we can neglect the last answer cause his working is not related to the question, figure 3. This feedback shows that the majority for respondents working or dealing with private sector.

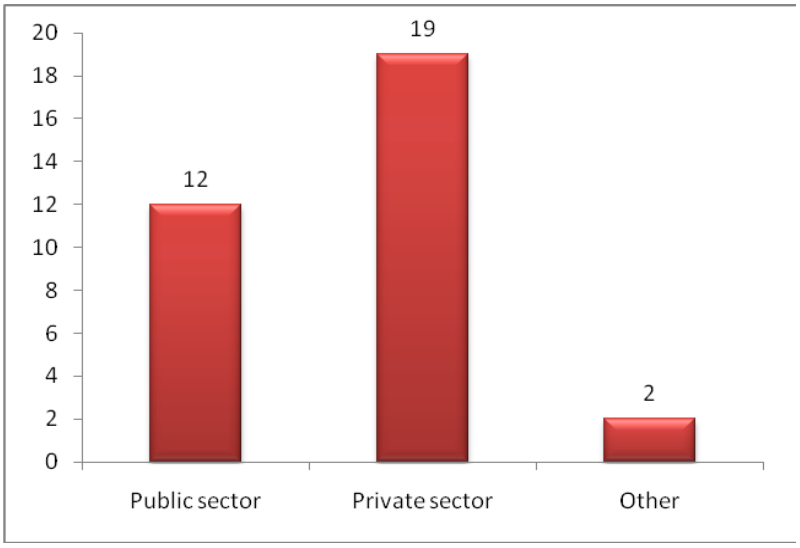

Figure 3 public and private sectors

4.3.4. Question No.4:

The question is looking for people who involved or not in low carbon programs, the survey show that 17 persons with 51.52% are involved, while 15 persons with 45.45% are not. One of the 33 persons is a researcher or producing researches which means he/she may involve or not, figure 4. To understand the relationship between question 2 and this question which assured in its feedback that the majority of respondents have some relation to carbon emission issues.

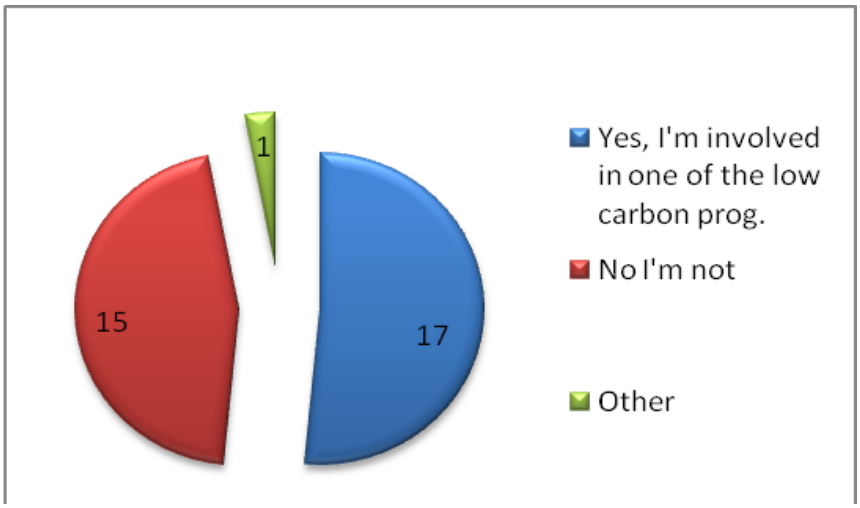

Figure 4 respondents involved in low carbon program or not

4.3.5. Question No.5:

This question is for all householders who deal with or have knowledge on low carbon technology and renewable energy. Also the question is a multi answer question, every person share this survey can choose more than one answer, and one of the 33 persons chooses all choices, so we can add his opinion for all choices. According to that, the survey shows that; apartment has 16 answers with 48.48% from all 33 persons, detached houses has 12 answers with 36.36%, cottage has 10 answers with 30. 30%, and terrace house has 7 answers with 21.21% figure 5. The feedback of this question shows the majority of participants using apartment as one of types of buildings.

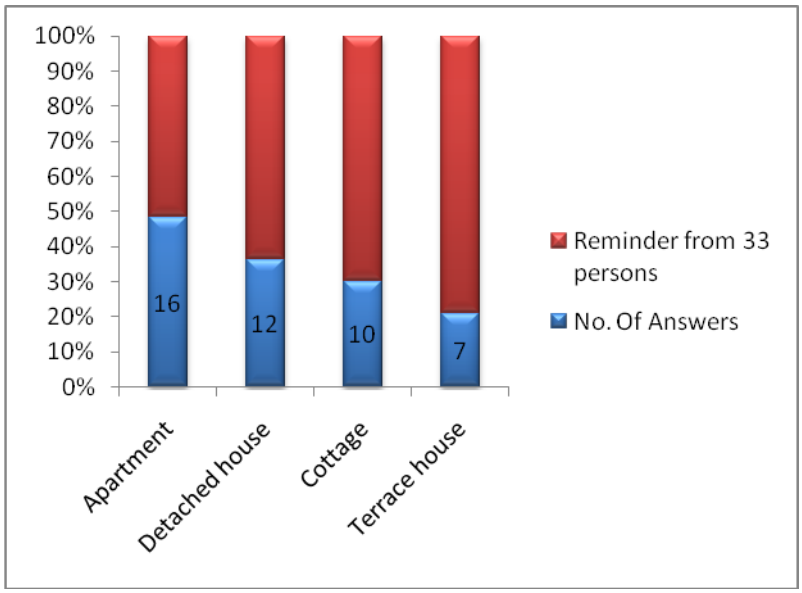

Figure 5 type of housing with householders dealing with low carbon technology

4.3.6. Question No.6:

The question is a multi answer question, and it's about the considerations are given to force to the low carbon technology in public residential sector, the chosen is between; Political support, Financial incentive, and Social benefits. From 33 answers, one answer is skipped and 32 have the answer dividing on the three choices;

9 persons with 27.27% choose political support, 14 persons with 42.42% choose financial incentive, and 19 persons with 57.58% choose social benefit figure 6. The feedback for this question is that social benefits have priority and the most promising expectation of respondents among all forces.

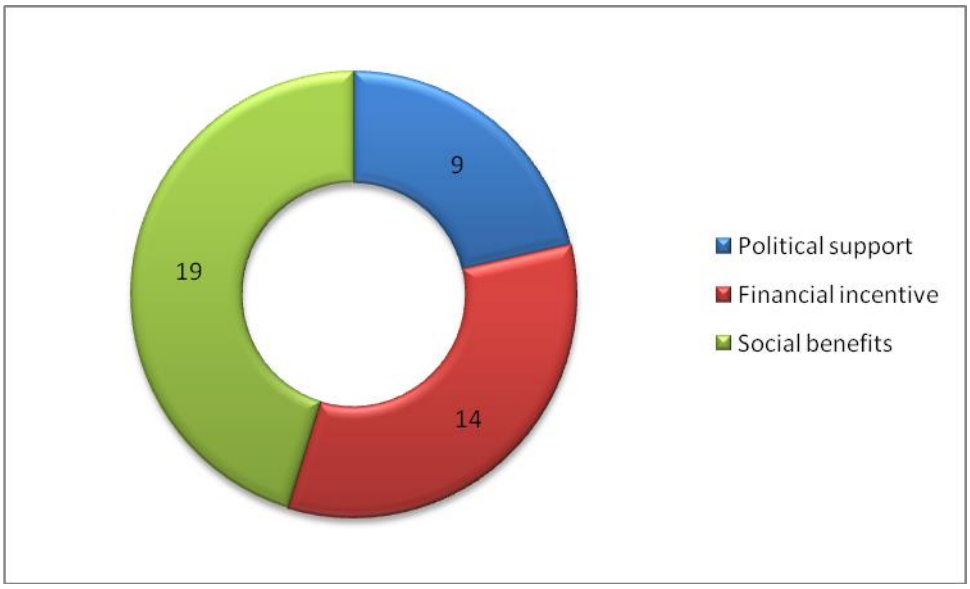

Figure 6 forces to the low carbon technology in public residential sector

4.3.7. Question No.7:

This question is a multi answer question like question 5 and 6, and is looking for the barriers to low carbon technologies in Public residential projects; the chosen is between; High building price, difficult techniques, High energy price, and Unable to pay back investment. From 33 persons, 3 persons skipped the question, and 30 persons answered it, one of them said that he don't know, so we can neglect him, other response give other choice which is high initial cost of some technology, so the right answers are from 29 persons divided on; 14 persons with 48.28% choose High building price, 8 persons with 27.59% choose difficult techniques, 14 persons with 48.28% choose High energy price, 6 persons choose Unable to pay back investment, last answer with 3.45% choose high initial cost of some technology. The feedback of

this question shows that the most important barrier(s) are high building price and high energy price, see figure 7.

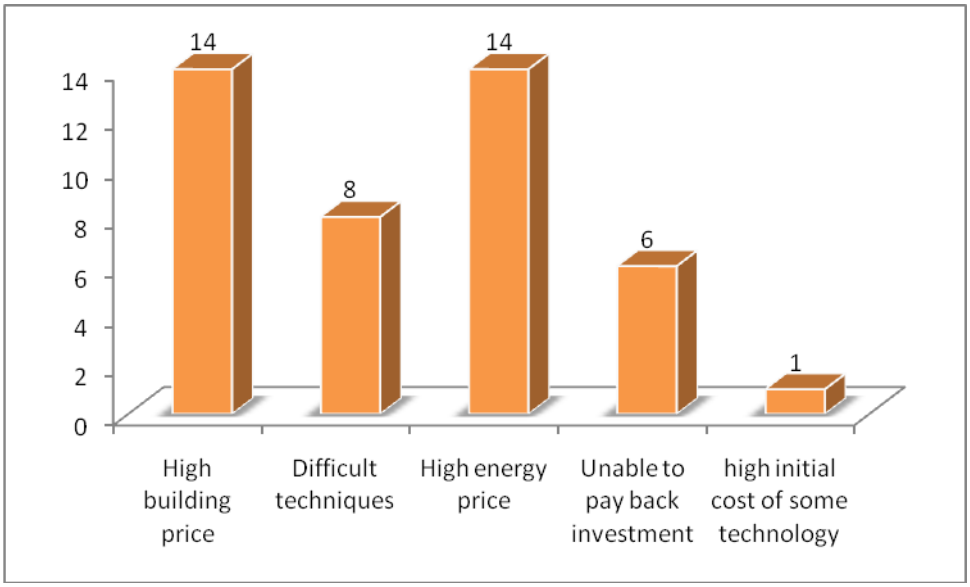

Figure 7 barriers to low carbon technologies in Public residential projects

4.3.8. Question No.8:

It is another multi answer question, and it's about the common client(s) are dealing with the responses, the response must choose any of the following choices; Tenants, landlords, Property Agencies, and Communities. 29 persons out of 33 have the right answers, one person gives other choice; Government, while another gives 2 choices; Communities and Housing association and private developers, and we can neglect the last 2 persons, cause one of them said none of the choices and the other said I don't have customers, according to these answers we can calculate the right answers are for 31 persons divided into; 4 persons with 12.90% choose Tenants, 10 persons with 32.26% choose Landlords, 9 persons with 29.03% choose Property Agencies, 10 persons with 32.26% choose Communities, one person with 3.23% choose Government, and other one person with 3.23% choose Housing association and private developers. The feedback of this question shows that participants distributing among all common clients, see figure 8.

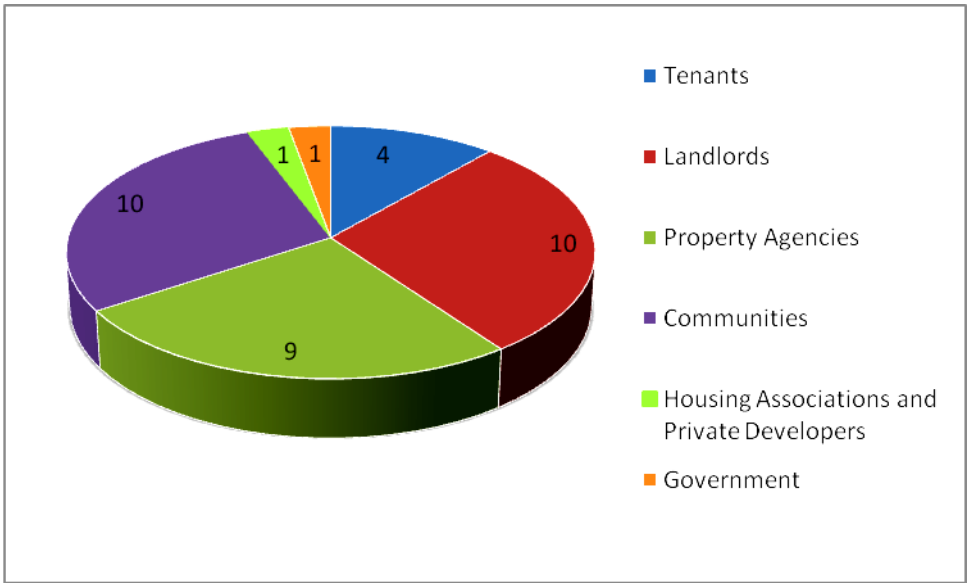

Figure 8 kind of common client(s) dealing with responses

4.3.9. Question No.9:

The question is asking the "participates" who have knowledge about renewable energy in their areas, especially, in public domestic building as a percentage. Out of 33 persons, one person skipped the question, 3 persons said that they don't know, and the other 29 persons have different answers divided into; 16 persons with 55.17% choose 0-19%, 9 persons with 31.03% choose 20-29%, and 4 persons with 13.79% choose more than 30%. The feedback shows that the majority of participants have shallow knowledge about renewable energy which is not agreed with feedback of question 4, see figure 9.

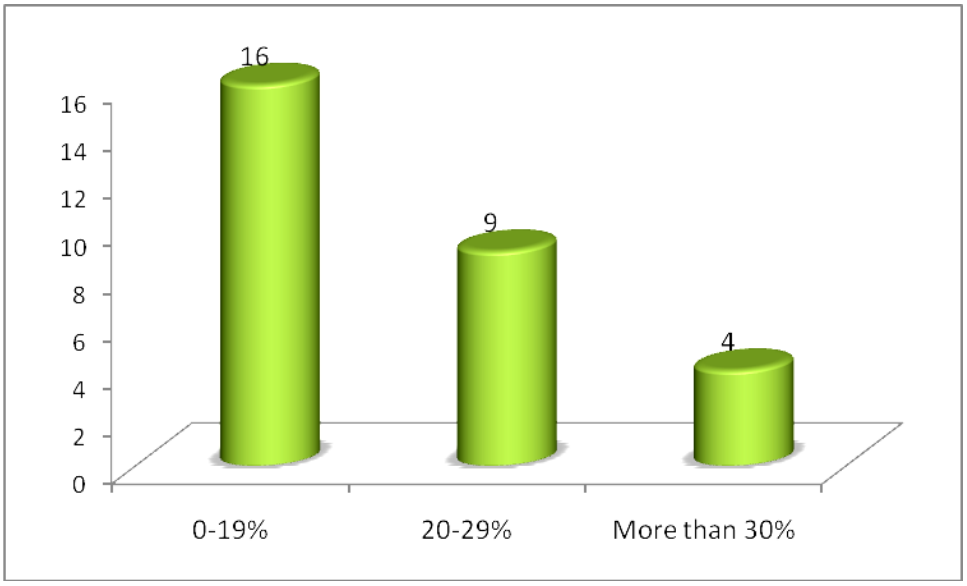

Figure 9 measure of participants experience for dealing with renewable energy

4.3.10. Question No.10:

This question also is a timetable multi choice question and it summarize the survey as a understanding question for the "participants", it is about the relationship between the householders and their knowledge of environmental policies. Out of 33 persons, one person skipped the question, and the other 32 persons have different answers which is divided into; 31 persons answered for Tenants with vary percentage; the maximum answers with 45.2% for third choice and the minimum answers with 9.7% for the fourth choice, 32 persons answered for Landlords with vary percentage; the maximum answers with 53.1% for second choice and the minimum answers with 6.3% for the fourth choice, 31 persons answered for Property Agencies with vary percentage; the maximum answers with 32.3% for first choice and the minimum answers with 16.1% for the third choice, 32 persons answered for Investors with vary percentage; the maximum answers with 40.6% for second choice and the minimum answers with 18.8% shared answers between the third and fourth choice, 32 persons answered for Communities with vary percentage; the maximum answers with 40.6% for second choice and the minimum answers with 9.4% for the fourth choice, the last choices gone to 28 answers for "Others" with different percentage; the maximum answers with 42.9% for fourth choice and the minimum answers with 7.1% for the first choice, see figure 10.

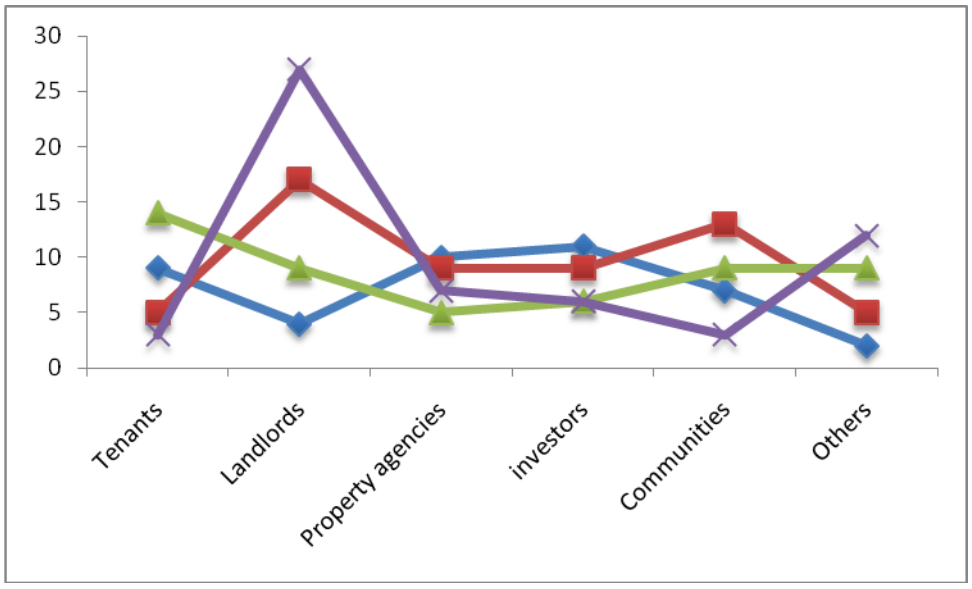

Figure 10 relationship between householders and their knowledge of environmental policies

4.4. Interviews

The important of interviews in this research is to follow-up the data collected from the questionnaires and these interviews to achieve the information which will help to put the conclusions. The research focused on the renewable energy and its technologies using in public domestic sector to reduce carbon dioxide emission not just in the UK but also in several places in the world. By using the e-mail to send the questions of the interview to many responses in several countries working in housing sectors, the respondents are from different countries, and because they may not followed the main target of the questions, on the other hand, the interviews are care to got the whole data of the respondents including their experiences in working in domestic sectors relation to renewable technologies. To be sure that the major topics of this research are applied, the interviews are used the semi-structured format, and that's allow the researcher to put his data also as an experience in housing issues. The interviews try to focus on:

- Who are the householders?, the relation between them and domestic sector
- Understanding for carbon dioxide emission
- Understanding for renewable technologies
- Barriers and strengths.

Records of interviews are attached to Appendix 2.

The main information about the respondents is:

	country	Age	year of working	Name of the co-mpany/agency	Current Position	Year of working in current company	Ex-housing companies /agency
Alan	UAE	48	28	DAMAC Group CO LLC	Vice President Service Delivery	10 months	5
Dinh	Vietnam	29	5	Institute for Building Science and Technology (IBST), Ministry of Construction	Project Manager	24 months	1
Yasser	Egypt	36		Aqarat 4u Real Estate Brokerage	sales manager	4 months	3
Tracy	UK			Homes and Communities	Manager		


Agency

Chapter 5:

Conclusions and Recommendations

There is evidence that the housing and community sector in the UK is unsustainable, in CO_2 emissions, overuse of land and other resources, social and economic indicators such as an institutional problems of a conservative building system and a planning and regulatory system that is slow to respond to changing needs and demands.

- Climate change: It was mentioned that, the burning of fossil fuels is the principal reason why greenhouse gases concentrations have gone up since the industrial revolution. And that is enough to make extreme weather events in whole the global as the same in the UK. The whole society demand to take action to reduce greenhouse gas emissions to get; reduction for climate change, improved energy and international security, a better environment, new economic opportunities and a fairer society.

- Sustainable development: As known, the main core for sustainable development in housing is creating low energy and ecological housing as a basic part of housing design, interés of the communities and Government(s), and technologies. However, the difficulty to reach this goal is as much culture as technical. It seems like there is no lack of knowledge, but the acceptance from society to priorities low energy design is not as prediction.

- Sustainable housing: House of Commons, (2006)mentioned that to achieve sustainable communities, the new housing must:

    - supply for different housing needs and aspirations;
    - provide for different household sizes;
    - ensure different tenures are integrated;
    - be built as part of mixed use areas, providing employment locally;
    - Have minimal impact on the natural environment.

- Government policies: The Government is committed to to reducing carbon emissions to meet 2050 targets. These targets will require developing

renewable heat and decarbonising the heating sector. The Government will be considering further the role that financial incentives can play in helping our society to meet our renewable and carbon targets.

- Energy efficiency: The main purpose to improve energy efficiency is to help tackling climate change, enabling households to transform home, presenting significant opportunities for UK industry and saving income resources. For that, the Government is acting to secure:
    - An effective way of reducing energy demand is through the introduction standards for new products on sale;
    - minimising the upward pressure on prices through policies to help households and businesses improve their energy efficiency;
    - providing support to the most vulnerable and improving the energy efficiency of their homes.
- Renewable sources for energy: It's the fastest growing global energy sources, and it currently expanding at growth rates. There are many chances to achieve renewable energy technologies in sustainable housing, while developing energy projects need number of investment funds which is available.
- Water conservation: Developing new water resources are the traditional water industry. However, the changing lifestyles of people within dwellings, making water appliances and personal behaviour the critical factor in the water equation.
- Eco-Towns: as an example for sustainability, 'ECO-town' was conceived as an urban management framework that would promote and direct the development of a new sustainable low density town. The eco-towns concept is designed to assist in meeting the twin challenges of providing additional housing by mitigating and adapting to climate change.
- Housing policy in the UK: Housing is built for the long term. Although more recent modernization of social housing has involved a move away from the

institutions, the roles and capacities of other players such as housing associations, building societies, housing tenure, political tenure strategies, and the exercise of housing choice, including choice that relates to the size and condition of dwelling and tenure have been changed.

- Building Regulations: Building regulations are mainly to ensure the health, safety, wellbeing and handiness of people in and around buildings, and to determine the needs for water and energy efficiency of buildings. An unhealthy housing has a wide failure affected on the society as a whole.

- Public sector: There would be a requirement for all relevant local public sector to cooperate in drawing up the strategy and committing to emissions cuts, and the strategy should set out the division of responsibility between bodies and individuals, setting out the policies to be delivered by all stakeholders, either through direct service provision, or through enabling local residents.

- Rates of population growth: there is a relationship between increasing dwellings and households in the UK. Many estimates of the precise number of homes required where as the number of households are increasing faster than current house-building levels.

- What will be happen in the future by supporting:

    - Our communities with cooperating of local authorities to improve our existing dwelling will achieve the greatest benefits and cost-efficiencies through delivering energy efficiency and wider sustainability benefits such as improving health, reducing crime, and creating local jobs, as well as saving money.

    - Government to achieve significant cost savings to the public sector.

    - Funding for Public sector to achieve most effective results at the early scoping and development stages of projects.

References

- Brian E., and David T., (2008), "*Sustainable Housing, Principles& Practice",* Talyor& Francis Group
- Burton, A.R., ed., (1992), "*Report of the Steering Group on Architecture*", Royal Institute of British Architects, London.
- Calthorpe P., (1993), "*The Next Urban Metropolis*", Princeton University Press, Princeton.
- Cambridge Futures, (2002), "*Cambridge Futures Project*". Retrieved from the World-Wide-Web at http://www.hop.co.uk/cambridgefutures/ on 8 August 2003.
- CMI, (2003), "*CMI mission*". Retrieved from the World Wide Web: http://www.cambridge-mit.org/about.
- CLG, (Dec2008), *"Changes to fire safety regulations affecting sub-surface railway stations – Consultation*" Department for Communities and Local Government, London
- CLG, (Jul., 2008), "*Communities in Control White Paper- Impact Assessments*", Department for Communities and Local Government, London, available online: http://www.communities.gov.uk/documents/communities/pdf/890165.pdf
- CLG, (Jun., 2010), *"Planning Policy Statement 3 (PPS3): Housing"*, Communities and Local Government: London, available online: http://www.communities.gov.uk/documents/planningandbuilding/pdf/planningpolicystatement3.pdf
- CLG, (Jun., 2009), *" Proposals for amending Part L and Part F of the Building Regulations – Consultation,Vol.1,2,3* Department for" Communities and Local Government, London
- Conservative party, (2010), *"Conservative manifesto: 2010 general election party policy",* available on the online: http://www.telegraph.co.uk/news/election-2010/7165000/Conservative-manifesto-2010-general-election-party-policy.html
- Crispin T., (1977), *"Climate Change and World Affairs",* Pergamon Press
- Dave R., (2005), "*Climate Change Begins at Home, Life on the two-way street of global warming",* Macmillan
- David M., Alan M., and Phil L., (2006). *"Housing policy in the UK*", Basingstoke: Palgrave Macmillan.
- DB Climate Change Advisors, Deutsche Bank Group *(*Feb 2009), *"Global Climate Change Regulation Policy Developments: July 2008- February 2009"* Whitepaper available online: http://dbadvisors.com/climatechange
- DCLG, *(Dec., 2006), "Building A Greener Future: Towards Zero Carbon Development",* Department for Communities and Local Government, London
- DCLG, (June 2010), *"Planning Policy Statement 3 (PPS3): Housing",3rd edition*, the Department for Communities and Local Government Publications, London

- DCLG, (Jun., 2009), *"Proposals for amending Part L and Part F of the Building Regulations – Consultation,Vol.1,2,3*" Department for Communities and Local Government, London
- DCLG, (Jul., 2009), *"Planning Policy Statement: Eco-towns. A Supplement to Planning Policy Statement 1"*, Department for Communities and Local Government, London, available online: http://www.communities.gov.uk/documents/planningandbuilding/pdf/pps-ecotowns.pdf
- DCLG, (Dec., 2009), *"Sustainable New Homes – The Road to Zero Carbon",* Department for Communities and Local Government
- Dearing, R.F., (1997), "*Higher Education in a Learning Society*", Her Majesty's Stationery Office (HMSO), London.
- DECC, (Mar2009), "*Climate Change Act, Impact Assessment*, available online: www.decc.gov.uk, Department of Energy and Climate Change, London
- DEFRA, (2002), "*Rural White Paper: Our Countryside – The Future – A Fair Deal for Rural England*", Department for Environment, Food and Rural Affairs, London.
- Department of Environment, (1977a), *"Housing Policy; A Consultative Document, Cmnd6851",* HMSO, London
- Department of Environment, (1977b), *"Housing Policy; Technical Volume Part 1",* HMSO, London
- DETR, (1999), "*Indicators of Sustainable Development*", Available online: http://www.sustainable-development.gov.uk/indicators/index on 8 August 2003, Department for Environment, Transport and the Regions, London
- DFID, (Jun., 2007), "*2007/08 DFID Sustainable Development Action Plan (SDAP)"*, The Department for International Development Publications, Available online: http://www.defra.gov.uk/sustainable/government/documents/DFID_Updated_SDAP_2007-08.pdf
- DTLR, (2002), *"Your Region, Your Choice: Revitalising the English Regions"* Department of Transport, Local Government and the Regions, London, Available online: http://www.communities.gov.uk/documents/regeneration/pdf/151228.pdf
- DTLR, (2001), "*Cambridge to Huntingdon Multi-Modal Study (CHUMMS)",* Department of Transport, Local Government and the Regions, London
- Friends of the Earth, (Mar., 2005), *"What the Government should do to tackle climate change",* Available online: http://www.foe.co.uk/resource/consultation_responses/ccpr_foe_submission.pdf
- Friends of the Earth, (Sep., 2006), *"Plan Policy Statement, Tackling Climate Change Through Planning; the Government's objectives",* Available online: http://www.foe.co.uk/resource/briefings/pps26_discussion_paper.pdf
- Friends of the Earth, (Sep., 2010), *"Climate Change Strategies and Action Plans",* Available online: http://www.foe.co.uk/resource/briefings/climate_change_strategies.pdf

- Giles A., Simon D., Eric N., Edward E., (2007), "*Handbook of Sustainable Development",* MPG Books Ltd, Bodmin, Cornwall
- HM Government, (Jul 2009a), *"The UK Low Carbon Transition Plan, National strategy for climate and energy*, the Royal Arms and other departmental or agency logos
- HM Government, (2009b), Building Britain's Future, *"The UK Low Carbon Industrial Strategy*", Department of Energy and Climate Change, available online: www.hmg.gov.uk/lowcarbon
- Hogwood, B. W. and Gunn, L. A.(1981), *"The Policy Orientation",* Strathclyde: Centre for Study of Public Policy, University of Strathclyde
- House of Commons, (1981a), *"Council Houses Sales, Second Report of the Environment Committee, Session 1980-81; Vol.11, Minutes of Evidence, (HC 366-II; HC 535 i-xi (1979-80)",* HMSO, London
- House of Commons, (1981b), *"DOE's Housing Policy, Third Report of the Environment Committee, Session 1980-8, HC 383",* HMSO, London
- House of Commons, (2006), *"DOE's Housing Planning, Local Government and the Regions, Affordability and the Supply of Housing Committee, Third Report of Session 2005-6,Vol.1, HC 703-1",* HMSO, London
- Jane P. &Others, *(*Mar., 2006), *"Reducing the environmental impact of housing, Final Report",* Environmental Change Institute, University of Oxford
- Labour Party, (2010), *"The Labour Party Manifesto 2010",* available on the internet: www.labour.org.uk/manifesto
- Lowry, I., (1964), *"A Model of Metropolis, the Rand Corporation,"* Santa Monica, California.
- Laure I., Frits M., (2008), "*Towards a Sustainable Northern European Housing Stock, Figures, Facts and Future",* TUDelft, IOS Press
- LCBP, (2010), "*Microgeneration for your home",* Low Carbon Buildings Programme, Department of Energy Climate Change, available online: http://www.lowcarbonbuildings.org.uk/Microgeneration-for-your-home/Planning-permission
- Lowry, I., (1964), "*A Model of Metropolis, the Rand Corporation*", Santa Monica, California.
- Lundberg, R.H. (1999), *"Modern Maids: A Study of Au Pairs as Gap Year Domestic Workers for Families",* PhD Thesis, Institute of Education, University of London
- D., (1995), *"Two Cheers and Assorted Heckles; the DoE and housing policy, 1970-1995",* 25th Anniversary of the DoE, DoE, London
- Malpass, P., (1998), *"Housing, Philanthropy and the State: A History of the Guiness Trust",* Bristol: University of the West Of England.
- Mark S., Christine W., Moira M., (2005), *"Lessons from the past, challenges for the future for housing policy, An evaluation of English housing policy 1975-2000",* Office of the Deputy Prime Minister: London

- Merrett, S., (1979), *"State Housing in Britain"*, London, Routledge & Kagen Paul
- Mike J., and Nicola D., (2005),*"Future Forms and Design for Sustainable Cities",* Architectural Press
- NHPAU, (Oct., 2007), *"Developing a target range for the supply of new homes in England*", National Housing and Planning Advice Unit, Fareham available online: http://www.communities.gov.uk/documents/housing/pdf/523984.pdf
- ODPM, (2005), *"Factcheet 4: Environmental Sustainability*, *Draft Code for Sustainable Homes"*, Office of the Deputy Prime Minister Publications: London
- ODPM, (Jan., 2005), *"Lessons from the past, challenges for the future for housing policy An evaluation of English housing policy 1975-200",* Office of the Deputy Prime Minister Publications, London
- ODPM, (Apr., 2006), *"The Building Regulation 2000,L1A, Conservation of Fuel and Power in New Dwellings,2006 Edition",* Office of the Deputy Prime Minister Publications, London
- ODPM, (Apr., 2006), *"The Building Regulation 2000,L2A, Conservation of Fuel and Power in New Buildings Other Than Dwellings,2006 Edition",* Office of the Deputy Prime Minister Publications, London
- ODPM, (Apr., 2006), *"The Building Regulation 2000,L1B, Conservation of Fuel and Power in Existing Dwellings,2006 Edition",* Office of the Deputy Prime Minister Publications, London
- ODPM, (Apr., 2006), *"The Building Regulation 2000,L2B, Conservation of Fuel and Power in New Buildings Other Than Dwellings,2006 Edition",* Office of the Deputy Prime Minister Publications, London
- ODPM, (Jan. 2005), *"The Context for Housing Policy Since 1975 Statistical Time Series With Commentary, Selected Statistical Times Series With Brief Commentary",* Office of the Deputy Prime Minister Publications, London
- OPSI, (2008), *"Climate Change Act 2008, 2008 CHAPTER 27*", Office of Public Sector Information
- Paul C., (1996), *"Directions in housing policy: towards sustainable housing policies for the"*, London.
- Peter K., (2006), *"Conservative Consensus? Housing Policy Before 1997 and After*". Imprint Academic.
- Peter W., (1997), *"Direction in Housing Policy, Towards sustainable housing policies for the UK"*, Paul Chapman Publishing Ltd.
- RTPI, (Aug., 2007), *"Planning for a Sustainable Future: A High Level Response"* The Royal Town Planning Institute.
- SDC, (Jul., 2010), *"The Future is Local- Empowering communities to improve their neighbourhoods",* Sustainable Development Commission, available online: http://www.sd-commission.org.uk/publications/downloads/SDC_TFiL_report_w.pdf
- Steve W., (2008), *"UK Housing Review2008/9",*, Chartered Institute of Housing and the Building Societies Association.

- Tatyana P., (2004), "*Beyond Economic Growth, An Introduction to Sustainable Development",* second edition, The World Bank, Washington DC
- TCPA, (Nov., 2009), *"Creating Low Carbon Homes for People in Eco-towns-Eco-towns Housing Worksheet -Advice to Promoters and Planners",* Town and Country Planning Association, London, Available online: http://www.tcpa.org.uk/data/files/ws_housing.pdf
- The Callcutt Review, *(*Nov., 2007), *"The Callcutt Review of house-building delivery"* the Department for Communities and Local Government, London
- The Electoral Commission, (May, 2009), *"Briefing note for registered political parties, Combined regulated periods and spending limits for elections in 2009 and 2010",* available online: www.electoralcommission.org.uk
- Thomson, G., Frances, J., Levacic, R., and Mitchell, J., (1991), *"Markets, Hierarchies and Networks, the Coordination of Social Life",* London, Sage.
- Tony M., Karen L., Tony L., and Judith A., (2010), "*Social Sustainability in Urban Areas, Communities, Connectivity and the Urban Fabric"* earthscan publications
- UK GBC, "*UK Green Building Council Zero Carbon Task Group Report, Appendices",* UK Green Building Council
- UN Documents, (1987), "*Gathering a Body of Global Agreements, Our Common Future, Chapter 2: Towards Sustainable Development",* available United Nations web sites: http://www.un-documents.net/ocf-02.htm
- Website, *"climate change and business implications, climate change agreements and climate change levy implications for UK organizations",* available online: http://www.businessballs.com/climatechange.htm
- Website, "*Principles of Sustainable Development", available online:* http://www.sustainablebuild.co.uk/SustainableDevelopmentPrinciples.html
- Whitehead C., (1977), *"Where have all the dwelling gone?"*, CES Review, No1.
- Williams,I. D. And Kelly, J. (2003), *"Green waste collection and the public's recycling behaviour in the Borough of Wyre, England",* Resources, Conservation and Recycling
- Zero Carbon Hub, (2009), "*Defining Zero Carbon Homes*", Zero Carbon Hub

Appendices

- ✓ Appendix 1: questionnaires
    - Contents of questionnaire

1. Introduction

Dear Sir/Madam

I'm very thanks for your kindness to take from your time to complete this survey.

This questionnaire is being conducted to fulfill part of the requirements for an award of MSc Project Management in the University of Greenwich

Through your participation I hope to understand some of the actual shortcomings of public residential sector. The results of the survey will be useful to determine what needs to be done to improve reducing carbon emission in this sector.

The survey is held until September 03, 2010.

Your answers are used for the study only.

If you have any questions, please feel free to contact via emails: am518@gre.ac.uk

Or amlok@hotmail.com

Regards,

Next

2. Default Section

1. You participate in

- [ ] Housing association
- [ ] Local Authority
- [ ] Tenant Forum

Other (please specify) _____

2. Your work experience in low carbon technology

- ○ Less than 1 year
- ○ 2-5 years
- ○ More than 5 years

○ Other (please specify)

_____

3. You work for

- [ ] Public sector
- [ ] Private sector

Other (please specify) _____

4. Do you involve any low carbon programmes?

- ○ Yes
- ○ No

Other (please specify) _____

5. Which types of buildings are appropriate to low carbon technologies?

- ☐ Apartment
- ☐ Detached house
- ☐ Cottage
- ☐ Terrace house

Other (please specify) _____

6. Driving forces to the low carbon technology in public residential projects

- ☐ Political support
- ☐ Financial incentive
- ☐ Social benefits

Other (please specify) _____

7. Barriers to low carbon technologies in Public residential projects

- ☐ High building price
- ☐ Difficult techniques
- ☐ High energy price
- ☐ Unable to pay back investment

Other (please specify) _____

8. Your common clients are

- ☐ Tenants
- ☐ Landlords
- ☐ Property Agencies
- ☐ Communities

Other (please specify) _____

9. in your area, how many public domestic sector using renewable energy as a source of efficient energy?

0-19% 20-29% More than 30%
Other (please specify)

10. Evaluate the relation between householders with environmental policies

	Excellent knowledge with responsibility	Have knowledge but can't deal with	Little information and don't care	No information
Tenants				
Landlords				
Property				
investors				
Communities				
Others				

Any addition information

- Questionnaires Summary

No.	Question 1				Question 2				Question 3			Question 4		
	Housing association	Local Authority	Tenant forum	Other	Less than1year	2-5 years	More than5 years	Other	Public sector	Private sector	Other	Yes	No	Other
1				X	X				X			X		
2	X	X					X		X					X
3				X				X		X			X	
4				X			X		X			X		
5	X					X				X		X		
6			X			X				X		X		
7	X						X		X			X		
8		X			X					X		X		
9			X				X				X	X		
10			X				X			X		X		
11			X		X					X			X	
12	X							X		X			X	
13		X			X					X			X	
14		X				X			X			X		
15	X				X					X			X	
16	X							X			X		X	
17	X				X				X			X		
18	X							X		X			X	
19	X				X				X			X		
20		X				X			X			X		
21	X					X			X				X	
22		X				X				X			X	
23	X				X				X				X	
24	X				X					X			X	
25			X		X					X		X		
26			X		X						X	X		
27	X							X		X			X	
28			X			X				X		X		
29			X		X					X			X	
30	X						X			X			X	
31	X				X				X					
32			X			X				X		X		
33	×				×				×			×		
T	16	6	9	3	14	8	6	5	12	17	3	17	14	1

No.	Question 5					Question 6				Question 7				
	Apartment	Detached house	Cottage	Terrace house	Other	Political support	Financial incentive	Social benefits	Other	High building price	Difficult techniques	High energy price	Unable to pay back	Other
1	X					X	X	X		X		X		
2	X	X	X	X		X		X						X
3	X	X	X	X	X		X						X	
4	X	X	X	X			X			X				
5		X				X	X				X		X	
6	X					X						X		
7				X			X	X						
8	X									X	X	X		
9	X					X					X			
10	X					X	X	X			X	X		
11				X				X				X		
12			X					X			X			
13		X					X			X				
14			X				X					X		
15	X							X		X	X			
16		X						X		X				
17	X							X		X				
18		X					X					X		
19	X							X		X				
20			X				X					X		
21			X				X			X				
22		X				X					X			
23	X							X				X		
24			X					X		X	X	X		
25	X			X			X			X			X	
26		X						X					X	
27				X		X								X
28	X					X	X	X				X	X	
29	X							X				X		
30	X		X					X		X		X		
31		X						X				X		
32		X						X		X				
33		×	×				×	×		×			×	
T	16	12	10	7	1	9	14	19	--	14	8	14	6	2

No.	Question 8					Question 9				Question 10					
	Tenants	Landlords	Property Agencies	communities	Other	0-19%	20-29%	More than 30%	Other	Tenants	Landlords	Property Agencies	investors	communities	Other
1					x	x				3	3	2	2	2	1
2		x													
3			x			x				3	2	1	1	1	
4				x	x			x		3	2	3	2	2	
5	x					x				3	2	2	2	2	4
6		x					x			2	2	1		3	4
7								x		1	3	1	4	1	
8		x				x				4	3	2	1	3	3
9		x	x			x				3	2	1	2	2	4
10				x					x	3	2	1	1	1	4
11			x	x				x			2	4	3	3	3
12					x				x	3	2	1	2	3	
13		x					x			3	2	2	1	1	3
14			x			x				2	2	2	1	3	4
15			x			x				1	2	3	4	1	2
16				x		x				3	3	2	2	3	4
17		x					x			1	2	1	3	2	1
18		x				x				1	2	1	3	2	2
19				x			x			2	1	1	2	1	3
20			x				x			2	3	1	4	2	3
21	x							x		1	2	4	1	4	2
22		x					x			1	2	3	3	2	1
23		x				x				1	2	1	1	2	2
24				x		x				3	3	3	3	3	3
25		x				x				3	2	2	1	2	4
26				x		x				1	3	3	3	2	2
27					x	x				4	4	4	4	4	4
28			x						x	3	3	2	1	2	4
29	x					x				3	3	4	4	3	4
30			x				x			4	4	4	4	4	4
31				x			x			1	1	2	1	1	1
32			x				x			2	1	4	2	3	3
33			×			×				3	1	4	2	2	4
T	3	10	10	8	4	16	9	4	3						

- Appendix 2: interviews result

- **Alan James Gammon, DAMAC Group CO. LLC, U.A.E.**

Personal Data:

Name	Alan James Gammon
Age	48 years
Years of experience	28 years
Present Company/organization you work in	DAMAC Group CO LLC
Current Position	Vice President Service Delivery
No. Of years in current position	24 months
Address of your company/position	Executive Heights, PO Box 2195, Dubai, U.A.E.
Brief on your Company/organization	A Multibillion dollar enterprise that is privately owned company that has numerous business interests including property development, management, catering, insurance, food services, asset management throughout the GCC and Middle east.

Questions:

1. What kind of dwelling organization you participate in?

Housing association	X
Local Authority	X
Tenant Forum	
Other	

2. In which sector you are working for?

Public sector	
Private sector	X
Other	

3. What kind of common clients you are dealing with?

Tenants	X
Landlords	X
Property Agencies	
Communities	X
Other	X

4. Which types of buildings your organization working on?

Apartment	X
Detached house	X
Cottage	
Terrace house	
Other	X

5. Do you have any years of experience in dealing with renewable energy or low carbon technology? If yes, how many year(s)/months?

Yes,	About 4 years
No	
Other	

6. Do you involve any low carbon programs? If yes please identify with whom

Yes, I'm involved in one of the low carbon prog.	With government programs
No I'm not involved	
Other	

7. Which types of buildings are appropriate to low carbon technologies?

Apartment	X
Detached house	X
Cottage	
Terrace house	
Other	X

8. In your area, how many public domestic sector using renewable energy as a source of efficient energy?

0-19%	
20-29%	X
More than 30%	
Other	

9. Identify the Driving forces to the low carbon technology in public residential projects

Political support	X
Financial incentive	X
Social benefits	X
Other	

10. Identify the barriers to low carbon technologies in Public residential projects in your area

High building price	
Difficult techniques	
High energy price	
Unable to pay back investment	
Other	Combination of the above

11. Evaluate the relation between householders with environmental policies

	Excellent knowledge with responsibility	Have knowledge but can't deal with	Little information and don't care	No information
Tenants			X	
Landlords		X		
Property agencies		X		
investors		X		
Communities		X		
Others				

Any addition information(s):

A relatively new area in respect of information gathering. The international employees outside of the GCC nationals generally have a better understanding of environmental issues. Whilst the senior nationals of the GCC certainly understand the impacts on the environment and are keen to minimize the impact.

I appreciate you to answer all the above questions, please add any additional information you find it useful related to these questions

Please send the answers to amlok@hotmail.com

- **Dinh Cong Phuc, Institute for Building Science and Technology (IBST), Ministry of Construction, Viet Nam**

Personal Data:

Name	Dinh Cong Phuc
Age	28
Years of experience	5
Present Company/organization you work in	Institute for Building Science and Technology (IBST), Ministry of Construction, Viet Nam
Current Position	Project manager
No. Of years in current position	24 months
Address of your company/position	81 Tran Cung, Ha Noi, Viet Nam
Brief on your Company/organization	IBST has been involved in almost all State essential research programs, State-level scientific research themes and international cooperation activities in the fields of structural engineering, concrete and building material, foundation engineering, environmental geotechnique, anti-corrosion and building's protection, construction technology, environmental technology, water supply and drainage, and fire prevention and protection,.. Moreover, IBST is a consulting institution (involved in design and design review, construction quality supervision,..) for a number of large structures such as hydro-electric plants, thermo-electric plants, cement plants, high-rise buildings and ancient cultural monuments...

Questions:

1. What kind of dwelling organization you participate in?

Housing association	X
Local Authority	X
Tenant Forum	
Other	

2. In which sector you are working for?

Public sector	
Private sector	X
Other	

3. What kind of common clients you are dealing with?

Tenants	X
Landlords	X
Property Agencies	
Communities	X
Other	X

4. Which types of buildings your organization working on?

Apartment	X
Detached house	X
Cottage	
Terrace house	
Other	X

5. Do you have any years of experience in dealing with renewable energy or low carbon technology? If yes, how many year(s)/months?

Yes,	About 4 years
No	
Other	

6. Do you involve any low carbon programs? If yes please identify with whom

Yes, I'm involved in one of the low carbon prog.	With government programs
No I'm not involved	
Other	

7. Which types of buildings are appropriate to low carbon technologies?

Apartment	X
Detached house	X
Cottage	
Terrace house	
Other	X

8. In your area, how many public domestic sector using renewable energy as a source of efficient energy?

0-19%	
20-29%	X
More than 30%	
Other	

9. Identify the Driving forces to the low carbon technology in public residential projects

Political support	X
Financial incentive	X
Social benefits	X
Other	

10. Identify the barriers to low carbon technologies in Public residential projects in your area

High building price	
Difficult techniques	
High energy price	
Unable to pay back investment	
Other	Combination of the above

11. Evaluate the relation between householders with environmental policies

	Excellent knowledge with responsibility	Have knowledge but can't deal with	Little information and don't care	No information
Tenants			X	
Landlords		X		
Property agencies		X		
investors		X		
Communities		X		
Others				

Any addition information(s):

A relatively new area in respect of information gathering. The international employees outside of the GCC nationals generally have a better understanding of environmental issues. Whilst the senior nationals of the GCC certainly understand the impacts on the environment and are keen to minimize the impact.

I appreciate you to answer all the above questions, please add any additional information you find it useful related to these questions

Please send the answers to amlok@hotmail.com

- **Yasser Mohamed Mohamed Othman- Murabahat Real Estate Solutions- Egypt**

Personal Data:

Name	Yasser Mohamed Mohamed Othman.
Age	36 Years.
Years of experience	14 Years of Experience.
Present Company/organization you work in	Murabahat Real Estate Solutions was Multinational Company one of Murabahat investment companies owned by a group of Kuwait and Saudi investors (Al Babtain, Al Ghanam) were entering the Egyptian market in June 2008. The main branch in Kuwait and has many branches in "Egypt - Saudi Arabia - United Arab Emirates – Turkey.
Current Position	Cairo Sales Manager.
No. Of years in current position	Two Years.
Address of your company/position	Al Maadi-Cairo- Egypt
Brief on your Company/organization	✓ My Organization was Multinational Worked In Real Estate Field In Different Countries "Saudi Arabia – Lebanon – Turkey – Egypt" ✓ We Offer Our Products To The Costumers (Free Hold or Unit Share) Have Many Sectors (Residential - Commercial).

Questions:

1. You participate in:

Housing association	✓
Local Authority	
Tenant Forum	
Government	
Other	

2. You work for:

Public sector	
Private sector	✓
Other	

3. Your common clients are

Tenants	✓
Landlords	✓
Property Agencies	✓
Communities	
Other	

4. Which type of house building your agency work on

Apartment	✓
Detached house	✓
Cottage	
Terrace house	
Other	

5. Do you have any years of experience in dealing with renewable energy or low carbon technology? If yes, how many year(s)/months?

Yes	
No	✓
Other	

6. Do you involve any low carbon programmes? If yes please identify with whom

Yes, I'm involved in one of the low carbon program.	
No I'm not involved	✓
Other	

7. Which types of buildings are appropriate to low carbon technologies?

Apartment	✓
Detached house	✓
Cottage	
Terrace house	
Other	

8. In your area, how many public domestic sector using renewable energy as a source of efficient energy?

0-19%	
20-29%	✓
More than 30%	
Other	

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9. Identify the driving forces to the low carbon technology in public residential projects in your area

Political support	
Financial incentive	✓
Social benefits	✓
Other	

10. Identify the barriers to low carbon technologies in Public residential projects in your area

High building price	
Difficult techniques	✓
High energy price	✓
Unable to pay back investment	
Other	

11. Evaluate the relation between householders with environmental policies

	Excellent knowledge with responsibility	Have knowledge but can't deal with	Little information and don't care	No information
Tenants		✓		
Landlords	✓			
Property agencies			✓	
investors	✓			
Communities			✓	
Government	✓			
Others				

Any addition information(s):

I appreciate you to answer all the above questions, please add any additional information you find it useful related to these questions

Please send the answers to amlok@hotmail.com

Questions for:

- **Tracy Gordon, Homes and Communities Agency, Warrington- UK**

Personal Data:

Name	Tracy Gordon
Age	46
Years of experience	
Present Company/organization you work in	Homes and Communities Agency
Current Position	Programme Manager – Carbon Challenge
No. Of years in current position	
Address of your company/position	Arpley House, 110 Birchwood Boulevard, Warrington, WA3 7QH
Brief on your Company/organization	• Our role is to create opportunity for people to live in high quality, sustainable places. We provide funding for affordable housing, bring land back into productive use and improve quality of life by raising standards for the physical and social environment. • Local investment planning is our way of doing business to support local authorities as they develop and implement their plans for their places and communities. • We are a non-departmental public body of the Department for Communities and Local Government.

Please answer the following 11 questions:

1. You participate in:

Housing association	yes
Local Authority	yes
Tenant Forum	
Government	Report to CLG
Other	

2. You work for:

Public sector	
Private sector	yes
Other	

3. Your common clients are

Tenants	
Landlords	yes
Property Agencies	
Communities	yes
Other	developers

4. Which type of house building your agency work on

Apartment	yes
Detached house	yes
Cottage	yes
Terrace house	yes
Other	Flats and large scale developments.

5. Do you have any years of experience in dealing with renewable energy or low carbon technology? If yes, how many year(s)/months?

Yes	More than 5 years
No	
Other	

6. Do you involve any low carbon programmes? If yes please identify with whom

Yes, I'm involved in one of the low carbon program.	yes
No I'm not involved	
Other	

7. Which types of buildings are appropriate to low carbon technologies?

Apartment	yes
Detached house	yes
Cottage	yes
Terrace house	yes
Other	Flats and large scale developments both new and retrofit opportunities.

8. In your area, how many public domestic sector using renewable energy as a source of efficient energy?

0-19%	
20-29%	
More than 30%	As we fund most social housing and it has to achieve at present at least a 25% reduction in energy performance most have to use a low carbon technology.
Other	

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9. Identify the driving forces to the low carbon technology in public residential projects in your area

Political support	Yes the government targets are moving things along in low carbon.
Financial incentive	Yes grants have made low carbon more attractive.
Social benefits	Low carbon has had limited impact on such issues as fuel poverty.
Other	

10. Identify the barriers to low carbon technologies in Public residential projects in your area

High building price	yes
Difficult techniques	
High energy price	
Unable to pay back investment	Yes – unable to gain increase in values when selling compared to second hand market.
Other	

11. Evaluate the relation between householders with environmental policies

	Excellent knowledge with responsibility	Have knowledge but can't deal with	Little information and don't care	No information
Tenants			✓	
Landlords		✓		
Property agencies			✓	
investors				
Communities			✓	
Government	✓			
Others				

Any addition information(s):

- The HCA's Carbon Challenge programme was set up to challenge designers and housebuilders to show how Level 6 of the Code could be delivered now, and on a significant scale.
- Working with our chosen development team and South Gloucestershire Council, the HCA is demonstrating the new ways of working that will be required to deliver the Government's 'zero carbon' standard by 2016.

I appreciate you to answer all the above questions, please add any additional information you find it useful related to these questions

Please send the answers to amlok@hotmail.com