# Sustainable Building Maintenance within Social Housing

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A thesis submitted in partial fulfilment of the requirements of the University of Greenwich for the Degree of Doctor of Philosophy

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# DECLARATION

"I certify that this work has not been accepted in substance for any degree, and is not concurrently being submitted for any degree other than that of (PhD) being studied at the University of Greenwich. I also declare that this work is the result of my own investigations except where otherwise identified by references and that I have not plagiarised another's work".

Signed (Student) ……..

Date …….

Signed (Supervisor) ……

Date …….

# ACKNOWLEDGEMENTS

This research was undertaken as part of the EPSRC SUE IDCOP project with support from Octavia Housing. The EPSRC SUE IDCOP project investigated how to help create the spaces in which people wished to live and work. It did so by looking at the performance of multi-storey, multi-occupancy buildings focussing on technology, the building user and manager as well as design and decision making tools. It consisted of 6 themes; The Building User's Perspective – Perceived and Measured Performance; The Role of the Facilities Manager; Smart Façade Technology Assessment; Personalisation in the Office; Decision Making Tools and Current Decision Making Practices.

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# ABSTRACT

The social housing sector contains the largest number of professionally managed properties and as such has a significant role to play in improving the UK's economic, environmental and social sustainability. This thesis explores the viability of integrating the sustainability agenda with social housing maintenance decision making in order that the sustainability of existing social housing stock can be improved through planned maintenance (and refurbishment).

The thesis presents the argument that the current single criterion, conditioned based approach to maintenance planning does not support the continuous improvement in sustainability of social housing. Furthermore it argues that a new, multi-criteria approach to maintenance planning is needed based upon the performance of a home in-use rather than its condition.

The performance based sustainable social housing maintenance model was presented and its application explored with Octavia Housing. Two aspects were further explored, firstly what criteria did landlords need to assess to ensure sustainability was systematically integrated into maintenance planning, and secondly, how could this multi-criteria be assimilated in order to prioritise maintenance actions to improve the sustainability rating of housing going forward.

The questionnaire determined that traditional social housing maintenance was still the norm and whilst the sustainability agenda was considered important, it wasn't integrated within housing management planning. The interviews determined the criteria landlords wished to use to assess the sustainability of their housing stock and prioritise maintenance need, exceeded that expressed in the Decent Homes Standard but, more importantly the specific criteria was unique to individual landlords and no definitive list of criteria required.

The case study demonstrated that the proposed maintenance model could be implemented and presented a methodology by which it could be populated. An important aspect of the new maintenance model was the development of the Analytical Hierarchy Process modelling toolkit to measure the sustainability of the existing stock and prioritise maintenance work to improve this measure over time through planned maintenance. Whilst the model was based on data collected in the field, the worked example was theoretical and provides an opportunity for further work with Octavia Housing.

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# ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| AECB | Association for Environment Conscious Building |
| ALMO | Arms Length Management Organisation |
| AHP | Analytical Hierarchy Process |
| ASB | Anti-Social Behaviour |
| BAMS | Building Asset Management Strategy |
| BEES | Building for Environmental and Economic Sustainability |
| BRE | Building Research Establishment |
| BREEAM | Building Research Establishment Environmental Assessment Method |
| BIS | Department of Business, Innovation and Skills |
| BS | British Standard |
| BSC | Balanced Scorecard |
| BSI | British Standards Institution |
| CASBEE | Comprehensive Assessment System for Building Environmental Efficiency |
| CCRA | Climate Change Risk Assessment |
| CCS | Considerate Constructors Scheme |
| CCX | Chicago Climate Exchange |
| CHP | Combined Heat and Power |
| CIB | International Council for Building |
| CIH | Chartered Institute of Housing |
| CIOB | Chartered Institute of Builders |
| CFC | Chlorofluorocarbon |
| $CO_2$ | Carbon Dioxide |
| $CO_2e$ | Carbon Dioxide Equivalent |
| CPI | Consumer Price Index |
| CREW | Community Resilience to Extreme Weather |
| CSH | Code for Sustainable Homes |
| DCLG | Department for Communities and Local Government |
| DCMS | Department for Culture, Media and Sport |
| DDA | Disability Discrimination Act |
| DECC | Department of Energy and Climate Change |
| Defra | Department for Environment Food and Rural Affairs |

| | |
|---|---|
| DER | Dwelling Emission Rate |
| DETR | Department of the Environment, Transport and the Regions |
| DH | Department of Health |
| DHS | Decent Homes Standard |
| dti | Department of Trade and Industry |
| DWP | Department of Work and Pensions |
| ECO | Energy Company Obligation |
| EHS | English Housing Survey |
| EI | Environment Impact |
| EMAS | Environment Management Assessment Scheme |
| EPBD | Energy Performance of Buildings Directive |
| EPSRC: | Engineering and Physical Sciences Research Council |
| EST | Energy Saving Trust |
| FIT | Feed-In-Tariff |
| foe | Friends of the Earth |
| G8 | Assembly of world leaders who meet annually to discuss global issues |
| GD | Green Deal |
| GDP | Gross Domestic Product |
| GHG | Greenhouse Gas |
| GSHP | Ground Source Heat Pump |
| GVA | Gross Value Added |
| GWP | Global Warming Potential |
| HCA | Homes and Communities Agency |
| HCFC | Hydrochlorofluorocarbons |
| HHSRS | Housing Health and Safety Rating System |
| HRA | Housing Revenue Account |
| IDCOP: | Innovation in Design, Construction and Operation of Buildings for People |
| IPCC | Intergovernmental Panel on Climate Change |
| IPD | Investment Property Databank |
| ISCCP | International Satellite Cloud Climatology Project |
| ISO | International Organisation for Standardisation |
| KLOE | Key Lines of Enquiry |
| KPI: | Key Performance Indicator |
| LA | Local Authority |

| | |
|---|---|
| LCA | Life Cycle Analysis |
| LEED | Leadership in Energy and Environmental Design |
| LGA | Local Government Association |
| LHA | Local Housing Allowance |
| LZC | Low, Zero Carbon |
| MCDM | Multi-Criteria Decision Making |
| NAO | National Audit Office |
| NAP | National Adaptation Programme |
| NHF | National Housing Federation |
| NHMF | National Housing Maintenance Federation |
| NOx | Nitrogen Oxide |
| ODP | Ozone Depletion Potential |
| ODPM | Office of the Deputy Prime Minister |
| OH | Octavia Housing |
| PAYS | Pay As You Save |
| PFI | Private Finance Initiative |
| PPM | Planned Preventative Maintenance |
| PV | Photovoltaic |
| RdSAP | Reduced Data Standard Assessment Procedure |
| RHI | Renewable Heat Incentive |
| RIBA | Royal Institute of British Architects |
| RICS | Royal Institute of Chartered Surveyors |
| RM | Responsive Maintenance |
| RPI | Retail Price Index |
| RSL: | Registered Social Landlord |
| SAP | Standard Assessment Procedure |
| SCIE: | Social Care Institute for Excellence |
| SCS: | Stock Condition Survey |
| SDC | Sustainable Development Commission |
| SHG | Social Housing Grant |
| SHIFT | Sustainable Homes Index For Tomorrow |
| SUE: | Sustainable Urban Environment |
| TCPA | Town and Country Planning Association |
| TSA | Tenant Services Authority |

| | |
|---|---|
| TSB | Tenant Strategy Board |
| UKCP09 | UK Climate Projections 2009 |
| UNCED | United Nations Commission on Environment and Development |
| UNWCED | United Nations' Wold Commission on Environment and Development |
| UNFCCC | United Nations Framework Convention on Climate Change |
| UKCIP | UK Climate Impacts Programme |
| USGBC | United States Green Building Council |
| WLC | Whole Life Costs |

# PUBLICATIONS

The following peer reviewed conference papers are based upon the research undertaken as part of this thesis and have been published prior to its submission.

Cooper, J. and Jones, K (2008). Routine Maintenance and Sustainability of Existing Social Housing. CIB W70 International Conference, Edinburgh.

> This paper presents the findings of a questionnaire survey examining current social housing maintenance practices and attitudes towards sustainability. Research found that, whilst the stock condition survey is the favoured format for determining maintenance need and economics the basis for priority setting; neither systematically addresses wider sustainability issues; and, whilst cost is a major barrier to more sustainable solutions being adopted, landlords are able and have the desire to improve their practices.

Cooper, J. and Jones, K (2008). Routine Maintenance and Sustainability of Existing Social Housing. COBRA International Conference, Dublin

> This doctoral conference paper reports on the initial findings of interviews with social housing providers and outlines a new performance based multi-criteria maintenance model from which an AHP hierarchy will be presented, integrating the principles of sustainability into maintenance strategies.

Cooper, J. and Jones, K (2009). Measuring Performance In-Use of UK Social Housing. COBRA International Conference, Cape Town

> This paper reports on the development of a set of key performance indicators (KPIs) which will support a new performance based sustainable maintenance model by providing a mechanism which can quantify and measure social, environmental and economic criteria to help social housing organisations define progress towards their strategic sustainability goals.

# Chapter 1

# Introduction

## 1.1 Introduction

This chapter provides a rationale for the study (1.2) and outlines the problem to be investigated (section 1.3); how to systematically integrate sustainable development theory into social housing maintenance practices and why this is considered necessary, including the aims, research questions and objectives (section 1.4) an overview of the approach adopted and methods used (section 1.5) and an outline of the thesis structure (section 1.6).

## 1.2 The Rationale

Since 1987 and the publication of the Brundtland Report, Sustainable development has been recognised as a major global challenge, this agenda is broad, integrating environmental protection, economic growth and social development and is currently dominated by 'Climate Change'. The sustainable impacts of housing (throughout its lifecycle) are significant and whilst much has been done to improve the sustainability of new homes (through the introduction of EcoHomes / Code for Sustainable Homes etc) their contribution to the housing sector is minimal as only approximately 1% per year of existing stock will be replaced with new. Thus it is the existing housing sector which needs tackling if the sustainability agenda is to be addressed and the $CO_2$ targets achieved.

The housing sector consists of the privately owned and occupied (65%), private rent (18%) and social rent (17%). The social rented sector represents the largest professionally managed and maintained housing stock (effectively financed by government) and plays a crucial role in the sustainability agenda and reduction of emissions. However, concerns regarding the quality of social housing were raised in the 1980s when a combination of low management and maintenance allowances resulted in large repair backlogs (DCLG, 2000). By 1996 the repairs backlog had reached £19 billion for England alone (DCLG, 2008b) and whilst this prompted

New Labour to commit to making housing decent by 2010 via The Decent Home Standard (DHS), the DHS wasn't designed to nor did it address the sustainability agenda (nor did it eradicate poor quality housing as there remained approximately 305,000 non-decent properties by the end of 2010).

Managing and maintaining social housing and improving the sustainable performance of that stock is a complex and complicated issue. Through its housing policy the UK government aims to deliver mixed sustainable communities (DCLG, 2006) and as the effective financier of social housing this policy needs to be reflected through social housing policy. Currently social housing maintenance need is determined upon a single attribute condition model. To accommodate the broader physical and in-use performance attributes of the sustainability agenda, a multi attribute maintenance model is needed and with it a new set of key performance indicators. As a result this research sought to develop a new maintenance model based upon the performance of a house in-use rather than on its condition, that provides a transparent and robust system for prioritising maintenance works which integrates social, environmental and economic criteria to improve the overall sustainability of existing housing stock through planned maintenance using the Analytical Hierarchy Process as a mechanism to measure the sustainability of the existing stock and prioritise maintenance action.

### 1.3 The Problem Outlined

Sustainable Development was established as one of the major global challenges facing the planet. Sustainable development was defined as development which "meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland, 1987) and should take account of each phase of a building's life cycle. Sustainable Development became dominated by climate change resulting in the world leading Climate Change Act 2008 which requires the UK's greenhouse gas emissions to be reduced by 80% (based on 1990 levels) by 2050 (discussed in section 2.2.1.1). Agenda 21 was formulated during the United Nations Rio Earth Summit (UN Department of Economic & Social Affairs 1992), to support sustainable development, determined it should be a priority item on the international community's agenda and significantly, highlighted the important role infrastructure maintenance played in achieving the goals of resource efficiency, environmental soundness, social acceptability and sustainable and energy efficiency.

Much had already been done to improve the sustainability of new housing through improved design and construction processes via building regulation standards and the introduction of EcoHomes and its successor, the Code for Sustainable Homes. However, new build contributed marginally to the housing sector, and according to the UK Construction Foresight Panel (dti, 2001), the majority of the UK's built environment that is required over the next 20 years already exists, as only approximately 1% per year of existing stock will be replaced with new. Thus a significant level of refurbishment/maintenance will be required of the existing housing stock if it is to accommodate changing household needs, achieve the broad requirements of sustainable development and if the Climate Change Act 2008 greenhouse emissions targets are to be achieved (discussed further in section 2.2.1.1).

Housing maintenance expenditure represented a significant outlay for landlords (LAs alone planned to spend £4.8 billion on repair, maintenance and improvement works to their managed properties in 2001/2, (Audit Commission 2002)), yet it was still considered a cost burden rather than an investment (discussed further in 2.3.3). This began to change with the introduction of the Decent Home Standard (discussed further in 2.3) which raised the profile of housing maintenance at board level and improved the quality of social housing stock but it did not address, nor attempt to address the sustainability agenda. Social Housing Landlords were aware that responsive maintenance was the most expensive form of maintenance and that they needed to reduce this type of maintenance in favour of planned preventative maintenance. In the past, housing maintenance priorities were set on the basis of what could be afforded rather than on the buildings' needs (Bowles et al, 1997). Thus, reprioritisation of maintenance is needed so that housing maintenance is carried out on the basis of what the building needs, the landlord's budget constraints and which satisfies the requirements for Sustainable Development.

The National Housing Federation acknowledged that Social Housing Landlords were under increasing financial pressure as a result of rent restructuring and increasing procurement costs, constraints which were further acerbated by the Government's 2011 housing strategy 'Laying the Foundations'. At the same time there were repairs backlog in the region of 630,000 repairs (Hay, 2005) to eliminate, 1.4 million dwellings to upgrade to achieve Decent Homes Standard (DEFRA 2005) by 2010 and efficiency savings from management and maintenance of £280 million to be made by 2007/8 (ODPM, 2005). The requirements of the efficiency gains focused on upfront costs and short term gains, the opposite of the long term horizons of sustainable

development and premise of whole life costs upon which sustainable maintenance should be based (discussed further in 2.3.3).

As a result of traditional maintenance decision making social housing maintenance was not producing sustainable buildings. Most maintenance decisions were based upon subjective information regarding the physical condition of a building (stock condition), (O'Dell, 1996, Chapman, 1999) set against economic constraints which take limited account of the requirements of sustainability. Research carried out by El-Haram and Horner (2002) and Olubodun (2001) identified that maintenance cost was significantly influenced by social issues such as the expectations of the tenants and the use of the property, yet such influences were not incorporated into housing maintenance decision making.

In 'A Better Quality of Life' (1999), the UK Government proposed sustainable development to mean "meeting four objectives at the same time, in the UK and the world as a whole; social progress that recognises the world as a whole: for everyone; effective protection of the environment; prudent use of natural resources; maintenance of high and stable levels of economic growth and employment". These definitions reaffirm the popular concept of sustainable development having three dimensions; environmental, economic and social, the triple bottom line, which need to be balanced.

Therefore, to discount from the housing maintenance decision making process concerns regarding social and environmental criteria is contrary to the triple bottom line concept of sustainability and would not take full advantage of an already limited maintenance budget.

This led to the research question;

> 'How can current housing maintenance decision making processes be adapted to address the triple bottom line of sustainable development to improve the sustainability of the existing social housing stock?'

The stakeholders in housing maintenance include the maintenance manager and the financial department of the landlord, the tenant and the Housing Corporation (now the Homes and Communities Agency), all of whom have different interests to be satisfied. An alternative method of setting maintenance priorities is required which satisfies the conflicting interests of

these parties to maintenance (Spedding et al, 1995) and integrates the social, environmental and economic criteria, as well as producing sustainable buildings.

To systematically integrate the triple bottom line of sustainability into maintenance decision making, it was expected that a number of criteria that were excluded from the traditional approach to social housing maintenance would need to be assimilated. At the outset of the research the extent of such criteria was unknown but it was recognised that the traditional single criteria approach to maintenance decision making would be inadequate. Thus the work of Cho, (1991), Kobbaccy, (1995), Labib et al., (1997, 1998), Saaty, (1990), Shen et al., (1997), Bana e Costa et al., (2002), Soebarto et al (2001) and Chen et al (2005, 2006) was reviewed, all of whom contributed to work which examined the use of multi-criteria decision making methods within building and manufacturing maintenance, bid analysis, building performance assessment for assisting the design process, construction planning and energy efficiency of intelligent buildings. However none of the authors examined how multi-criteria decision making methods would be used to prioritise building maintenance by social landlords to improve the ongoing sustainability of its stock.

As a result, it is expected that new sustainable building criteria for existing dwellings will need to be established and that a new approach to assimilating this criteria (multi-criteria assessment) will be required to improve maintenance prioritisations. However, there remains the question of the availability and adequacy of toolkits to assess the sustainability of existing dwellings. At the time of writing there was no standard or universally recognised approach to measuring sustainable development, however there was a broad consensus that new ways of measuring progress were needed to determine if activities and decision-making processes were moving towards or away from the goals of sustainable development. (Hardi et al., 1997; Azapagic and Perdan, 2000, cited in Azapagic and Perdan, 2011). There were a number of building assessment models available for rating individual buildings through to community based developments, at both a local (state) and national level, with the objective of encouraging continuous improvement in sustainability, all be they flawed. The models measured the sustainability of a building in its current state but little work had been carried out to demonstrate how these toolkits could be integrated to inform the improvements needed through routine maintenance and refurbishment to improve the sustainability of existing buildings (discussed further in 2.2.3).

## 1.4 Research Aim, Research Questions and Research Objectives

Thus the ultimate aim of this thesis was to develop a new social housing maintenance model based upon the performance of a house in-use rather than on its condition that provides a transparent and robust system for prioritising maintenance works which integrates social, environmental and economic criteria to improve the overall sustainability of existing housing stock through planned maintenance. The model should be generic in form to provide guidance for all social housing providers yet flexible enough to incorporate the local requirements and interpretations of the sustainability agenda of individual organisations. In order that the aim be achieved, the following research questions first need to be answered.

1. Has the sustainability agenda influenced the way that social housing maintenance is perceived, planned and implemented in England?
2. Are the current practices/toolkits used by maintenance managers conducive to improving the sustainability of the existing social housing stock?
3. What is the range of criteria social housing maintenance managers believe they need to address when assessing the sustainability of their existing social housing?
4. How can these criteria be integrated into a decision making model that is robust and defendable?
5. How can the new model be applied practically?

The following objectives represent the above research questions;

- To investigate the influence the sustainability agenda has had on the way social housing maintenance is perceived, planned and implemented in England.
- To examine current maintenance practices and toolkits to determine if they are conducive to improving the sustainability of existing social housing stock.
- To identify the range of criteria required to assess the level of sustainability of the existing housing stock by social housing maintenance managers.
- To apply the Analytical Hierarchy Process (AHP) to integrate the sustainable performance criteria established above into the maintenance decision making model.
- To populate the theoretical Performance Based Sustainable Social Housing Maintenance Model with Octavia Housing to demonstrate its use in practice.

## 1.5 Research Approach and Research Methods

The research sought to answer the question 'Can performance based decision making be used to integrate sustainability into the Built Asset Management process?' and as such dealt with research within the building management environment and social contexts and ideally from the perspective of professional and (non-professional) housing occupants. The toolkits required by the performance based sustainable social housing maintenance model included subjective and objective measures, themselves consisting of a mix of quantitative and qualitative data and analysis. Thus it stood to reason that the methods used to determine the content of such toolkits and their indicators should include both qualitative and quantitative data collection. Therefore a pragmatist approach was taken to allow the use of various paradigms.

A three stage sequential mixed method research approach was adopted; a questionnaire survey to social housing landlords addressing research questions 1 and 2, interviews with selected social housing landlords (who participated in the phase 1 questionnaires) to address research questions 3 and 4 and a participatory study with Octavia Housing to address research question 5 which consisted of 3 workshops, a tenant telephone survey and AHP pair-wise meeting.

## 1.6 Thesis Structure

This thesis consists of 10 chapters, a reference section and a series of appendices. Chapter 1 above provides an introduction to the research, the remaining chapters are summarised below.

Chapter 2: Literature review

> A through literature review covering sustainability, social housing, social housing maintenance and decision making provides the conceptual background for the thesis establishing that more can be done to improve the sustainability of social housing through routine maintenance.

Chapter 3: Theory

> Introduces the established theory of building performance and maintenance in contrast to the 'performance based sustainable housing maintenance' model which is the proposed solution to the issue of improving the sustainability of existing social housing through routine maintenance. How Analytical Hierarchy Process (AHP) is integrated to ease the decision making process completes the chapter.

Chapter 4: Research Design

Provides details of how the research methodology was developed and the tools used to carry out the research.

Chapter 5: Questionnaire Results

The results of the pilot and large scale questionnaire survey are provided.

Chapter 6: Interview Results

The interview results are provided which focused on establishing the range of criteria that social housing maintenance managers need to address when assessing the sustainability of their existing housing.

Chapter 7: Reflections and Discussion Part 1

Presents a summary of the main findings from the questionnaire survey and interviews and describes how they have contributed to the development of the 'performance based sustainable housing maintenance model' and AHP model.

Chapter 8: Participatory Study Results

This chapter is made up of two parts. Firstly it introduces Octavia Housing, the participatory research partner, provides an overview of their stock portfolio and approach to Building Asset Management (BAM) and takes a critical look at the implications of Octavia's current and proposed approach to BAM to this research. The second part describes the population of the performance based sustainable social housing maintenance model within Octavia Housing and the new set of KPIs developed for measuring the sustainability of Octavia Housing's housing stock. It also presents the sustainable maintenance hierarchy and associated pair-wise decisions.

Chapter 9: Discussion Part 2

Presents the findings from the participatory research as a means of demonstrating how the sustainable social housing maintenance model could be applied in practice and explains how the AHP model could be used to measure the sustainability of the existing stock and prioritise maintenance action.

Chapter 10: Conclusion

This chapter provides a brief summary of the overall key research findings, how they have contributed to knowledge and where further research is needed.

Reference

Provides a list of all references used in the completion of the thesis.

Appendices

This section contains a number of resource documents including the questionnaire and interview templates and responses, workshop slides and agendas and OctaviaHousing's Housing Standard.

# Chapter 2

# Literature Review

## 2.1 Introduction to the Literature Review Chapter

This chapter provides the results of a critical review of relevant literature and positions the research undertaken within the context of the wider academic and professional community. Gaps within current knowledge are identified and propositions are presented of how this research aimed to fill those gaps.

The literature review consists of five sections. The first section is the introduction (2.1). The second section (2.2) looks at the meaning of sustainability; how the sustainable development debate has developed in the UK since the Brundtland report, its relevance to the social housing sector and the process of measuring the sustainability of housing with proposals of how it can be made more relevant to existing social housing stock and social housing maintenance. The third section (2.3) provides an overview of social housing. By looking over the history of social housing, it is possible to comment on how and why the current situation of undersupply, questionable quality and unsustainable homes has arisen and by reviewing current social housing policy and asset management, the role maintenance can play in improving the sustainability of existing housing will start to be formulated. The current approach to social housing maintenance is then critically reviewed (2.4). This is combined with a critical review of the approaches taken to decision making within the social housing sector and beyond, thus the literature review identifies where advances may be made to the current approach to maintaining social homes to integrate the principles of sustainability (2.5). The literature review is summarised in the final section (2.6).

## 2.2 Sustainability

This section explores the meaning of sustainability in general terms and then focuses on its application to the social housing sector. The current level of understanding within the social housing sector of environmental, social and economic sustainability and how this understanding

was applied to the maintenance of existing stock was explored. In doing so it highlights some of the problems faced by landlords as they attempt to interpret and apply the agenda. Hence the necessity to firstly review the development of the sustainability debate, determine its relevance to the social housing sector and critique the tools available to landlords to measure social housing sustainability.

### 2.1.1 Sustainability – what does it mean?

The term sustainability has "over 200 definitions" (Parkin et al 2003), its meaning being dependent upon context (development, agriculture etc.) and the perspective taken (Shearman, 1990) and thus means different things to different people, to such an extent some say the term has lost all meaning and yet others consider it to be one of the greatest long-term challenges we face. The Oxford English Dictionary provides a definition of the word "able to be maintained at a certain rate or level" and Shearman (1990) argues that the other definitions are examples of sustainability rather than definitions and therefore the problem isn't with meaning but with its implication. Martens (2006) points out that sustainable development is complex and multi-dimensional, encompassing "different magnitudes of scale (of time, space and function), multiple balances (dynamics), multiple actors (interests), and multiple failures (systemic faults). Therefore a global definition would include the Brundtland definition for which sustainability means ecological sustainability which addresses global poverty with an emphasis on growth; 'development which meets the needs of the present without compromising the ability of future generations to meet their own needs'. As will be seen, climate change dominates the sustainability agenda and is a result of emissions such as carbon dioxide released through the use of fossil fuels to atmosphere. Such emissions do not recognise and constrain themselves to the countries boundaries from which they were created, they enter the global atmosphere and as such effect the whole planet. The impacts of climate change around the globe are imbalanced as the most developed countries in the world create the majority of emissions (USA emits approximately 25% of the world's GHGs compared to Africa's 5%, Gore, 2006) yet it is the developing countries which suffer the most as a consequence. Therefore, society must address global climate change through global, national and local initiatives.

An example of a national definition is the one produced by the UK Labour Government in their 2005 report 'Securing the Future' for which 5 principles need to be simultaneously addressed if sustainable development is to occur (living within environmental limits, ensuring a strong,

healthy and just society, achieving a sustainable economy, promoting good governance, using sound science responsibly); whilst an example of a local definition would be Octavia Housings approach which is "based on good housing design in an appropriate location. It maximises land use in an urban area, has good access to public transport, local employment opportunities and is in close proximity to shops and other local services" (Octavia Housing, 2013). The three pillars of sustainability is a popular conceptual approach in that economic, environmental and social aspects of sustainability are balanced holistically, however in reality there is a tendency to view these issues separately which means some of the interdependencies are overlooked (Kemp and Martens, 2007). This silo approach can lead to narrow definitions, such that environmentalists may view sustainability as the preservation of the ecosystem.

A criticism of current definitions such as Brundtland or the UK Government 'Securing the Future' is that they provide concepts rather than the practical or operational guidance needed.

Whilst a lack of consistency within the interpretations is seen as a weakness by detractors of sustainable development, Fortune and Hughes (1997) and Robinson (2004) believes this lack of overarching definition benefits the debate rather than detracts from it as it provides the flexibility needed to allow all varieties of actors to interpret the agenda and identify responses that will benefit their specific needs.

Sustainability and sustainable development are often used as synonyms but sustainability is associated with preservation whilst sustainable development places a greater focus on progress (Kemp and Martens, 2007).

#### 2.2.1.1 Climate Change

Whilst sustainable development is a broad agenda integrating environmental, economic and social issues (discussed in greater detail in the following paragraphs), it is currently dominated by 'Climate Change'. Climate is critical to the world we know and live in. Modern buildings, technology, transport, agriculture and other complex infrastructure has allowed human settlements to be located in parts of the world once considered inhospitable. Despite such advances, climate still heavily influences the planning, design, construction and cost of such settlements. In recognition that climate varies over time; "design rules .... and safety standards are developed to cope not just with average climate but also with climatic extremes such as floods and droughts. If the climate changes, human society must adapt by changing its designs,

rules and infrastructure – often at great expense, especially for retrofitting existing infrastructure" (Pittock, 2009). Thus infrastructure is carefully designed to withstand 50, 100 and 1000 year weather events. However, Holdren, 2008 highlighted that the frequency of such extreme weather events is rapidly increasing when referring to the 2003 heatwave event that killed approximately 28,000 people across Europe "The continuation of the heating trend under mid-range climate change scenarios would make the heatwave – which was about one-in-a-100-year event at the time it occurred .... in to a one-in-two-year-event by 2050 ... and will be considered an unusually cool summer [in 2070]".

In 1992 The United Nations Framework Convention on Climate Change accepted that climate change was a serious problem and in 2007 the Intergovernmental Panel on Climate Change (IPCC) concluded that the majority of increases in average global temperature, recoded since the mid-20$^{th}$ century, were likely due to increases in anthropogenic emissions (emissions created by humans mainly through the burning of fossil fuels and forest destruction). Soot particles (may result in local surface warming as they absorb sunlight), sulphate aerosols (may result in local surface cooling by reflecting sunlight away from the earth and influence cloud formation by reducing cloud droplet size (Charlson et al, 1987 and Pittock, 2009)), water vapour (a naturally occurring greenhouse gas) and cloud cover also contribute to climate change. In 2007 scientists announced that carbon dioxide could alter cloud cover over much shorter timescales than originally thought (nerc, 2008). According to ISCCP "clouds modulate the Earth's radiation and water balances" they act as both an amplifier and inhibiter of radiation and thus effect "both sides of the global energy balance equation", whilst precipitation and evaporation produced by cloud cover heat and cool the atmosphere. Clouds and climate exist in a complex feedback loop relationship in that clouds are produced by climate and climate is influenced by clouds (isccp, 2013). The extent to which cloud influences earth's temperature is also determined by the cloud's "height, latitude and droplet size" (Pittock, 2009). Sherwood et al 2014 discuss the spread of equilibrium climate sensitivity estimates in their 2014 paper for Nature stating that it "arises largely from differences in the feedback from low clouds, for reasons not yet understood". However they were able to attribute the mixing of low and middle tropical troposphere clouds to approximately half of the variations in 43 climate models. These observations "imply a climate sensitivity greater than 3°C for a carbon dioxide doubling ... significantly higher than the currently accepted 1.5°C". The implications being that global average temperature has been underestimated and could increase by at least 4°C by 2100 for a doubling of atmospheric $CO_2$, twice the 2°C limit. Climate Change is one facet of the

sustainability agenda but as will be seen plays a crucial role in UK policy. Whilst there is scientific confidence that temperatures will continue to rise in the UK, there is less confidence regarding the associated changing climate variables.

Average global temperatures increased by 0.74°C between 1906 and 2005 (IPCC, 2007). This may appear small but considering the previous deglaciation consisted of approximately 5°C change in temperature over a period of 10,000 years (0.05°C per century rate), then this temperature increase, which reflects a 1.3°C per century increase over the last 50 years, becomes more alarming (Pittock, 2009). Climate Change is the result of the 'Green House Effect'. Incoming short wave solar radiation is bounced back off the earth (and oceans) via long-wave re-radiation. Greenhouse gases (GHG), such as carbon dioxide and methane, trap the re-radiated solar energy and return it earth, subsequently heating it up as GHGs are transparent to the short-wave radiation but not long-wave. In 2011 $CO_2$ accounted for approximately 83% of the UK's anthropogenic GHG emissions (DECC, 2012a) released mainly from the burning of fossil fuels for energy.

Climate Change is serious as even small average global increases in temperature can have catastrophic effects such as, increased sea levels and increased extreme weather events. The 2007 IPCC found that spring events occur two days early per decade affecting agriculture and forestry management. The consequences of such events have huge societal and economic costs. The heat wave of 2003 was the hottest recorded in 500 years; in 2005 the Office of National Statistics confirmed the number of premature deaths across Europe as 28,000 however more recently authors have cited figures in excess of 70,000 (Robine et al, 2008). The flooding event of 2007 resulted in a £3bn repair bill whilst the flood of 2012 cost £1.19bn (BBC, 2013). The effects of climate change will change from area to area and will have positive and negative impacts on the environment, society and economy (Defra, 2009).

The most important GHGs are covered by the Kyoto Protocol and include carbon dioxide ($CO_2$), methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride (unfccc, 2014). Chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) are also powerful greenhouse gases but these are being progressively phased out under the control of the Montreal Protocol (UNEP, 2012)

There are two approaches to limiting the impacts of climate change, mitigation and adaptation. Mitigation aims to reduce GHG emissions through energy efficiency and the use of alternative fuels, whilst adaptation accepts that regardless of the mitigation measures undertaken and the current level of emissions, we are committed to a certain level of (anthropogenic) climate change due to historic emissions and the longevity in which they remain in the atmosphere. The aim of adaptation measures are therefore to " (enhance our capacity to adapt (building adaptive capacity) and minimise, adjust and take advantage of the consequences of climate change ..." (ukcip, n.d). Failure to improve our resilience to the impacts of climate change is expensive, not only did the 2007 floods produce a repair bill of £3bn but cost UK businesses £720 million, approximately £100,000 per business. There is a convincing economic argument for adaptation, estimates suggest that "in the wider European context, every £1 spent on adaptation represents 4 times its value in potential damages avoided" (Defra, 2013).

The UK Governments current approach focuses on the mitigation of the impacts of climate change through public and private housing is to retrofit buildings via the Green Deal. This scheme aims to reduce emissions from homes by the inclusion of insulation (loft and wall), draught-proofing, boiler replacement, double glazing and the installation of renewable technology such as solar thermal (Gov.uk, 2013a), together with ECO, FIT, RHI (which are discussed further in section 2.2.2)

The UK Climate Impacts Programme (UKCIP) has identified a range of impacts likely to affect the UK (Defra, 2009);

- An increase in the risk of flooding and erosion
- Greater pressure on drainage systems
- Water supply shortages
- Increased water demand
- Increased summer cooling demands
- Significant changes in weather paths affecting consumption and transport
- International supply chain effects on imports and exports
- Loss of many important habitats and wildlife
- Summer water shortages and low stream flows
- Increased risk of subsidence (in areas where subsidence is already a problem)
- Increased demand for summer cooling

- Buildings becoming uncomfortably hot
- A range of health issues

A requirement of the Climate Change Act 2008 is to undertake a UK-wide climate change risk assessment (CCRA) every five years to identify the risks and opportunities of climate change for each sector of the economy. Defra's 2012 CCRA (the inaugural report) concluded that "higher temperatures and changing rainfall patterns" will be the biggest challenges for buildings which will "be affected by both extreme weather events and long-term gradual change in climate." The risks identified included, 'damage to property due to flooding and coastal erosion' (flooding is the most significant short term risk), overheating, 'increasing impact from the Urban Island effect' and subsidence (increasing in significance over the medium term – mid-century). The CCRA was unable to identify any opportunities for the housing sector. The CCRA is informed by the UK Climate Change Projections (UKCP09) and as such takes into account "a range of potential changes in climate" due to uncertainty regarding future climate. Uncertainty over when opportunities and risks related to climate change will occur or how they will change over time creates a degree of complexity when implementing policy and at a local housing level, difficulty planning and implementing cost effective mitigation and adaptation works. The CCRA subsequently informs the National Adaptation Programme (NAP) which develops policy, objectives and proposals to address the risks identified (Defra, 2012).

2.2.1.2 The Cost of Climate Change

In 2006 the Stern Report highlighted the problems associated with determining the consequences of climate change with any certainty due to the long-time horizons involved and its global nature. The cost of achieving the deep cuts in emissions necessary to stabilise at 500-550ppm $CO_2e$ was expected to be in the region of 2-3% of global GDP per year by 2050. Without such cuts Stern believed there was a 75% chance that average global temperatures would reach 2-3°C by 2050 with uncontrolled climate change costing the equivalent 20% global GDP. So whilst this is a significant commitment, the cost of doing nothing is far greater and "would put stabilisation even at 550ppm $CO_2e$ beyond reach – and this level is already associated with significant risks" (Stern, 2006). In order to get a true measure of the cost of climate change, the cost of mitigation measures must be reviewed against the cost of potential climate change damage, those items not normally given a monetary value such as damage to human health, damage to the environment, irreversible changes. Such items have typically been overlooked in the past. The IPCC2007

report followed the Stern report with estimates of 5.5% global average GDP by 2050 to stabilise GHG emissions at 445ppm. The focus on mitigation measures to reduce emissions and adaptation measures to deal with the unavoidable impacts of climate change are equally as important but the importance of adaptation has been underplayed in a number of countries (including the UK). Mitigation and adaptation measures should be considered as investments. At the time of publication the Stern report received criticism for the choice of (low) discount rates and (high) impact estimates, however these decisions have generally been supported by later analysis including the IPCC 2007 report (Pittock, 2009). Lord Stern stated at the World Economic Forum in Davos, that he had underestimated the risks. "The planet and the atmosphere seem to be absorbing less carbon than we expected, and emissions are rising pretty strongly", he now expects global average temperature to be in the region of four degrees and stated that had he realised he "would have been much more strong about the risks of a four or five degree rise" (Stewart and Elliot, 2013).

Social Housing adaptation strategies seek to understand the level of vulnerability of homes and residents to these (changing) impacts and to implement resilience works to homes through asset management planning and risk management. However climate change is a long-term issue, the current UKCP09 "give probabilistic projections of climate change up to the end of the present century over both land and sea for 3 greenhouse gas emissions scenarios" (Defra, 2009). The longevity and uncertainty of impacts can complicate the development of adaptation strategies. To reduce the impact of uncertainty any long-term adaptation strategy must remain flexible to "incorporate new knowledge and information" as it becomes available in the future. Of particular importance to social housing landlords currently is the impact on homes and residents of flooding and overheating due to the cost to life and building repair (as demonstrated above). There is undoubtedly an economic impact of developing and implementing adaptation strategies (although effective asset management can limit this) but there are also a number of benefits, amongst which are the cost benefits of reduced damage to building assets where flood resistance measures have been implemented and health benefits resulting from flood defence work which reduces the risk of contaminated water (Defra, 2009).

2.2.1.3 Defining Sustainability Development: Global Perspective

The term sustainable development came to prominence in 1987 when the United Nations' Wold Commission on Environment and Development (UNWCED) published the report 'Our Common Future' (also known as the Brundtland report) which defined it as 'development which meets the

needs of the present without compromising the ability of future generations to meet their own needs'. The term sustainability is not new and can be traced back to the 12th century in relation to finding a balance between consumption and reproduction of forestry, however in its modern concept it was first used by the Club of Rome in 1972 in the 'Limits to Growth' report. This concept emerged from the post-war environmental movement to bring together social, environmental and economic issues in recognition of the detrimental impact human growth and development was having on the environment and communities. UNWCED's conception of sustainable development was a global approach, harnessing technology and social organisation for a new era in economic growth (UNWCED, 1987). Sustainable Development according to the Brundtland report requires the three pillars or dimensions of sustainable development or triple bottom line (economic growth, social inclusion and environmental balance) to be balanced, or in other words enhancing economic growth, social progress and environmental protection (IPD, 2010). Unfortunately there appears to be the misconception that there is a decision to be made between a healthy planet or a healthy economy when in fact it is possible to have both. There is also a tendency to focus on the negative aspects of sustainability when there are a number of benefits.

The Rio UNCED conference followed in 1992 which saw commitments from governments from around the world to sustainable development with the first attempts to develop strategies for a more sustainable pattern of development. The Framework Convention on Climate Change (UN, 1992) (acceptance that climate change was a serious problem, industrialised countries had to take a lead and that $CO_2$ emissions needed stabilising, albeit with no binding targets) was signed at this summit and Agenda 21 (a guide to sustainable development for the 21st century), was introduced (a voluntarily implemented sustainable development action plan for implementation from the global to local level for the UN and other multilateral organisations for execution at local, national and global levels).

The binding targets for greenhouse gas emissions sought during the Rio summit were finally agreed at the Kyoto meeting in 1997, committing industrialised countries to a reduction of annual greenhouse gas emissions of at least 5% on 1990 level for the period 2009 - 2012 as a means of stabilising "greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system" (UN, 1998).

At the 2007 G8 summit in Heilegendamm it was agreed via a non-binding communiqué that G8 nations would "aim to at least halve global $CO_2$ emissions by 2050" (IPD, 2010).

Also in 2007 the UNFCCC in Vienna reassessed the most effective approach to tackling climate change and determined that "the response needed was global, with the involvement of all countries and that it needs to give equal importance to adaptation and mitigation .....[and] that energy efficiency can achieve real emission reductions at low cost" (UN, 2007). Despite the successor to the Kyoto Protocol dominating the 2007 UNFCCC conference in Bali and again in the 2008 UNFCCC conference in Poznań it wasn't until the 2009 UNFCCC conference in Copenhagen that agreement was reached that climate change was one of the greatest challenges the world faced and that global average temperature increases should be kept below 2°C. The Copenhagen Accord wasn't legally binding, didn't include commitments to reduce $CO_2$ emissions and wasn't unanimously passed by all countries participating in the debate (UNFCC, 2009), however by the following year DECC reported that over 70 countries (representing approximately 80% of global emissions) had "registered targets or actions to limit their greenhouse gas emission" (DECC 2010). The 2012 Doha climate summit secured a second period of international emissions cuts under the Kyoto Protocol from 2013 to 2020. This was important in terms of providing continuity (especially for the accounting system) but what it's actual impact on emissions will be by 2020 is less certain as the number of countries with emission reduction commitments is small (UNFCCC, 2012).

The 2005 World Summit Outcome Document reaffirmed the importance of integrating the "three components of sustainable development – economic development, social development and environmental protection – as interdependent and mutually reinforcing pillars" (UN, 2005).

Lutzkendorf and Lorenz (2005) asked "what is sustainable development" and presented Rydin's (2003) argument that there are two approaches, the 'triple bottom line' approach where economic, social, environmental aspects are equally balanced, represented by three overlapping circles to demonstrate the interdependent nature of the three issues (Parkin et al, 2003) as the three issues cannot be considered in isolation as they each influence the other (Figure 2.1), and the 'nested model of sustainability' where the environment is the dominant issue (Figure 2.2). In 2001 the Australian researcher and activist Jon Hawkes (2001) suggested there should be a fourth pillar of sustainability to highlight the essential role culture plays in public planning. There are others that support four equally balanced pillars of sustainability; improving quality of

life and well-being; meeting the needs of present and future generations, justice and equity in terms of recognition, whilst living within the limits of supporting ecosystems (Schlosber, 1999 and Agyeman, 2005), also known as 'One Planet Living'. WWF and Bioregional have developed the concept of one planet living and established a framework of 10 principles (zero carbon, zero waste, sustainable transport, sustainable materials, local and sustainable food, sustainable water, land use and wildlife, culture and community, equity and local economy and health and happiness) to help people understand the sustainability challenges "and develop action plans to live and work within a fair share of the earth's resources" (oneplanetliving, 2008). The sustainable development agenda is a complex one and its meaning will depend upon local context and be influenced by personal and organisational agenda. Hasna (who also supported the triple bottom line approach) stated that the process of achieving sustainable development is an evolving process, the end point of which isn't fixed but is instead a wishful set of characteristics of a future system (Hasna, 2007).

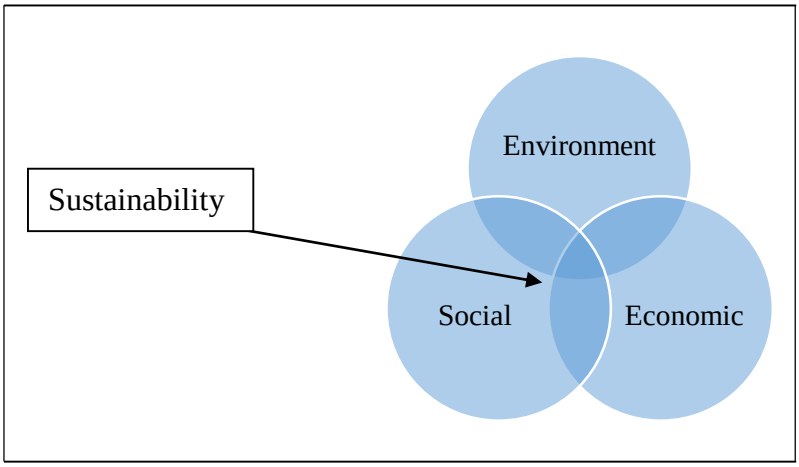



**Figure 2.1 Sustainable Development**

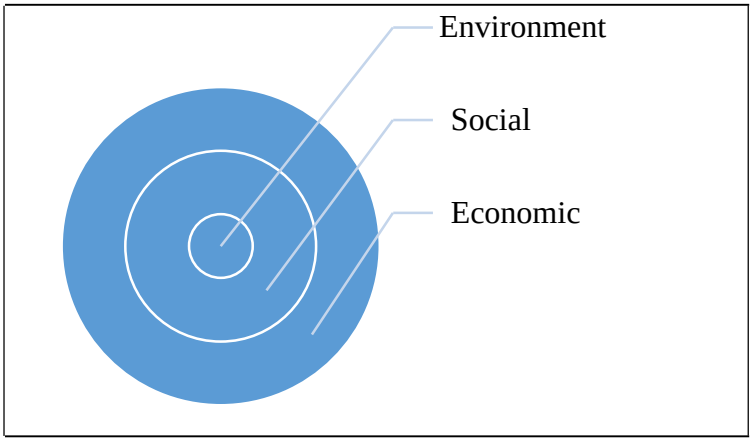



**Figure 2.2 Nested Model of Sustainability (from Lützkendorf and Lorenz, 2005)**

Countries around the world are using a mix of regulation and market forces (carbon pricing, renewable energy targets and investment) to tackle climate change, as summarised in Table 2.1. Australia's approach has been to set renewable energy targets and rely on market forces via carbon pricing and investment to achieve those targets. Whilst Table 2.1 includes the USA, the federal government's approach to addressing climate change does not necessarily reflect the state level approach. Individual US state governments were progressing with policies to reduce climate change with greater success. California was leading the way taking a combined mitigation and adaptation approach which included a cap and trade scheme aimed at reducing GHG emissions to 1990 levels by 2020 and 80% reduction on 1990 levels by 2050 (rtcc, 2013a). There was also a private sector carbon market such as the Chicago Climate Exchange (CCX). CCX was established in 2003 as a voluntary GHG cap and trade programme with an offset component. Participants such as major corporations, utilities and financial institutions committed to legally-binding annual GHG reduction targets. The scheme collapsed in 2011 following an inundation of credits from offset projects which plummeted the price per carbon unit to 5 cents. Its sister institute (Chicago Climate Futures Exchange) then took over (Gronewold, 2011) until February 2012 when it too folded (ccfe, 2012). The EU uses the full range of approaches to tackle climate change. China has been the biggest emitter of GHG linked to climate change (although on a per capita basis, emissions were more in line with those produced by India and Africa (Gore 2006) but in 2013 it reported its plans to reduce GHG emissions per unit of economic output by 40-45% before 2020 and to learn lessons from developed countries that have implemented emission trading schemes. China is at the start of its journey and intends to implement climate change plans into law in the coming years. It aspires to achieve 20% renewable energy by 2020 but with infrastructure connectivity to renewable energy sources continuing throughout 2013 and constantly increasing energy demands ($CO_2$ emissions have increased by 7.5% annually since 2005) it is unclear if this target will be met. (Bloomberg, 2013 and rtcc, 2013b)

**Table 2.1 Global Approach to Climate Change**

| Country | Regulation | Market Forces | | |
|---|---|---|---|---|
| | | **Carbon Pricing** | **Renewable Energy Targets** | **Investment** |
| **Australia** | Renewable Energy Act 2000<br>Renewable Energy Regulations 2001<br>Clean Energy Bill 2011 | | 20% by 2020<br>FIT | $10 billion |
| **USA** | Clean Air Act (for GHG) only Partial<br>Pledge to reduce emissions by 17% on 2005 levels by 2020, not ratified | Pilot Schemes due 2014 | Double wind and solar electricity by 2020 (on current level) | Increase current funding by 30% |
| **EU** | EU Emissions Trading Scheme<br>Renewable Energy Directive<br>Energy Efficiency Directive (2012)<br>Energy Performance of Buildings Directive (EPBD) | EU ETS | 20% by 2020 | 5 EU ESI Funds Horizon 2020 (adaptation)<br>LIFE (mitigation) |
| **UK** | Climate Change Act 2008<br>Green Deal<br>Energy Performance Certificates (EPBD) | | 80% by 2050 | £12 million |
| **China** | Ratified Kyoto Protocol as a non-Annex I country | Pilot Schemes due 2014 | 15% by 2020 | US$294 billion to 2015 |

2.2.1.4 Defining Sustainable Development: UK Perspective

The UNCED Rio Conference in 1992 led to UK government's first national strategy in 1994 and the subsequent proposal for the delivery of sustainable development in 1999 in 'A Better Quality of Life' (Defra, 1999), which identified sustainable development as meeting the four objectives below in the UK and the world as a whole;

- Social progress that recognises the needs of everyone
- Effective protection of the environment
- Prudent use of natural resources
- Maintenance of high and stable levels of economic growth and employment

This delivery proposal also provided headline indicators against which sustainable development within the UK would be measured on an annual basis and provided the national and regional focus from which the 'Local Agenda 21' strategies could be formulated. From a building centric perspective, UK priorities included; providing better places to live and work and improving energy efficiency.

Following the 2007 G8 summit the UK Government became the first (and so far only) government to "introduce a long-term, legally binding framework to tackle climate change" (Committee on Climate Change, n.d). Under The Climate Change Act, $CO_2$ emissions are to be reduced by at least 80% on 1990 levels by 2050 (and subsequent 450ppm $CO_2e$ target by 2050 with approximate 50% chance of preventing the 2°C threshold), although some say the cuts should be much deeper and more representative of 100% reductions.

The current UK sustainable development strategy (and measures) is provided by the Coalition Governments' 2011 'Mainstreaming Sustainable Development' which builds upon the principles of New Labours 2005 'Securing the Future' UK sustainable development strategy. The 2005 strategy provided a framework up to 2020 consisting of five principles which must be incorporated into a policy for it to be sustainable, as detailed in Table 2.2 (Defra, 2005).

**Table 2.2 New Labour government sustainable development (Defra, 2005)**

| **Principles** | **Priorities** |
|---|---|
| • Living within environmental limits<br>• Ensuring a strong, healthy & just society achieving a sustainable economy<br>• Using sound science responsibly<br>• Promoting good governance | • Sustainable production and consumption<br>• Climate change and energy<br>• Natural resource protection and enhancement<br>• Sustainable communities |
| Behavioural Change | |

The coalition too, accepts the Brundtland definition of Sustainable Development in that our current development decisions must account for social wellbeing, environmental protection and economic growth without impeding future generations to do the same. However, as a result of the recession the Coalition's strategy appears to focus more strongly on stimulating economic growth, with social wellbeing and environmental protection playing supporting roles despite their rhetoric "that growing the economy and improving the environment can be mutually supportive" (Defra, 2011). The positive aspect of this policy is the emphasis placed on

mainstreaming sustainable development so that it's a core strategic issue rather than 'an extra over'. This is an important message, especially to social landlords who have many targets to achieve within financial constraints. Thus the 2005 strategy provides the principles and priorities for sustainable development whilst the Coalition's vision provides the principle of a systematic approach to incorporating sustainable development into policy, the running of government buildings and procurement decision making (the internal application). As a result of all government departments considering "the potential impacts and opportunities for driving improvements across the economy, environment and society .." a number of policies have been published from a variety of departments which show the breadth of issues incorporated into sustainable development, including;

- Promoting sustainable transport through the bus network – Department for Transport (DfT)
- The Green Deal, Community Energy Savings Programme, Warm Home Discount – Department of Energy and Climate Change (DECC)
- The Green Investment Bank – Department for Business, Innovation and Skills (BIS)
- National Planning Policy Framework – Department for Communities and Local Government (DCLG)
- Broadband for All – Department for Culture, Media and Sports (DCMS)
- Be Food Smart – Department for Health (DH)

The 2005 policy, for the first time, recognised that sustainable development was not possible without long-term changes in peoples' behaviour. In the past, government has relied upon economic incentives to change business behaviour and publicity campaigns to change individuals' behaviour but neither approach was successful in creating lasting change. Consequently the 2005 approach to policy implementation developed one that would evolve over time as attitudes and behaviours changed. The behaviour change model aimed to; ENABLE people by making it easy for individuals, communities, private and public sector to make more responsible choices; it would ENCOURAGE (and sometimes enforce) behaviour change through peer and market forces; ENGAGE people to co-produce policy and take responsibility for their actions; and EXEMPLIFY by leading by example (Defra, 2005). The 2011 vision focused on leading by example (Defra 2011).

The Housing Corporation published its own 'Sustainable Development Strategy and Action Plan' in 2003 as a means of assisting the social housing sector to significantly contribute to the development of sustainable communities. Through this strategy social housing landlords were encouraged to address sustainable development issues through their policies, strategies and actions for each of their key business areas; development of new homes, maintenance of existing homes and supporting and enhancing communities, as shown in Figure 2.3 (Wilson et al, 2007).

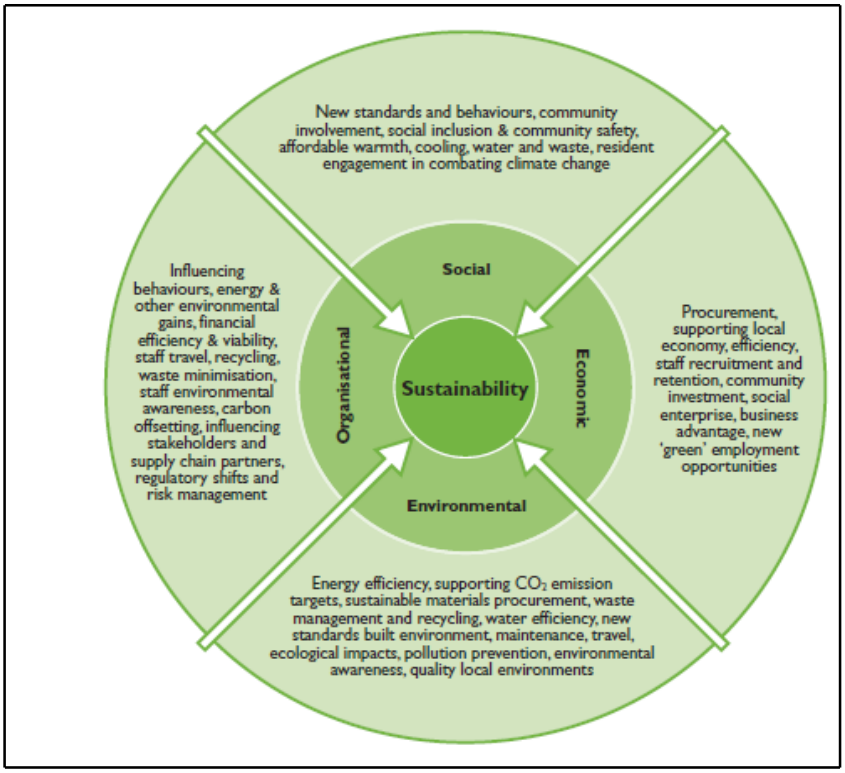



**Figure 2.3 Sustainable Development and Social Housing Providers (Wilson et al 2007)**

Sustainable Homes ltd were commissioned by the Housing Corporation to determine the extent to which RSLs had implemented sustainability strategies and action plans. This survey (representing 3% of RSLs in 2006) found that 83% of the responding RSLs had implemented such a strategy and action plan, the majority of which were post 2003 indicating the strong influence of the Housing Corporation. The report associated with the findings of this survey determined that "For housing associations to consider sustainable development, a clear understanding of their purpose as a social housing provider, their organisational goals and aspirations and external stakeholders, expectations are required. Principles of sustainability should be integrated into the corporate objectives of the organisation." (Wilson et al, 2007)

2.2.1.5 Implications for Research

The discussion thus far has illustrated that climate change is dominating the sustainability agenda, the consequences of which no-one can predict with any certainty. So whilst the threat and the desired end goal is understood and accepted by the majority, it appears there is less agreement regarding the route required to achieve that goal. Energy reduction is key (mitigation, adaptation) but there is still a lack of global agreement on targets, timeline, consequences, but even when there is agreement (at national level – UK) there still lacks a joined up focus.

There are various definitions of 'Sustainable Development' and a number of models have been presented, the crucial element for the social housing sector then is to agree their own interpretation of the sustainability agenda and apply it to their unique circumstance.

### 2.2.2 Sustainable Development and Social Housing

As discussed in section 2.2.1, the consumption of energy from fossil fuel is a major contributor to climate change and as shown in Figure 2.4, the housing sector is the second largest contributing sector, responsible for 31% of the UK's total $CO_2$ emissions (DECC, 2010).

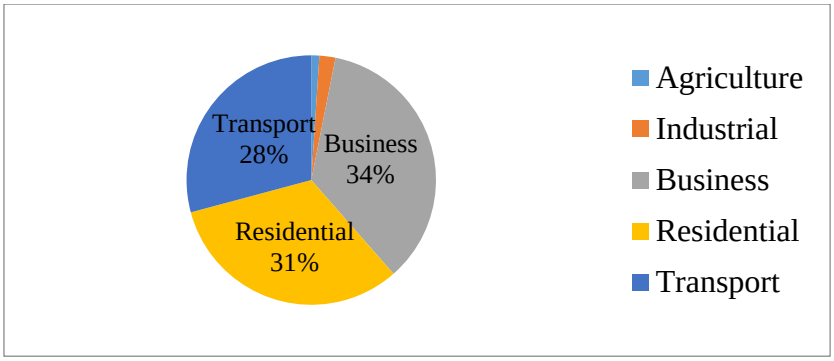



**Figure 2.4 2010 UK $CO_2$ Emissions Estimate by End User ($MtCO_2$) (DECC, 2010)**

According to the English Housing Survey Headline Report 2012 – 2013 (DCLG, 2014) there were 22.0 million dwellings in England, 14.3 million (65%) were owner occupied, 4 million (18% and an increase of 2 million from 1996) were rented from private landlords and 3.7 million (17%) were rented from social landlords (of which 2.0 million dwelling were owned by RSLs and 1.7 million dwellings were owned LAs). New build rates were at their lowest since the 1920's (Holmans, 2013) with expectations that two thirds of the housing stock in 2050 had

already been constructed (DCLG, 2008a), thus if the emissions target is to be achieved; the existing housing stock must be addressed. Although the social housing sector represents only 17% of the total housing stock in England it plays a crucial role in the sustainability agenda and reduction of emissions as it represents the largest professionally managed and maintained housing stock and with the Government as its effective financier it is used to drive through Government housing policies. The Select Committee on Existing Housing and Climate Change acknowledged the important role existing housing plays in the reduction of greenhouse gas emissions in their 7th report of session 2007-08 to the House of Commons "a significant contribution to the overall reduction [in carbon emissions] is required from housing", and that "substantial gains can and need to be made from actions to reduce the emissions that result from our heating, out lighting, our water use and the way we manage our homes" (DCLG, 2008a).

Figure 2.5 identifies that the majority of household energy is spent making occupants comfortable as 60% is spent on space heating and 18% is spent on water heating, of which 65% of that energy is provided via natural gas and 25% via electricity (although this figure does include electricity generated from renewable sources) (DECC, 2012b). The EPSRC / E.ON funded research project 'Carbon, Control and Comfort' (CCC) found that, to a large extent comfort in the home meant warmth to the participating social housing tenants (by 2003 homes were heated to an average 18°C, an increase of 6°C since 1970 and the "energy efficiency measures taken since 1970 have halved what UK domestic energy demand would otherwise be" (DCLG, 2008a). "Occupants' comfort practices (predominantly thermal comfort) as realised through their use of the building technologies (heating system, lighting, mechanical ventilation etc.), fabric (doors, windows, etc.) furnishing (curtains, floor coverings, etc.) and clothing and have an enormous effect on energy use ..." (Cooper et al, 2012). The participating tenants' view of what comfort means is shown in Figure 2.6, which not only emphasises the importance of providing warm homes but also shows a discrepancy between the lay persons understanding of comfort and the standard comfort dimensions used by building services designers of thermal, air quality, visual, acoustic, ergonomic, and psychological comfort (ASHRAE, 2013 and CIBSE, 2013).

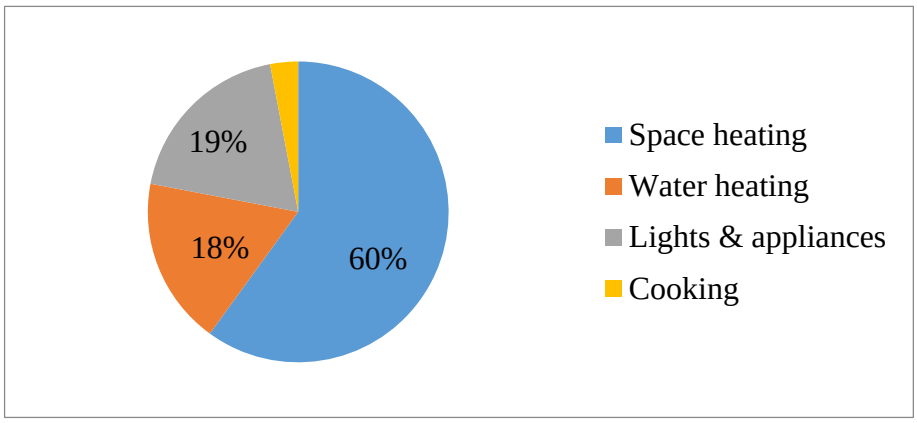



**Figure 2.5 Household Energy Consumption (DECC, 2012b)**

The amount of energy used to create a warm 'comfortable' environment will depend on the homes' occupant, building fabric (how well it retains heat, or not) and the buildings services (how efficient the heating system is). Of course the emphasis to date has focussed on providing warmth as a means of creating comfort and for the tenants participating in CCC project the provision of cooling was not a comfort priority, although with climate change projections and overheating the ability to provide cooling is expected to become an increasingly important issue.

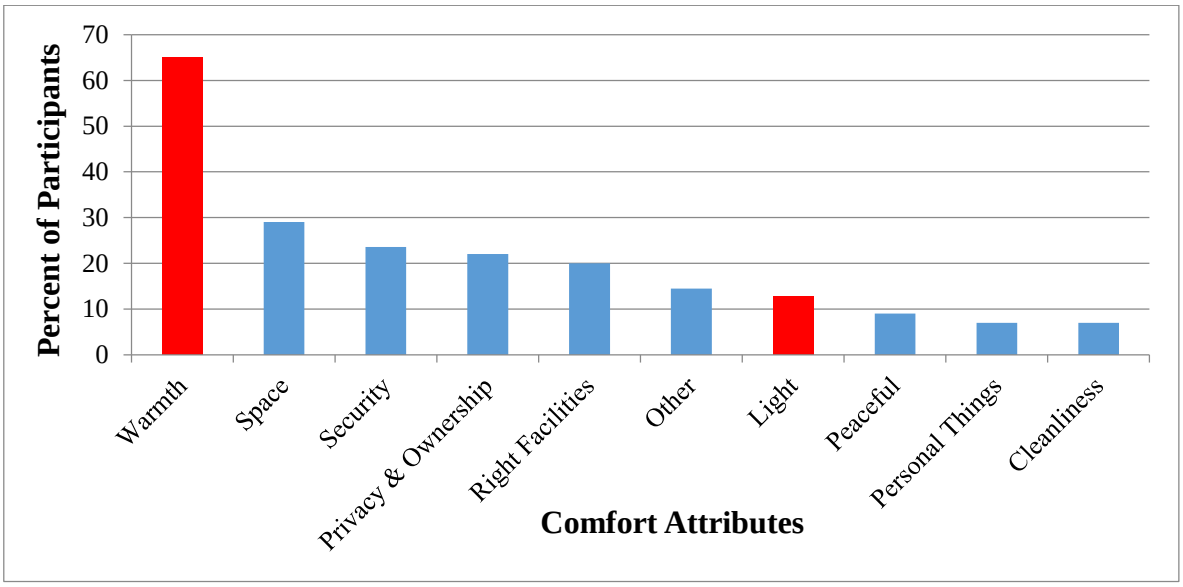



**Figure 2.6 Comfort Attributes of Social Housing Tenants (Cooper et al, 2012)**

The following paragraphs look at the role of the occupant, building fabric and building technology in relation to energy consumption.

The occupant's lifestyle and patterns of activity play a critical role in household energy consumption as energy use in identical homes can vary by over 250% (NHF, 2010), with similar variance in water consumption, material use and waste production. So the way buildings are occupied can determine whether a home is sustainable or unsustainable. This had not been articulated in Government policy until the 'Securing the Future' sustainable development framework (Defra, 2005) which recognised the importance of people's lifestyles on carbon emissions. In the context of the built environment this forced those responsible for developing and managing buildings to examine the impact that their buildings have on the environment and develop policy and strategies to reduce that impact over time.

The home loses heat in three ways, heat loss through the building fabric (proportions of heat loss (Figure 2.7a) from a typical house are 10% through the roof, 25% walls, 10% floor and 25% glazing), infiltration (draughts, cracks, Figure 2.7b) and ventilation (fresh air brought in to replace stale air, Figure 2.7c) which together can account for 30% heat loss (Borer and Harris, 1998). The energy performance of the dwelling therefore can be improved by addressing heat loss through insulation, ventilation by installing efficient or passive forms of ventilation and infiltration by improving its air tightness through draught exclusion.

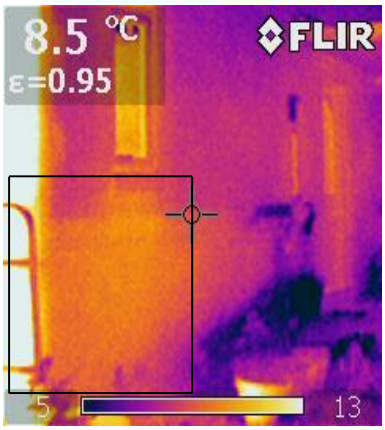



**Figure 2.7a Fabric Loss (Cooper et al, 2012)**

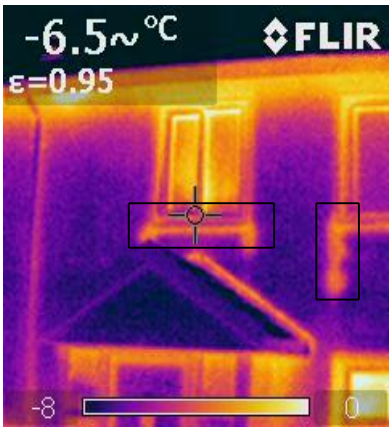



**Figure 2.7b Infiltration Loss**

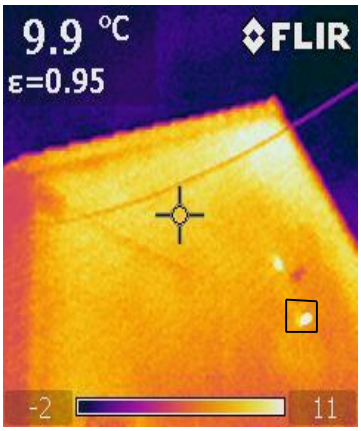



**Figure 2.7c Ventilation Loss**

Technology used within the home covers a wide range of items including building services, such as the central heating system (90% of all social homes have central heating (DCLG 2013)), kitchen appliances, such as the kettle, entertainment appliances, such as the TV, health and wellbeing appliances such as electric toothbrushes and DIY appliances such as an electric drill (which could also include gardening appliances such as the lawn mower). More appliances than

ever before are being bought and whilst the efficiency of most appliances is constantly being improved, the number of each such appliance per household is on the rise. "The amount of energy used by appliances has increased by 9% since 1990 [to 2000], …" (BERR, 2000). Figure 2.8 shows the increase of households owning a variety of appliance in 2011 in comparison to 1970. What Figure 2.8 doesn't show is the number of each appliance owned by households, for example the CCC project found that 15% of participants had 2 or more TVs.

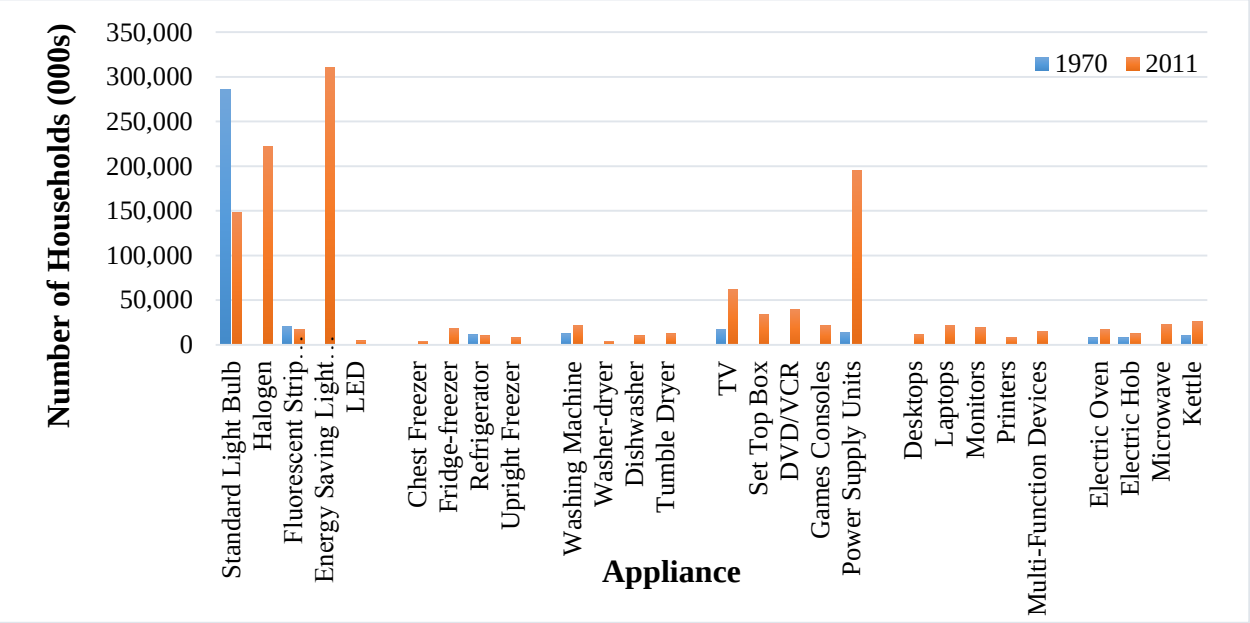



**Figure 2.8 Number of Households Owning Appliances (DECC, 2012c)**

With this in mind an effective approach to improving the energy performance of a dwelling is to consider the energy hierarchy (Figure 2.9) which is a holistic method encompassing all aspects of the dwelling fabric, technology and occupants.

The first priority is to reduce the need for energy; with existing buildings this would include making improvements to the building fabric through the addition of insulation, draught proofing and repairing cracks to reduce heat loss as described above. This approach is also known as the 'fabric first approach' and is endorsed by the BRE (BRE, 2013a). The second priority is to use energy more efficiently and would include replacing old appliances with more efficient new appliances and occupant behaviour activities such as turning appliances off instead of using standby. The third priority is the use of renewable technologies such as solar thermal or photovoltaics to provide hot water and electricity. As these technologies are expensive to install it makes sense to reduce the household's energy demand as much as possible to improve their

affordability. The fourth priority is to use any resultant fossil fuel from clean and efficient sources. It will be many years before the UK is able to rely solely on renewable forms of energy so in the meantime energy production from finite fossil fuels should employ more efficient and less damaging fossil fuel processes such as carbon capture and storage. The Institute of Mechanical Engineers endorses this approach and includes a fifth priority which is the further exploitation of fossil fuels in recognition of our dependence upon them for all human activities (imeche, 2003).

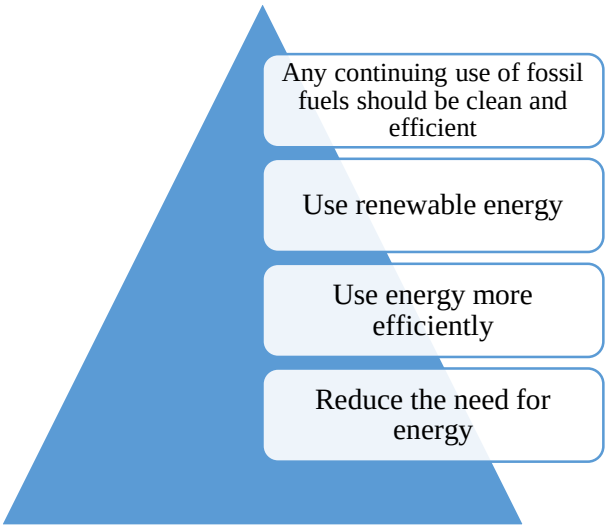



**Figure 2.9 The Energy Hierarchy**

The above paragraphs have focussed on the sustainability effects of the home in-use (operational phase of a building), mainly energy consumption, however a building goes through a number of stages throughout its lifecycle, all of which have an impact on sustainability and which in turn impacts the building lifecycle. In basic terms these phases include planning and design, construction, operation, maintenance and refurbishment and demolition and each of these phases consume; materials (raw and recycled); energy (e.g. transporting and production of materials); water and produce waste and pollution. The planning phase has additional environmental impacts of (potential further) urbanisation (and urban spread); loss of Greenfield land and additional car use may be encouraged through the location of new developments. Two popular approaches to assessing the life cycle of a building (products and elements) are, life cycle costing (LCC), "... are those [costs] associated directly with constructing and operating the building" (Wilmot Dixon, undated) and is useful for comparing projects with the same performance requirements but with different initial and operating costs. The other is Life Cycle Analysis (LCA) which is a cradle to grave assessment of the environmental impact of a product or service.

Building maintenance is an important building lifecycle phase and Section 2.4 looks at housing maintenance in greater detail, however in brief, periodic maintenance is required throughout the operational phase to bring the building capacity back to its original (physical) condition. To go beyond this requires building refurbishment which can undertake work to improve the building's original condition and meet changing functional demands through improvement and modernisation. However maintenance and refurbishment cannot keep pace with changing user expectations and demands on the building and thus an obsolescence gap is created between the existing building condition and the desired performance. Thomsen and van der Flier (2011) broadly define building obsolescence as "the process of declining performance resulting in the end of service life." The obsolescence gap is a function of maintenance, technical and functional gaps, the maintenance gap occurs only once the building is in-use, whereas the technical and functional gaps may occur prior to occupation due to the time between inception and occupation and maybe internally or externally driven (Finch, 1996). Mansfield (2009) believes "obsolescence is unpredictable, can be more generalised and may be impossible to address" as it comprises the physical structure, the property's site and surrounding area, the regulatory framework and building aesthetics. The author would argue that obsolescence goes even further and includes occupant behaviour and expectation and climate change, supported in part by Thomsen and van der Flier (2011) in the conceptual model of obsolescence as shown in Figure 2.10.

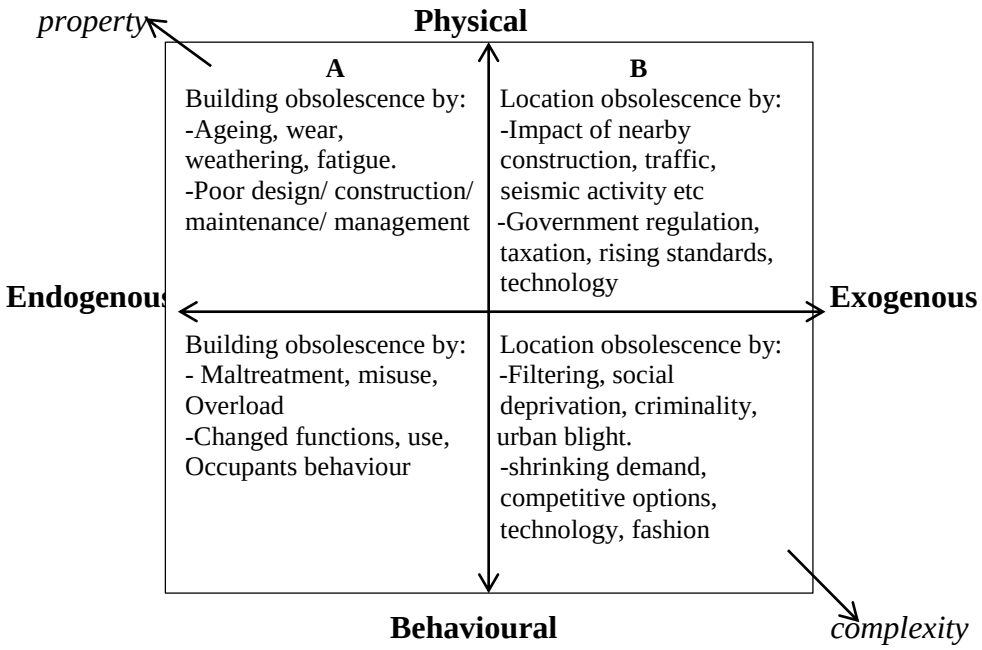



**Figure 2.10 Conceptual Model of Obsolescence (Thomsen and van der Flier, 2011)**

Figure 2.11 indicates that the sustainability agenda may result in a shortening of the maintenance and refurbishment cycles, for example extreme weather events such as storms will increase roof repairs and increasing summer temperatures will increase the need for summer cooling.

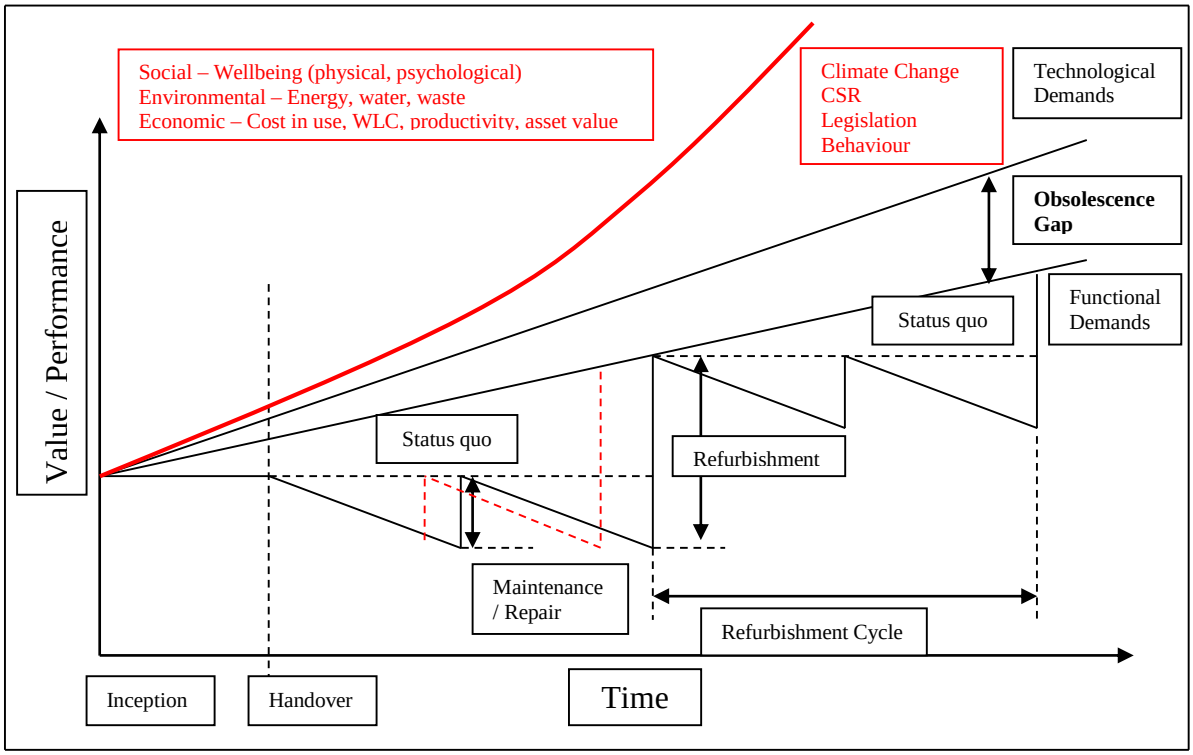



**Figure 2.11 Model of the Maintenance-Refurbishment Life Cycle**

(Source: Jones, 2013 adapted from Finch 1994)

There are positive and negative impacts of housing on society as we spend approximately 90% of our time in one form of building or another (BRE, 2011a). The (poor) physical environment of the home can have a negative impact on the occupants' health and wellbeing, the Social Care Institute for Excellence found a link between "visible damp or mould and the prevalence of asthma or respiratory problems among children .... poor quality housing can have an adverse effect on children's psychological well-being, parents and children both complain of the social stigma of living in bad housing .." (scie, 2005). Shelter (2005) found overcrowding to have a negative impact on a child's education, development and physical and mental health. However house building, refurbishment and maintenance contribute significantly to the UK economy. In 2012, construction industry output represented 7% of GDP (Cohen, 2013), which in November 2012 represented £5,429 million in new work and £3,005 million in repair and maintenance (non-seasonally adjusted) (ONS, 2013).

There are a number of policies affecting domestic energy efficiency of UK buildings, including;

- the 1997 Kyoto protocol;
- EU Energy Performance of Buildings Directive (EPBD) 2010 which requires all member states to achieve a minimum energy performance target for buildings. There are four main aspects to this policy in that; a methodology for calculating the energy performance of a building must be established (SAP 2009 for domestic buildings); Minimum energy performance requirements set (this applies to new build and major refurbishment through Building Control Approved Document Part L and the completion of a feasibility study to review the potential of renewable technologies prior to new construction); provision of energy performance certificates at point of sale, rent and construction; and inspection of boilers and air-conditioning (Gov.uk, 2013b).
    - SAP is the Government's Standard Assessment Procedure for Energy Rating of Dwellings which was extended to become EPBD compliant in 2005 and revised again in 2009. SAP is central to demonstrating Part L compliance and the provision of the Energy Performance Certificates. "The indicators of the energy performance are energy consumption per unit floor area, an energy cost rating (the SAP rating), an Environmental Impact (EI) rating based on $CO_2$ emissions (the EI rating) and a Dwelling $CO_2$ Emission Rate (DER)" (BRE, 2009) on a scale of 1 to 100, with 100 indicating zero energy cost. SAP ratings beyond 100 are possible and indicates a dwelling is a net exporter of energy. The SAP methodology incorporates a standard occupancy and usage pattern but this is not suitable for design purposes and does not reflect reality, as occupancy behaviour varies substantially between dwellings even of similar design as already discussed. It is a compliance tool rather than a design tool for efficient, low energy dwellings based on standardisation (RIBA, 2009). Thus whilst SAP is customarily used by Government, developers and landlords as a proxy for the energy performance of new and (RdSAP for) existing dwellings, it's actually a poor in-use performance indicator.
- and the Climate Change Act 2008. DECC has suggested that housing achieves emission reductions as close to 100% as possible rather than the 80% prescribed, this superseded the recommendations made by the Sustainable Development Commission in their 'Stock Take' report which identified a reduction of 60% raising average SAP(2005) to 80 from the then current level of 51 (SDC, 2006).

Mechanisms by which the (public and private) domestic property sector can contribute to these targets had focused upon new build, such as the building regulations approved documents and the Code for Sustainable Homes. Building Regulations are mandatory for all housing whilst only housing financed through the Homes and Communities Agency required a minimum CSH level (3). However based upon an analysis of demolition rates and assuming all new housing in the UK is carbon neutral, Shipworth (2008) estimated that only around a 5% reduction in $CO_2$ emissions would be achieved by 2050. Thus, if the UK is to get close to its stated target, it can't rely upon new build alone and must address the carbon footprint of its existing housing stock. Building fabric, energy efficient and low/zero carbon technologies and occupant behaviour must be addressed in order to reduce the carbon footprint of existing housing, but in the UK such retrofitting schemes have been low. This is due to high upfront costs, even though installation of energy efficient and low/zero carbon technologies should result in significant life cycle cost savings (fuel bills) for occupiers (DCLG, 2006c) and potentially improved indoor thermal comfort. The Heat and Energy Saving Strategy Consultation (DECC, 2009) was the first step towards large scale refurbishment and energy reduction and set out plans to upgrade 24 million UK homes to near-zero carbon by 2050 and to reduce emissions by up to 44 million tonnes by 2020 (30% saving compared to 2006 levels). The consultation proposed an integrated approach including the installation of low/zero carbon technology, decarbonising the electricity grid and changing occupant behaviour, yet the April 2009 budget failed to reflect this change in tactic by delivering well below the expected fiscal strategy for refurbishment than expected by many.

In April 2010 the Clean Energy Cashback Scheme (Feed-In-Tariff (FIT)) was introduced under powers within the Energy Act 2008 to boost installation of small-scale (less than 5MW) low-carbon electricity generation. The scheme guaranteed a fixed, premium rate for micro-generated renewable electricity (and exportation to the national grid working alongside the Renewables Obligation), however at the outset the scheme was expected to generate only 2% of the energy supply despite DECC research indicating that as much as one third of projected 2020 UK electricity demand could be met via the scheme (foe, 2009). Despite the initial projections, within the first month of the scheme Npower reported (Edwards, 2010) an 80% rise in inquiries for solar panels and had installed 55 systems. The schemes success far exceeded Governments expectations resulting in the implementation of a tariff degression during its Comprehensive FIT Review in April 2012 to a maximum rate for approved PV installations of 21p/kWh reducing further to 15.44p/kWh by November 2012 (DECC, 2012d). The 'Renewable Heat Incentive'

(RHI) was also introduced under the Energy Act 2008 supporting the generation of low-carbon heat at all scales (DECC, 2012e).

The UK Coalition Government came to power in May 2010 and announced it would be the 'greenest government ever' (Randerson, 2010). Its housing strategy 'Laying the Foundations' published in November 2011 stated "our homes need to be well designed, of the highest quality and environmentally sustainable" and provided eight actions for "social, environmental and economic sustainability", only one of which was explicitly focused on existing buildings – the Green Deal (GD). Greg Barker (Minister of State for Energy and Climate Change) claimed the GD would be 'the biggest energy improvement programme of modern times' (a re-design of the Labour government's Pay-As-You-Save (PAYS) scheme, without implementing the lessons learnt from the pilot schemes). The GD was another provision of the Energy Bill and aimed to encourage energy efficiency improvements to be made to homes and other buildings with no upfront cost to the occupant or building owner. The improvement costs were to be repaid through savings on the electricity bill with the financial obligation remaining with the building rather than the occupant should they move on and was based upon the 'Golden Rule', such that the 'expected financial savings must be equal to or greater than the costs attached to the energy bill' (Hough and Edward, 2010). Estimates regarding the maximum level of improvement works that would be implemented ranged from £6,000 to £10,000, however officially there is no cap on the level of funding that can be provided which will instead be determined by the Golden Rule. It was expected that the Energy Company Obligation (ECO) would complement this funding mechanism to permit upgrades resulting in deeper emissions cuts that wouldn't otherwise meet the Golden Rule. It is currently made up of three parts; solid wall insulation and other costly measures (£760m), affordable warmth (£350m) and fuel poverty (£190m). However the Energy and Climate Change Committee do not believe the ECO will address fuel poverty as the measures provided by energy providers will be paid for via charges to energy bills and as such poor households will be subjected to increased fuel costs, more so than their affluent counterpart. The GD became available in October 2012; however ECO was not available as the brokerage structure had not been determined. The Social Housing sector was encouraged to take advantage of the GD, however this received mixed reviews at the Homes Conference in 2012 due to the relatively high interest rates on the loan (amongst other things). During this same period the Technology Strategy Board's Retrofit for the Future programme was running which provided funding for the implementation of 'low carbon refits' of existing low-rise social homes to demonstrate how $CO_2$ emission reductions of 80% $CO_2$ could be achieved. Peter Rickaby of

Rickaby Thompson Associates has analysed the retrofit installation cost data against the proposed $CO_2$ savings as shown in Figure 2.12 and found that retrofit cost is proportional to emissions reduction. He determined that the target zone for retrofit (maximum emissions reduction per pound spent) should be to produce $CO_2$ emission savings in the region of 50 – 65% at a cost of between £20,000 and £30,000 per property (nhmf, 2011). The potential funding available from the GD represents a significant shortfall from this level of investment. Peter Rickaby argues that it will not be necessary for individual properties to achieve 80% reductions, instead a combination of decarbonisation of the electricity grid, allowable solutions such as renewable technologies and replacing the least efficient dwellings with zero carbon dwellings will achieve the difference between the more appropriate 60% emissions reduction and the Climate Change Act emissions target. (nhmf, 2011). Over the next 5 years the Technology Strategy Board (TSB) plans to invest half of its £60 million Government fund on research that will half the cost of deep retrofit to a more affordable level of £15,000 to £20,000.

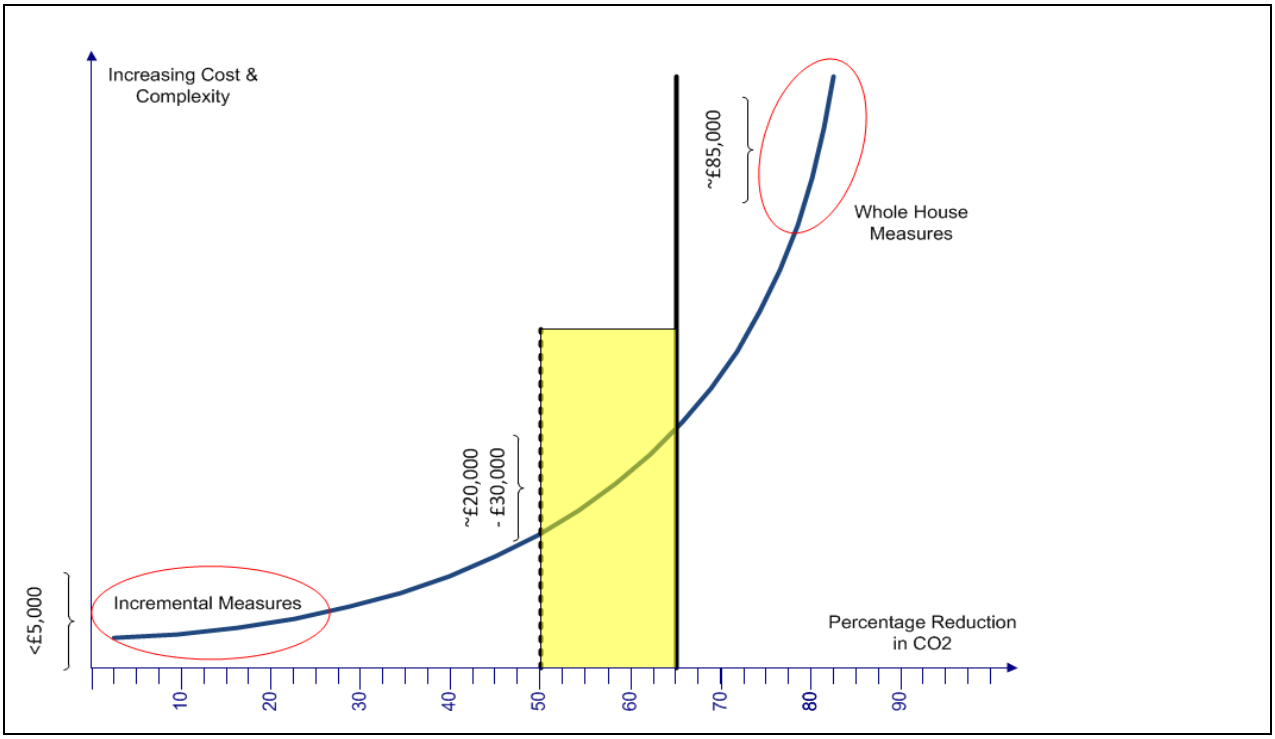



**Figure 2.12 Meta Analysis of Retrofit For The Future Projects.**
Source: Rickaby, 2011.

The social housing sector provides homes for a significant number of vulnerable households ("one that contains the elderly, children or someone who is disabled or has a long term illness", DECC, 2013c) which by their very nature makes them particularly susceptible to changes in

housing policy and costs of living (increased energy bills). Under the 10% rule ("a household is said to be fuel poor if it needs to spend more than 10 per cent of its income on fuel to maintain an adequate level of warmth") there were 4.5 million households (approximately 17% of all households) in fuel poverty in the UK in 2011. Whilst this was a reduction on the previous year it missed the target of eradicating fuel poverty for vulnerable households by 2010. Fuel poverty depends on income, fuel prices and fuel requirement (which depends upon the energy performance of the dwelling) (DECC, 2013c). Despite social housing being amongst the most energy efficient housing in the UK (due in part to the planned approach to building asset management of these landlords), 17% of tenants were in fuel poverty in 2011 (DCLG, 2011). The potential problem for social housing tenants thus relates to recommendations and expected savings not being based upon the individual households' in-use energy performance; actual cash savings cannot be guaranteed. However on this basis Government has realised that lower income and vulnerable households may not save money through energy efficiency measures because they don't use their heating systems as predicted in 'normal use'. Consequently the Energy Company Obligation (ECO) will focus on addressing fuel poverty (Stockton and Campbell, 2011) (in March 2013 Warm Front, which was a Government grant for energy efficiency measures as a means of tackling fuel poverty was replaced by the Energy Company Obligation which some commentators believe will make fuel poverty worse as the costs incurred by energy companies are reclaimed through household energy bills (UtilityWeek, 3013 and Lloyd, 2013) and provide additional support for such households and for hard to treat homes (in simple terms this consists of at least 7% of social housing stock which was constructed pre 1919 (DCLG, 2013) and likely to be of solid wall construction) where energy efficiency measures are currently too expensive to meet the Golden Rule.

#### 2.2.2.1 Implications for Research

Existing buildings thus need to address three inter-related issues if the 2050 target is to be achieved; technological solutions; physical improvements to the performance of existing homes; and changes to lifestyle to support sustainable living. So whilst 'Securing the Future' (Defra, 2005) recognised the importance that people's lifestyle and behaviour have on carbon emissions and committed to greater community engagement; deliberative forums to help people live more sustainable lifestyles; investigating ways in which stakeholders can influence decision making; new commitments to support education and training in sustainable development and evaluation of key environmental taxes, none regularly made it into housing management policy. Thus the task facing social housing landlords is to determine to what extent they can address the issues of

sustainable development through building fabric, technology improvements and occupant behaviour and to establish the most effective mechanisms for doing so.

### 2.2.3 Measuring Sustainable Performance

There is no standard or universally recognised approach to measuring sustainable development, however there is a broad consensus that new ways of measuring progress are needed to determine if activities and decision-making processes are moving towards or away from the goals of sustainable development. (Hardi et al., 1997; Azapagic and Perdan, 2000, cited in Azapagic and Perdan, 2011). Gross Domestic Product (GDP) has traditionally been used to measure progress, indicating a nation's economic health and wellbeing, but is inadequate as a measure of a nation's sustainable progress. (foe, 2010 cited in Azapagic and Perdan, 2011).

The Rio de Jeneiro Earth Summit helped popularise the process of measuring sustainable development. The summit produced a set of action points for sustainable development (Agenda 21) following which the United Nations established a set of indicators to help put these actions into practice and to monitor progress against them. Governments who signed up to Agenda 21 were tasked with establishing policy tools which would implement local sustainable development, these policy tools became known as Local Agenda 21. In 2000 the Labour government put a duty on LAs to ".. prepare community strategies which should promote or improve the economic, social and environmental well-being of their area, and contribute to the achievement of sustainable development in the UK" (DETR, 2000a). On the face of it these two policies appear to have the same goal; to balance environmental, economic and social considerations emphasising partnership working and community working as the way forward and the requirement of a vision statement linked to an action plan against which progress is measured. They do have two major differences, LA21 seeks to tackle global problems from a local level whereas the communities' strategy doesn't consider the global impacts of its local activities and LA21 is focused on the intergenerational implications of planning decisions whilst the communities' strategy doesn't look beyond 15 years (Lucas et al, 2003). This shows a lack of joined up policy which only adds to the complexity of those trying to interpret and implement government's sustainability policies.

The 147 headline indicators established in 'A Better Quality of Life' were updated and reduced to 68 in 'Securing the Future'. The success of the UK's sustainable development strategy is

determined by measuring progress against these indicators and reported on an annual basis. These indicators are not assessed against absolute targets; instead they are used to indicate if improvements, deterioration or no change has occurred since they were last measured. "The 68 indicators ... measures of everyday concerns including health, housing, jobs, crimes and our environment – aim to provide an overview of progress across four themes:

- Sustainable consumption and production
- Climate change and energy
- Protecting natural resources and enhancing the environment
- Creating sustainable communities" (Defra, 2010)

There are problems with objectively measuring some aspects of sustainability which can be very subjective, well-being for instance is an indicator in the 'Securing the Future' strategy, which can be broken down into income, health, employment, community participation, education, and housing conditions, however the importance of these criteria and the weightings that should be applied to them will vary from one person to another as well as over time.

The paragraphs above have demonstrated how the UK government measures sustainable development on a national level, the paragraphs that follow look at how these national indicators may be interpreted at a building level because in order to improve the sustainable performance of a building we must first understand the environment, social and economic impacts the building is having.

There are a number of building assessment models currently available for rating individual buildings through to community based developments, at both a local (state) and national level, with the objective of encouraging continuous improvement in sustainability. Table 2.3 provides a selection of nationally and internationally recognised methodologies and examples of toolkits fully evaluated by research led by the University of Dundee which assessed over 100 different sustainability toolkits for describing, predicting, evaluating and modifying behaviour towards sustainability.

As determined by Cotterell and Dadehy in 2012, it is not possible to directly compare these methodologies as they measure different criteria, use different conventions, make different assumptions and many are country specific. Since Dundee University undertook their research

(SUE-mot, 2004) many more toolkits have become available including CASBEE (Comprehensive Assessment System for Building Environment Efficiency) from Japan and some methodologies weren't included such as Passivhaus from Germany which will be discussed in more details in sections 2.2.3.11 and 2.2.3.12.

**Table 2.3 Sustainability Toolkits (adapted and updated from SUE-mot, 2004)**

| Tool Type | Examples of Tools Available | Sustainability Dimensions | User Country |
|---|---|---|---|
| Macro Level – Urban Planning Tool | BRE Sustainability Checklist | 3 | UK |
| | Community Sustainability Assessment | 3 | International |
| | SEEDA | 3 | UK |
| Building Level – Design Tools | Ecotect | 1 | Australia |
| | Building Design Advisor | 1 | USA |
| Building Environmental Frameworks and Rating Systems | BREEAM | 1 | UK |
| | EcoHome / CSH | 1 | UK |
| | LEED | 3 | USA |
| | SPeAR | 3 | UK |
| LCA Tools | ENVEST | 2 | UK |
| | TEAM | 1 | International |
| Infrastructure Tools | CEEQUAL | 2 | UK |

Sections 2.2.3.1 to 2.2.3.4 provide more detailed information on a selection of toolkits which were also the subject of a later study undertaken by Xing et al, 2009.

2.2.3.1 Building Research Establishment Environmental Assessment Methodology (BREEAM)

Building Research Establishment Environmental Assessment Methodology (BREEAM) is promoted as a holistic approach to (third party) rating and certifying the environmental performance of any new or existing building type, anywhere in the world. According to the BREEAM website it "is the world's foremost environmental assessment method ….". Assessments are generally carried out at design and post construction phases to provide an 'as built' performance rating, however a separate methodology was introduced in 2012 (In-Use Asset scheme, BRE, 2013b) to measure the operational environmental performance of non-domestic buildings. This scheme is only mandatory where BREEAM Excellent or Outstanding

has been achieved. In the current version of BREEAM New Construction (BRE, 2011b) there are 49 individual criteria spanning 9 weighted categories (Management, Health and Wellbeing, Energy, Transport, Water, Materials, Land Use and Ecology and Pollution) plus a separate category for innovation against which scores are allocated (provided the prerequisite has been met), multiplied by the appropriate weighting in order that a single (ecopoint) score can be produced which corresponds to a BREEAM rating of unclassified, Pass, Good, Very Good, Excellent or Outstanding. Minimum category standards are included to ensure fundamental performance issues such as water and energy are not disregarded. (BRE, 2011b).

#### 2.2.3.2 Leadership in Energy and Environmental Design (LEED)

LEED is the USA's Green Building Council's Green Building (third-party) rating and certification system which assesses the environmental performance of a building over its lifecycle and as such is applicable to all building types at all stages (albeit operational assessment is via a separate methodology similar to BREEAM). It was established in 2000 and in 2011 was "the world's second most widely adopted method with 24,682 projects … in 120 countries" (Sleeuw, 2011). A holistic approach is taken in that a range of criteria and sub-criteria covering the building and its site are measured via 5 main categories (sustainable sites, water efficiency, energy and atmosphere, materials and resources and indoor environmental quality), up to 3 additional categories depending on the building type and 2 bonus categories relating to innovation and region. Points are allocated in a similar way to BREEAM in order that a single score is achieved which corresponds to the rating system of Certified, Silver, Gold and Platinum (usgbc, 2013).

#### 2.2.3.3 Envest 2

Is a design stage environmental impact and whole life costs analysis software which assists in the production of optimal environmental and financial building design focused on the client/designers priorities. From an environmental perspective it covers 12 impacts including climate change and toxicity which can be combined into a single ecopoint score (to facilitate communication and comparison) and cost is in pounds Sterling "according to Net Present Value, discounted at 2002 Treasury rates" (BRE, 2013c).

#### 2.2.3.4 ATHENA

Is another design stage (new build or major refurbishment) life cycle assessment methodology used predominantly in the USA (athenasmi, 2014).

Xing et al, 2009 evaluated BREEAM, ENVEST, LEED and ATHENA and found that they were not "integrated sustainability tools" as social and economic impacts were not fully taken into account.

AlWaer and Kirk (2012) carried out a comprehensive review of BREEAM and LEED and determined that whilst the tools covered the same main criteria (both excluding economic sustainability), the sub-criteria, indicators and priorities differed. The report acknowledged that they are becoming the accepted standards of UK and USA building regulators yet ultimately fail as sustainability toolkits for not simultaneously integrating, social, environmental and economic aspects of sustainability. Ding (2008) and Essa (et al 2007) (cited in AlWaer and Kirk, 2012) highlight other important factors to the sustainable built environment debate (culture and technological constraints) that the toolkits are unable to incorporate.

In their 2011 book 'Managing the Assets: A Guide for Housing Associations', The National Housing Federation recommend using EcoHome XB, T-Zero, ISO14001, EMAS and SHIFT for the assessment of environmental sustainability (Jones et al, 2011).

2.2.3.5 The Code for Sustainable Homes (CSH)

CSH was launched in 2007 as a replacement for EcoHomes© (upon which it is based) and was the government's response to tackling (amongst other criteria) the carbon footprint of new housing by measuring performance across 9 key issues; Energy and $CO_2$ emissions; Water; Materials; Surface water management; Waste; Pollution; Health and Wellbeing; Management; Ecology (DCLG, 2007). From July 2012 the BREEAM Domestic Refurbishment (BDR) superseded EcoHomes© for rating the environmental performance of existing properties undergoing refurbishment. BDR and CSH are affiliated to the BRE Global International Code for A Sustainable Built Environment and as such "ensure that a common scientific and performance basis is used …" (BRE, 2013d). The CSH introduced the post-construction assessment (to supplement the design phase assessment) to enforce the design intent of a development and to start addressing the gap between design and built performance. Whilst this additional assessment was a step in the right direction the methodology was still no closer to determining the in-use performance of a building and how that building contributes to emission targets, as seen in section 2.2.2, energy consumption of identical homes can vary by over 250%. Since its inauguration the CSH has been revised to accommodate changes to Approved Document Part L, whilst the BDR was designed to be more relevant to refurbishment projects by

eliminating site specific categories, increasing the environmental weightings of energy and updating category issues; both schemes have resulted in a stronger fabric first approach to property design. As both schemes are BRREAM methodologies they use the same approach to scoring as BREEAM does. A Housing Standards Review (HSR) was announced in October 2012 to simplify the local and national housing standards and reduce development costs, resulting in the absorption of energy and water, access space and security standards previously contained within the CSH (DCLG, 2014) and the potential abolition of the CSH.

2.2.3.6 EcoHome XB

Ecohome XB was developed by BRE in conjunction with the Housing Corporation for the environmental assessment of existing social housing stock and to help landlords "assess the environmental efficiency of their stock, and to help them identify the potential for improvement; and to measure this improvement when works have been carried out." (Sustainable Homes, 2006). The scheme allows landlords to score their stock so that benchmarks for improvements can be established, to track improvements made and to help identify areas where attention is needed and therefore help prioritise maintenance and refurbishment works. It's a self-assessment tool which covers management policies as well as environmental issues (largely following the format of EcoHomes©). The concerns with this scheme include the length of time and cost to implement together with the collection of additional data which cannot be utilised elsewhere, however landlords who have used the standard to assist the design of refurbishment schemes found it provided "an opportunity to show how green the business is" (Housing Corporation, 2006). Hexagon contributed to the development of the standard and participated in a trial prior to its launch, stated in their annual review 2007/08 "… EcoHomes XB standard, which all housing associations now have to meet, …". At the time there was some debate about the long-term role of the standard with some suggesting it would become mandatory for social housing landlords, however in 2014 the standard was still voluntary.

There are problems with both CSH and EcoHome XB including; the generic approach to what can be atypical developments that does not reflect local needs; the definition of 'zero carbon'; focuses on measuring physical parameters at design stage and does not measure in-use performance; it is one-dimensional in its coverage of sustainability; the collection of supporting evidence and costs incurred (especially for formal third party assessment) can be onerous; and they take a limited holistic approach in terms of life cycle analysis.

On a positive note the tools display a degree of flexibility in that they can be used at various times during the building lifecycle, but as a design / refurbishment aid rather than a formal third party assessment; they are regularly upgraded to accommodate changes in legislation etc.; and scores can be aggregated to provide a single overall score.

2.2.3.7 T-Zero

T-Zero was an interactive web-based tool for handling energy and environmental performance with the aim of developing novel ways of reducing the environmental impact of existing housing, this tool however is no longer operational (T-zero, 2009).

2.2.3.8 ISO 14001

Is an international standard which defines the requirements of an Environmental Management System based upon the Denning Cycle of plan, do, check, act and focuses on an organisation's processes and procedures rather than on specific parameter, targets or performance indicators (Hyde and Reeve, 2006). The benefits of this process include compliance with environmental legislation, a process of continual improvement towards environmental objectives (and identification of areas of weakness), organisation-wide commitment providing an effective tool for disseminating its interpretation and aspirations for environmental performance to all stakeholders and links an organisations environmental management system to an internationally recognised standard. The disadvantages include the level of commitment in respect of time and resources; in 1998 Vale Housing Association spent 12 months, approximately 1,700 staff hours and nearly £10,000 on attaining the ISO 14001 accreditation (Inside Housing, 15/9/2008).

2.2.3.9 EMAS

EMAS is the European Union Eco-Management and Audit Scheme and like ISO 14001 aims to "provide good environmental management" so the two schemes complement each other, however the process and principles of EMAS are more rigorous and go beyond those required by ISO14001. Achieving ISO 14001 as part of the environmental management section of EMAS will help an organisation transfer to EMAS more easily (European Commission, 2008).

2.2.3.10 The Index For Tomorrow (SHIFT)

SHIFT was introduced in 2008, specifically for affordable housing providers, resulting from the real need for a "comprehensive assessment of environmental credentials … [who's members] … demonstrates commitments to evidence-based benchmarking against a set of externally-

developed criteria" (Sustainable Homes, 2012). The Homes and Communities Agency formally recognise this scheme through their Place Recognition Scheme. It's a voluntary scheme in which members seek to reduce the environmental impacts (of their offices and social homes) through a process of independent assessment. This assessment process covers strategy and management, office practices, existing buildings and new buildings and assists users to embed environmental sustainability into their operations. Each category is weighted and scored from which a single overall score out of 100 is calculated and a ranking assigned (Bronze, Silver, Gold or Platinum) (Sustainable Homes, 2014).

The 'Existing Building' category receives the highest weighting of 45% and focuses on;

- Average SAP rating for the stock portfolio, percentage of properties for which a renewable micro-generating feasibility study has been undertaken and water consumption
- Tenant engagement regarding energy reduction, water saving measures, other environmental issues such as waste management and how to cope with the effects of climate change
- Percentage of housing maintenance/management staff who are trained on sustainable materials and maintenance practices
- Is there a policy for sourcing maintenance contractors (and subcontractors) based upon their environmental credentials?
- Sustainable alternatives for pesticides, herbicides, cleaning products, fittings
- Percentage of waste generated by refurbishing existing stock is recycled / reused
- Percentage of existing stock provided with waste management systems, ecological enhancements
- Flood and overheating adaptation for housing stock

The criteria attempts to cover building performance in terms of energy, water and waste management, however in-use energy performance is based upon SAP rather than actual consumption data (see below) and water consumption is based upon 'calculated' household averages rather than actual consumption data. This methodology encourages specific tenant engagement in recognition of the influence housing occupants have on the sustainability of existing housing. However, this is just one criteria amongst many contained within the maintenance category and due to the flexibility of the methodology could be easily disregarded. There are currently 38 SHIFT members who are increasingly "addressing the flooding effects of climate change" resulting from experience of flooding events in their areas (Sustainable Homes,

2012); however it can be easily argued that these landlords are the innovators of the sector and not necessarily representative of the whole.

2.2.3.11 Comprehensive Assessment System for Building Environmental Efficiency (CASBEE)

Is a Japanese tool for measuring the environmental performance of buildings and the built environment first used in 2001. A suite of toolkits have been developed in recognition of the building life cycle. As such there are Pre-Design, New Build, Existing Building and Renovation toolkits for a variety of building types. CASBEE can be applied at the building level and city level. Its predecessors are BREEAM and LEED and follow a similar approach; however this methodology is specifically for Japanese and Asian buildings and not intended for use elsewhere (CASBEE, 2013). One significant difference between CASBEE and its predecessors is that CASBEE measures the environmental performance of the building and then separately assesses the negative impacts of that building upon the neighbouring (built) environment (Alyami and Rezgui, 2012). CASBEE is a voluntary scheme whose toolkits have been designed to be used nationally, however a number of Japanese local governments apply the toolkits and tailor them to meet local conditions. It consists of 4 headline topics (Energy Efficiency, Resource Efficiency, Local Environment and Indoor Environment) and approximately 90 sub-items against which points are awarded (CASBEE, 2013). CASBEE differs to BREEAM and LEED in that it doesn't use the simple additive approach to calculate the environmental performance of a building but instead calculates the Building Environmental Efficiency (BEE) score using the following equation;

$$BEE = \frac{\text{Building environmental performance points (Building environmental quality)}}{\text{Building environmental loadings (negative impact on local area points)}}$$

(Mao et al, 2009)

2.2.3.12 Passivhaus

Is a design approach based upon building physics to constructing (and more recently refurbishing) buildings which are very comfortable and use limited energy. It originated in Germany but is gaining some popularity in the UK especially amongst social landlords. There are four mandatory technical requirements; Airtightness below 0.6ach, (maximum) Annual Specific Space Heat of 15kWh/$m^2$ to provide space heating to 20°C or space cooling to 25°C; Specific Heat Load of 10kWh/$m^2$ to maintain 20°C internally at -10°C externally; (maximum)

Annual Specific Primary Energy Demand of 120kWh/$m^2$. In order to achieve these rigorous requirements the design is centred upon the compact form of the building, the glazing to optimise solar gain, an excellent standard of airtightness, a thick uninterrupted layer of insulation which is free of thermal bridges and comfort ventilation with heat recovery (Cotterell and Dadeby, 2012). Passivhaus relates purely to the energy consumption of a building and does not address the wider sustainability agenda; however this can be overcome by incorporating it into the CSH for instance. There are problems using the UK energy performance compliance tools (e.g. SAP) to measure the energy efficiency of a Passivhaus as the tools embedded "assumptions are not always consistent with low energy dwelling design, … it plays down the significance of insulation and airtightness, and assumes high levels of internal gains …. [and] does not provide well for passive solar design …" (AECB, 2008).

The toolkits mentioned thus far use explicit and measurable criteria that adopt proven measurement methods ensuring meaningful results that can be repeated and benchmarked. However, AlWaer et al (2008) raised concerns regarding the hidden subjectivity of the assessment procedure (hidden cultural, economic and social influences) and the consequences it had on scoring (Cole and Larsson, 1998 cited in AlWaer and Kirk, 2012).

#### 2.2.3.13 Summary

Whilst there are many definitions for sustainability, there is a good understanding of its meaning at national and local levels within the UK. There are a range of toolkits available, all be they flawed, that provide a measure of the sustainability of a building in its current state but little work has been carried out to demonstrate how these toolkits can be integrated to inform the improvements needed through routine maintenance and refurbishment to improve the sustainability of existing buildings.

## 2.3 Social Housing

This section outlines the sector in its current form, which is contextualised via a brief summary of the sector from its inception to current day, a review of social housing asset management is then presented with a critique of the maintenance model and finally alternative maintenance models in other industry sectors are presented. This discussion is used to identify the manner in which social housing maintenance is undertaken, the reasoning behind it so that limitations and deficiencies within the current model can be identified and potential solutions identified.

### 2.3.1 Introduction to Social Housing

Social housing provision is essential for members of society who are unable to gain access to the housing market and rely upon housing provided by Local Authorities (LA), Arms Length Management Organisations (ALMO) and Registered Social Landlords (RSL) or on housing benefits provided through tax receipts for private rent. Social housing in the context of this research project is housing owned/managed by organisations for below market rents and for allocation principally on the basis of (tenant) need rather than demand. This research is only concerned with direct providers of social housing as they are responsible for the maintenance of their properties, as opposed to enablers of social housing, such as the Homes and Communities Agency who may provide cash grants to support social housing development (although their influence as social housing regulators will discussed).

As stated in section 2.2.2, there were 3.7 million households in the social rented sector which were effectively government financed and used to drive through the housing policy of the day and thus must be able to adapt to changes in political and economic climates whilst still providing the basics; that people need somewhere to live which is decent, has reasonable infrastructure for access to work and recreation as well as education and healthcare facilities, which can be afforded or provided (for those who can't afford) and which is maintained to prevent disrepair for the sake of those currently in occupation and for future occupants.

### 2.3.2 A Brief History of Social Housing and Social Housing Policy

Up until World War 1, it was believed that private enterprise would provide all housing necessary (except rural housing and workers housing in London) and that the primary housing function of LAs was to provide accommodation for families displaced by sanitary improvement schemes. In 1917, due to a huge housing deficit and the results of war it was agreed that central government finance should be used to subsidise LA house building. The Advisory Housing Panel later agreed that 300,000 new houses should be constructed during the first year of peace via a 'partnership of responsibility', and so the LA as a provider of social housing was born. The general policy throughout the 1920s was for LAs to provide sufficient housing to satisfy the shortfall between housing need and that provided by private enterprise, which meant that housing would be available for "general needs" and not only to provide housing for the poor (Burnett, 1986).

In 1918 The Tudor Walters committee made recommendations for post war LA housing standards. To clearly demonstrate the governments' commitment to welfare, one of the most important aspects of the house building policy was that standards should be greatly improved in comparison to pre-war standards. As a result the quality of the recommendations made and the attention to building standards, spatial requirements (12 properties/acre in towns and 8/acre in the country) and tenure mix was unprecedented for working class housing (Powell, 1974). The Local Government Board considered all aspects of redevelopment including escalating building costs and skills shortage but economies of scale and provisions of large scale standardisation of materials and fittings 'on the lines adopted for the manufacture of a motor car' made the recommendations manageable. Recommendations also included district heating from power station waste, the development of interchangeable building components and the need to phase public transport with the building of new estates (Burnett, 1986). Not dissimilar to the lean construction proposals made by the 1998 Egan report and DECCs 2009 report identifying the potential of district heating (also known as heat networks) and its 2013 report 'The Future of Heating: Meeting the challenge' which aims to provide support and funding for LA developing district heating. The housing crisis was expected to be over by 1927 and normal market forces should have resumed (Bowley, 1945). However by 1922 the Minister of Health determined further state intervention was unnecessary as only 170,000 of the 500,000 homes needed had been built.

The next government was a conservative government which brought in a new Housing Act which reversed the emphasis from public sector house building to private sector building via increased subsidies and promises that sales and rents could be set by the builder. These homes were smaller than the Tudor Walter homes but had the benefit of a fixed bath. Although nearly half a million homes were built over a 6 year period little was done to provide rented accommodation for the working classes. (Burnett, 1986).

And so years of exchange between Labour and Conservative governments followed, each brought in a new Housing Act to combat the continued housing shortage and each reversed the others emphasis of who should take responsibility for building the new homes needed; private enterprise was favoured by the Conservatives and LA building was favoured by the Labour. Whilst this succession of governments and their housing initiatives generally improved amenity and condition (DETR, 2000a) from 1924, home size decreased, housing densities increased, the

provision of multi-storey flats increased and suburban living for the working classes increased leading to large planned residential suburbs.

Between 1919 and 1934, 2,459,000 houses were built, 33% of the total housing stock of 1934 which dramatically changed the age composition and the standards of amenity. LA had built 31% of these houses and private enterprise 69%. (Burnett, 1986)

By the end of World War 2, 475,000 houses had been destroyed or made permanently uninhabitable, with many more damaged. The housing policies which followed were reliant upon the alternating labour and conservative governments (electoral defeat due in some part because of failed housing policies) and, in its simplest forms, fluctuated between subsidies for general needs housing and slum clearances. The Labour governments continued to favour publicly owned housing with centralised control whilst the Conservatives ideology favoured home ownership and decentralised control. Housing and politics continued in the same fashion post World War 2 as it did during the inter-war years, none bridging the demand - supply gap and focussing on supply rather than maintenance or improvement of existing housing. (Burnett, 1986).

Beyond the exchange between Labour and Conservative governments post World War 2 and the opposing housing ideologies the two parties were synonymous with, housing policies of note included;

- The first national criteria for 'unfitness' was introduced in 1954 in The Housing Repairs and Rents Act which provided subsidies for general needs new build and slum clearances (HMSO, 1954), as unfit homes rose to 847,000 in 1954 (Hansard, 1958).
- The Housing Corporation was established in 1964 (Housing Act) and from 1974 was responsible for funding and regulating RSLs with "the duty of encouraging housing associations, and with power to borrow up to £100 million from the Treasury to encourage the building of houses for letting at cost rents" (Burnett, 1986).
- In 1965 for the first time emphasis was diverted from new build to the rehabilitation of existing buildings.

The returning Labour government in 1974 departed from their traditional housing policies to support owner-occupation as the favoured form of tenure. By this point more than 50% of all

homes were privately owned and occupied (Shelter, 2009), signalling infiltration of home ownership into the working class sector. This new government tried to re-establish economic stability and social calm following the miner's strike and the 3 day week of 1972 and 1974 but was prevented by the economic crisis of 1976 which reduced public expenditure by £1000 million and LA housing budgets by £150 million (Rogers, 2009).

The Conservatives became the governing party in 1979 introducing Margaret Thatcher's defining housing policy, the 'Right to Buy' policy established by the Housing Act 1980. The 'Right-to-Buy' resulted in 1.7million council houses being sold by 1995 (Hills, 1998), helped increase home ownership from 55% of the population to 67% in 1990 and raised £28 billion for the treasury (LGiU, 2012). For the first time since the end of World War 1, LAs were no longer the main providers of social housing, they relinquished their provision and management role for one of enabler. The number of new build local authority houses declined from 151,824 in 1976 to 39,960 in 1982 to 1,058 by 1998 (Clark et al 2001) through the John Major Conservative years and into the New Labour years.

A review of housing policy between 1975 and 2000 identified three policy clusters of particular importance; deregulation and liberalisation, restructuring housing subsidies and asset restructuring. Housing policy during this period led to (amongst others) increased social housing management complexity due to the wider role landlords were playing in achieving broader neighbourhood objectives such as ASB and crime, and continued disrepair due to "inadequate renovation programmes to maintain properties in effective use" (ODPM, 2005). It appears that the emphasis on housing maintenance established in 1965 wasn't capitalised on beyond 1968 until New Labour.

New Labour came to power in 1997 presenting its view of housing reform via the Housing Green Paper 'Quality and Choice: A decent home for all' (DETR, 2000b). The DHS was introduced as one mechanism to "deliver improvements in quality and a fairer market that allow people to make real choices about their homes, that support people moving into work and self-dependence, and that protect the vulnerable". The DHS would also become a central theme of the government's sustainable community's agenda which highlighted the interdependent relationship between housing, health and sustainability (ODPM, 2003).

There had been concerns' regarding the condition of social housing since the 1980's when a combination of low management and maintenance allowances, unwillingness to raise rents to match repair needs and restrictions preventing the cross subsidisation of Housing Revenue Accounts from general funds resulted in large repair backlogs (DCLG, 2000). By 1996 the repairs backlog had reached £19 billion for England alone (DCLG, 2008b) which in turn prompted New Labour to commit to making housing decent by 2010 via The Decent Home Standard (DHS) at the same time establishing a common definition of decency. The DHS was conceived as a minimum standard which triggered action if a range of decency standards were not met. A property was considered decent if it: satisfied the Housing Health and Safety Rating System (HHSRS) as fit for purpose; was in a reasonable state of repair; had reasonably modern and appropriately located facilities; and had a reasonable degree of thermal comfort (SAP 2005 rating of 35 or more) (DCLG, 2006a). This is a revised version of the original definition following the replacement of the fitness standard with the HHSRS. As affirmed in by the Climate Change Programme 2006 the DHS was not the principle vehicle for action to reduce energy consumption but a 'trigger point' through sustained increases in SAP to improve energy efficiency over time. The social housing maintenance policy therefore became a combination of the DHS and Warm Front. In 2001 there were 1.6 million (39% of all social housing) non-decent dwellings in the social sector consisting of 1.2 million managed by LAs and 400,000 managed by RSLs. In November 2009 it was estimated that only 92% of dwellings would be decent by the end of 2010 (target date for all social homes to be made 'Decent'), reducing the number of non-decent dwellings to approximately 305,000, furthermore, at that conversion rate, it would be 2019 before 100% decency was achieved (NAO, 2010). To tackle this backlog the 2010 spending review made £1.6bn available to LAs (including ALMOs) which was expected to make a further 127,000 properties decent during 2011-2015. An additional £510m was also made available to existing LSVT to assist with "the cost of bringing poor value housing transferred from local authorities up to the Decent Homes Standard" (HCA, 2013a). The DHS raised the profile of maintenance amongst senior executives, enabled a more planned approach to maintenance to be taken and of course provided funds (for the first time significant sums of private finance was used to support social housing as RSLs were expected to finance their own DHS programmes). Beyond the DHS the green paper aimed to promote 'social inclusion' meaning greater involvement of tenants in the decision making process, effectively increasing the complexity for landlords as their management role expanded.

This period was marked by a strong regulatory framework of central government direction and constraints and performance monitoring and inspection. Those landlords who could demonstrate efficiency found themselves free from the complex regulatory framework, whereas landlords unable to prove efficiency and cost control remained under the greatest level of control.

By the time the current coalition government came to power in May 2010 house building rates had reached lows not seen since the 1920s, one reason according to the Barker review (2004) was that social housing strategy had been focused on achieving the Decent Homes Standard rather than commissioning new build. However, despite its faults the DHS did focus attention on existing properties and the quality of those properties for the first time since the 1960s.

The housing policies mentioned above have resulted in the age and tenure profiles shown in Figures 2.13 And 2.14. Whilst the flagship policy went some way to addressing the quality of UK housing it did little in terms of sustainability as the DHS was not a sustainability standard, it did not explicitly address the sustainability agenda and as such minimal impact on this aspect of the UK housing stock was made.

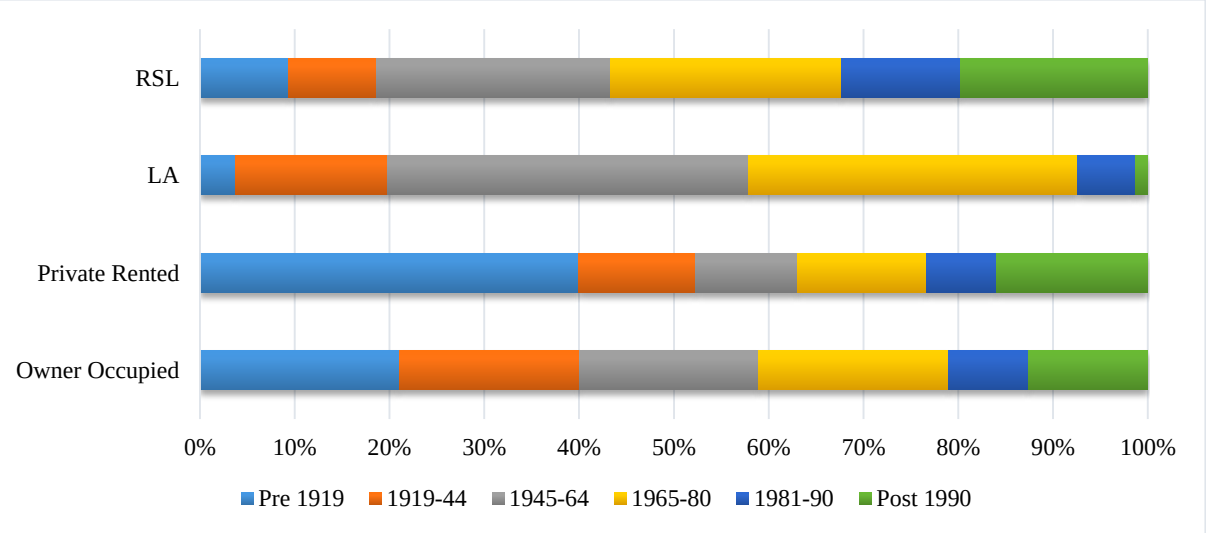



**Figure 2.13 Age Profile of Stock by Tenure (English Homes Survey 2010-11)**

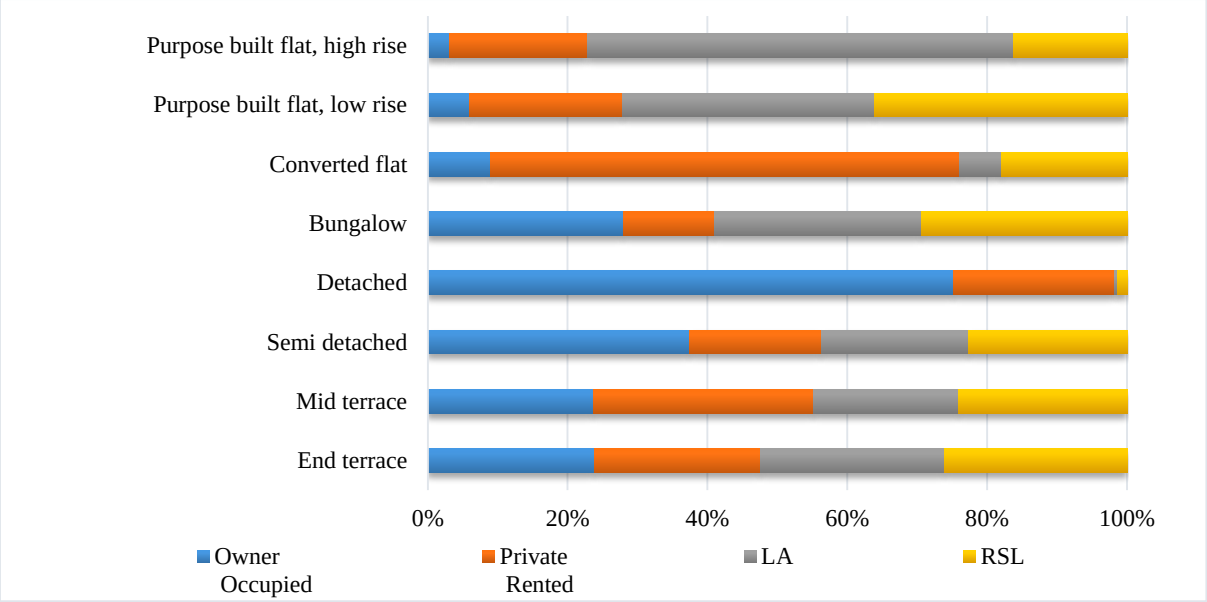



**Figure 2.14 House Type by Tenure (English Homes Survey 2010-11)**

2.3.2.1 Social Housing and their Regulators

At the start of this research The Housing Corporation was the non-departmental public body responsible for providing funding for new affordable housing and the regulation of housing associations in England, established by the Housing Act 1964. The Housing Corporation together with the Audit Commission were responsible for auditing and assessing the services provided by social housing landlords. In 2007 Ruth Kelly, the Secretary of State for Communities and Local Government under the Labour Government instigated a review of English Housing regulation in the form of the Cave Review, 2007 which recommended that the Corporation's regulatory and investment responsibilities be separated. The regulatory responsibilities were handed to an independent body which was eventually named as the Tenant Services Authority (TSA), and investment responsibilities were handed to what eventually became the Homes and Communities Agency (HCA). The legislative framework for these two new bodies was contained within the Housing and Regeneration Act 2008.

The coalition government instigated a radical reform of the social housing sector due, in part, to the 1.8 million households on waiting lists for social homes (Barclays, 2012). Through the Localism Act 2011, the social housing reform has;

- "given social landlords more flexibility on the types of tenancies they can offer, while protecting existing tenants' rights
- given local councils the power to manage their housing waiting lists

- made it easier for social tenants to move within the social sector by introducing a national home swap scheme" .

Part of its manifesto was to review the number and cost of quangos resulting in the announcement by Grant Shapps (Minister of State for Housing and Local Government) that whilst the HCA would be retained it would be reformed to cut running costs and would be merged with the TSA. In April 2012 the social housing regulatory powers previously held by the TSA were transferred to the HCA. "The new regulatory framework for social housing in England from 2012 implements the amendments to the Housing and Regeneration Act 2008 introduced by the Localism Act 2011, ..." (HCA, 2012a) Social Housing Providers include registered LA Landlords, Private registered providers such as Housing Associations and registered ALMOs.

In terms of housing maintenance and repair this has led to co-regulation (tenants take on a governance role and scrutinise the performance of landlords), replacement of the HRA subsidy system by self-financing and the elimination of performance targets such as KLOE and regular audits by the national audit commission.

The regulatory framework focuses on effective stakeholder and tenant engagement, transparency and accountability. Previously the Audit Commission and the Housing Corporation relied upon performance indicators and regular audits to determine the standard of service provision. These performance indicators could be quite prescriptive and covered a variety of economic and social issues but didn't explicitly address the sustainability agenda (Audit Commission, 2007). Housing managers "often boxed-in by government-imposed objectives and targets" (Gilbertson et al, 2006) concentrated on achieving the criteria against which their regulators measured their performance (and level of success) detracting attention from issues such as the sustainability agenda. This could lead to landlords believing the sustainability agenda to be 'an extra over' to their core performance requirements. Under the new reforms landlords must define their own quality services, develop innovative and 'value for money' approaches to drive improvements in the services they offer tenants in consultation with their tenants.

In order to support tenants in their role as co-regulators, from April 1st 2012 HCA (DCLG, 2012b) took over the Tenant Empowerment Programme from the TSA to;

- set up tenant panels
- challenge their landlords to provide a better service

- take over the management of local housing services such as repairs and estate management, through the Right to Manage

The Coalition government's legacy for social housing maintenance was to develop a more proactive and planned approach, however policies such as the 'Tenant Cashback' (DCLG, 2012c) which at best may provide training and employment for tenants, increase tenant self-reliance, change tenant behaviour and attitudes towards housing maintenance, whilst reducing maintenance costs through reduced repair spend and administration costs. At worst such a policy may worsen housing quality, increase insurance premiums and increase maintenance spend, but perhaps worst still is that such policies deflect attention from the integration of sustainable planned repairs (Housemark, 2012). If the presentations made at the National Housing Federation Maintenance Conference in 2012 were a reflection of current policy and the challenges facing landlords, they demonstrated that climate change adaptation strategies were not being considered in repairs and maintenance planning.

2.3.2.2 Funding

The coalition government also reformed council housing funding by ending the much-criticised housing revenue account subsidy regime.

Traditionally maintenance work was funded through the revenue account and thus dependent on rents applied and successfully collected.

Following the Spending Review of 2004, the Government instructed Social Landlords to make efficiency savings of £835 million by 2007/8, of which, management and maintenance was to contribute £280 million (ODPM, 2005). Efficiencies were sought through more effective procedures rather than cuts in quality of services. In the same year the DHS was introduced and social landlords were set the target of making all homes decent by 2010 (DCLG, 2006a). The mechanisms to improve the quality of UK social housing varied depending on the legal status of the landlord. RSLs were expected to make their homes decent through their own resources and were able to borrow money from banks and building societies (private money was pumped into the sector). However the same freedom to borrow was not applied to LAs who were expected to fund DHS works through existing funds (including the Major Repairs Fund) and where this wasn't possible they could apply for resources through ALMO, PFI or Stock Transfer (the Government was keen to separate out the LA strategic and day-to-day management of housing

stock). The 2010 spending review (HM Treasury, 2010) provided DHS backlog funding of £1.6bn to 46 LA (including ALMOs) to make approximately 127,000 homes decent. A further £510m of Government funding was provided to Large Scale Voluntary Transfer (LSVT) Gap Funding to fund improvement work to poor value homes to achieve the DHS (House of Commons, 2010).

The Coalition Government's Welfare Reform Act 2012 introduced the biggest shake-up of the welfare system in 60 years with the aim of streamlining the benefit system, to save money and incentivise people into work. The prominent changes with the greatest potential impact on maintenance funding were the Universal Credit, 'Bedroom Tax' and the Household Benefit Cap.

The Universal Credit is being phased-in over 4 years (from April 2013 to 2017) and is a single, monthly benefit paid directly to the claimant (vulnerable claimants may have their housing benefit paid directly to their landlord). This integrated benefit for working age claimants includes the housing benefit which was previously paid directly to the landlords as well as, Income Support, Jobseeker's Allowance, Employment and Support Allowance, Child Tax Credit and Working Tax Credit which were paid directly to the claimant but on a fortnightly basis. Beyond the operational difficulties of running such an integrated scheme, tenants face new budgeting problems and landlords face additional direct (rent arrears) and indirect costs (diversification and increasing traditional workloads due to support mechanisms to help educate and train tenants in household budget management, costs associated with recouping those arrears, eviction and increased void costs). The 2013 National Housing Federation Report on the impact of the welfare reforms (produced by Ipsos Mori) stated that The Department of Work and Pensions (DWP) found payment collection rates averaging at 92% during the initial implementation phase but was unable to comment on whether these rates would improve or not as tenants became more familiar with the system. It also found that approximately 2 million social tenants were expected to be transferred to the Universal Credit and whilst not all of these payments would include the housing benefit aspect, it was expected that one third of tenants would have difficulties budgeting on a monthly basis and handling rent within this budget. (Ipsos MORI, 2013). Pilot studies carried out in 6 regions resulted in rent arrear increases of between 2% and 11% which a HA in County Durham quantified the cost to them in the region of £500,000 per year (BBC, 2013). As a consequence to the increased risk of rising rent arrears, mechanisms are due to be put in place so that DWP can deduct rent arrears from benefits and deliver them directly to landlords. Whilst this will help landlords recoup much needed payments and increase the level of

confidence for housing asset managers, this will add further pressure on tenants who are already struggling to budget and make ends meet.

The Bedroom Tax is a reduction in housing benefit for working age claimants who are deemed to be under-occupying their home. The reform was implemented in April 2013 and reduced housing benefit by 14% and 25% from working age tenants who had one and two spare bedrooms, respectively. DWP (as reported in the Ipsos MORI report mentioned) have estimated that 540,000 households will initially be affected; however this number is expected to rise in line with the pensionable age of women. Of course the aim of this reform was to reduce the benefit bill (£505m in 2013/14 rising to £540 the following year) and reduce overcrowding by encouraging tenants under-occupying homes to move to smaller properties and thus avoid the reduction in benefits. However beyond the arguments associated with what constitutes a bedroom and under-occupancy there is a real problem of re-housing tenants who are willing and able to move into smaller properties as the numbers necessary don't exist where needed. In March 2013, the NHF estimated a deficit of 95,000 one bedroom properties in 2011-2012 based on 180,000 households under-occupying two bedroom properties and only 85,000 one bedroom properties available (Conway, 2013). Newcastle city council rent arrears have increased by £550,000 since April 2013 as 60% of affected households fall behind in their rent (HC Deb, 12th June 2013, col 340). Housing Hartlepool rent arrears have increase by 9.6% since the implementation of the bedroom tax. One thousand Peabody households were affected by the reform yet only 50 households were willing to move to smaller premises as a result. Those households opting out were able to cover the benefit gap in the early stages but how long this can be maintained was uncertain. The early indications of this welfare reform appear to suggest that overcrowding isn't being addressed and further pressure is being applied to tenants' cost of living (Spurr, 2013). A survey conducted by the National Housing Federation concluded that 51% (32,432 tenants) of tenants affected by the tax (from 51 English HAs) were unable to pay their rent, for one in four of those tenants it was the first time they had been in arrears (Brown, 2013). The TUC's False Economy campaign suggested 50,000 council tenants, none of whom were previously in arrears, were unable to pay their rent as a result of the tax and this whilst the Discretionary Housing Payment is available (Conway, 3013). The impacts of the reform are therefore three fold, the overcrowding issue is not tackled, and tenants are pushed into further debt and at a financial cost to landlords.

The Housing Benefit Cap seeks to limit the amount of benefits households claim to ensure benefits do not exceed net earnings of working families. Families and couples had their benefits capped at £500 per week (including housing benefit) and single households capped at £350 per week (exemptions include those receiving Disability Living Allowance). The housing element is the first benefit to be adjusted where benefits exceed the cap. The DWP estimated that 56,000 households will be affected by the cap, of which 25,760 are social housing tenants (DWP, 2012 cited in Ipsos Mori, 2013). Table 2.4 indicates that tenants in larger properties will be more affected by this benefit reform than those in 2 bedroom (or less) properties. Those living in private rented accommodation and those living in London (Pawson, 2011) are also expected to be more at risk due to the benefit change due to higher rental costs.

**Table 2.4 Weekly Non-Housing Benefit Entitlement by Property Size** (adapted from Clarke and Monk, 2012 cited in Ipsos Mori, 2013)

| **Size of property** | **Composition of household that would normally occupy** | | **Benefits claimed** | **Benefit cap** | **Amount left over for rent** |
|---|---|---|---|---|---|
| Bedsit | Largest | Single person over 25 | £71.00 | £350 | £279.00 |
| | Smallest | Single person under 25 | £56.25 | £350 | £293.75 |
| 1 Bed | Largest | Couple with no children | £111.45 | £500 | £388.55 |
| | Smallest | Single person with no children | £71.00 | £350 | £279.00 |
| 2 Bed | Largest | Couple with two children | £276.49 | £500 | £223.51 |
| | Smallest | Single parent with one child | 122.10 | £500 | £377.90 |
| 3 Bed | Largest | Couple with four children | £406.75 | £500 | £93.25 |
| | Smallest | Single parent with two children | £170.91 | £500 | £329.09 |
| 4 Bed | Largest | Couple with six children | £537.02 | £500 | -£37.02 |
| | Smallest | Single parent with four children | £366.30 | £500 | £133.70 |

Table 2.5 provides a summary of the potential impacts on landlords and tenants of the Universal Credit, Bedroom Tax and Household Benefit Cap welfare reforms, "Income collection is likely to require more active management as the impact of welfare reforms begins to affect the sector" (HCA, 2013b). The direct payment of benefits to tenants is expected to have the biggest impact on landlords. More generally the vast majority of landlords believe the welfare reforms will lead to increased rent arrears in the region of 51%. The majority of landlords do not expect rising levels of rent arrears to affect their ability to make debt repayments (Ipsos Mori, 2013) so

efficiency gains will be necessary elsewhere and could impact the funding available for maintenance and refurbishment.

**Table 2.5 Risk Factors Presented by Universal Credit, Social Sector Size Criteria and Benefit Cap** (source. Ipsos Mori, 2013)

| **Risk factor for HA** | **Welfare reform** | **Impact** | **Potential Impact on Landlords** |
|---|---|---|---|
| Large proportion of working age tenants on Housing Benefit | All measures | HAs with greater proportion of working age tenants claiming benefits will be most affected by reforms | |
| Large proportion of tenants have rent paid in full by Housing Benefit | Universal Credit – Direct Payment | Tenants not used to paying rent themselves may find this difficult. | - HA will have to provide more resources for money advice and arrears management etc<br>- Increased difficulty in rent collection<br>- A rise in level of arrears Fall in rental income |
| Large proportion of workless households with 4 or more children | Household Benefit Cap | Most of these households will see their housing benefit cut to keep benefits in-line with the cap, some of which will be substantial. | - Increased difficulty in rent collection<br>- Fall in total rental income - - Change in allocations policy |
| HAs in London and other high priced areas | Household Benefit Cap | Tenants' housing benefit is expected to be cut to keep it in-line with the cap. | |
| Small proportion of 1 bedroom stock | Social Sector Size Criteria | HAs will experience a mismatch between supply and need. Tenants will be prevented from moving to more appropriately sized accommodation to maintain receipt of their full housing benefit. | - Increased difficulty in rent collection and arrears<br>- Fall in total rental income - Change in allocations policy<br>- Reclassification of a significant number of properties to a smaller number of bedrooms |
| High proportion of larger properties | Social Sector Size Criteria | More exposed to under-occupation and benefit cuts as a result. | |

2.3.2.3 Rents

A new investment framework instigated 2011/2012 permits (not mandates) landlords to let new properties (and a proportion of re-lets) at affordable rents, most likely 80% market value (market value should be calculated in accordance with RICS valuation methods and considered against the Local Housing Allowance (LHA)). To put this rise into context, in the 2009 analysis of rents (DCLG, 2009), LA tenants paid approximately 62% market value (representing a subsidy of £3.7bn) and HA tenants paid 67% (£3.4bn subsidy), and thus the affordable rent represents a

significant increase. The same analysis concluded that by increasing rent by 10% a further 50,000 people would need housing benefit (an increase from 67% of tenants to 68%). The additional revenue accrued by HAs from Affordable Rent should be made available to develop new social housing (Wilson, 2013), as opposed to the maintenance and improvement of existing homes. Affordable rents sit along-side social rents both of which are available for fixed term and full assured tenures. This undoubtedly complicates housing management and also has implications for housing asset management. Whilst rents are set, mechanism to increase rents was created under section 13 of the Housing Act 1988 for assured tenures only, such statutory provisions were not extended to fixed term tenure. However that doesn't mean that rent increases cannot occur during the fixed tenure period but instead needs careful consideration at the outset of the contract. Traditionally social rents have been set by government and not subjected to market-based volatility, unlike the affordable rents which will be more susceptible to the precariousness of the housing market (NHF, 2012). The Coalition Government maintained the rent convergence and target rent instigated by the previous administration, which essentially sought to eradicate rent variance across the social housing sector so that similar rents were offered for similar properties but still providing discounts to market level rents. The 'formula rent' was based upon property value, local earnings relative to national earnings and weighted against the number of bedrooms so that "rents better reflected the perceived value of properties being occupied" (Wilson, 2013). Convergence of HA and LA rents is expected by 2015-2016 and supported by a national average increase of 6.8% for 2011/2012; the increase was based upon inflation and convergence factors. The ability to raise rents would certainly ease housing asset management however any increases must be weighed against what tenants can afford. A survey of the top 25 stock-owning councils in England by Inside Housing found that 3 landlords (Leicester, Lambeth and Nottingham) owning 20,000+ properties opted out of applying the maximum rent increase for 2013/14 (average 5.1%) citing consideration for tenant cost of living. This was despite warnings from the Association of Retained Council Housing that non-application of maximum rent increases could jeopardise stock investment. The Coalition Government (via the Localism Act 2011) continued with the LA reforms instigated by the previous administration by way of replacing the HRA subsidy system with a self-financing system which (amongst other issues) permits LA to set their own rent levels. Beyond the convergence target of 2015/16, Government announced, via the 2013 budget, annual rent increases of the Consumer Price Index (CPI) plus 1% which was welcomed by the NHF (Merrick, 2013) for providing a level of rental security which will enable landlords to manage their existing stock and produce development plans with greater confidence.

The social housing sector has been innovative in many ways and this extends to funding for maintenance and refurbishment of existing properties. 'Warm homes Oldham' was a new scheme announced in September 2013, which for the first time received investment from the NHS, to be combined with ECO and landlord investment to fund refurbishment schemes that will tackle fuel poverty and thus reduce the burden on health care and social services. Tenants will be able to apply for the funding which aims to lift 1,000 people out of fuel poverty during the first year with up to £10,000 for retrofit works for insulation and heating upgrades. This is a similar level of funding available via the GD but is still significantly less than the figures quoted by Rickaby for retrofit works to achieve emission reductions in the region of 60%. So whilst this scheme is innovative and if successful will reduce fuel poverty in Oldham, it is not expected to significantly contribute to the 2050 emissions target.

2.3.2.4 Summary and Implications for Research

The Government is still the effective financier of the social housing sector through housing benefit allowances and as such uses the sector to push through its housing policies. The sector can be vulnerable to economic flux, must be able to adapt to change and have mechanisms in place to achieve national and local targets. Traditional regulation and inspection regimes have influenced social housing landlords' operational and long term strategic approach to housing management focussing on short-term gains which was counterproductive for the integration of the sustainability agenda. The reforms could be an opportunity to redress the previous policy shortcomings and allow landlords to determine for themselves what sustainability means and how they can best implement it, albeit focus remains on climate change mitigation rather than an integrated approach with adaptation and the broader sustainability agenda. The new model must have the functionality to incorporate the decisions of other stakeholders including tenants, transparently.

### 2.3.3 Social Housing Asset Management

The literature review thus far has provided a brief history of social housing policy as a means of contextualising the current social housing position and its influence on maintenance. This section will examine current asset management strategies and review the social housing maintenance model.

Social housing management has been defined as " ... the set of all activities to produce and allocate housing services from the existing social housing stock." (Priemus et al, 1999). This definition encapsulated the large variety of activities undertaken by a social landlord in the management and administration of their housing stock, such as, all the technical aspects including maintenance and refurbishment, the financial management including rent collection and housing allocation. There wasn't any systemic strategic asset management of social housing prior to 2000.

Asset Management has traditionally been associated with the private sector but the discipline has rapidly evolved within social housing helped in part by the DHS from which landlords were "encouraged to develop asset management skills in support of strategic business planning and option appraisal (Larkin, 2000; Walker and Van der Zon, 2000). Asset management received a further boost with the implementation of the principle of co-regulation under the current regulatory regime which essentially replaces the regulators and stakeholders with residents in the decision making process which is expected to "drive a more active asset management strategy" because "residents have realistic expectations of the life of their homes and can inform delivery of works and services" (Jones et al, 2011). Whereas in the past asset management strategy has focused on achieving the targets established by regulators; strategies now must have the resident as the central feature and work towards "delivering a service that is in the best interest of the residents and their business." (Jones et al, 2011). The National Housing Federation (2011) thus defines housing asset management as "... understanding and managing the performance of, and risks presented by, a landlord's assets. A housing asset management strategy therefore provides a framework for landlords to manage stock proactively and support business plan objectives." Thus it is implied that operational implementation of the housing asset management strategy reflects the organisations strategic goals and it is the responsibility of the housing asset manager to develop strategic housing management plans which achieve this. The strategy must take account of national (e.g. government regulation) and local variations (e.g. stock (profile and quality), housing demand (Gruis and Nieboer, 2003) and the changing level of building performance during its life-cycle).

Whilst the demand for housing asset management strategy has been externally driven by Government (as seen recently with the DHS) and regulators, the manner in which these expectations are met are driven internally and depend upon the business ethos and corporate agenda (Bacon et al 2007 cited in Morris, 2013 and Menzi, 2007). Gruis et al 2004 have

identified two main approaches taken by social housing landlords towards housing asset management strategy; the market orientated approach and the traditional task driven approach. A market oriented approach to housing asset management includes stock rationalisation as well as acquisition. Thus a landlord would sell off under-performing (high maintenance spend) properties, reinvest those returns via stock improvement works such as the DHS and purchase new dwellings as a means of diversifying the portfolio and generating greater returns. In contrast, a traditional task driven approach to housing asset management would not take a commercial approach to stock rationalisation, instead focusing on retaining and maintaining its existing stock and managing the needs of its existing tenants. These landlords are seen by some to be less innovative than their counterparts (Czischke et al 2012).

Beyond the physical performance of the housing asset, social housing landlords are under increasing pressure to consider the sustainable performance of their stock. From a social perspective it requires a strategy that understands the needs and aspirations of its current tenants and how that may change over time; from an environmental perspective landlords are driven towards reducing energy consumption and carbon emissions (foremost) to reduce fuel poverty (amongst other targets) and from an economic perspective it's about understanding what is affordable in the business plan. In this respect the National Housing Federation (Jones, et al 2011) also support the market oriented approach to housing asset management and the departure of the traditional task driven approach due to current co-regulatory regime and encourage a housing asset management strategy that "consider what investment is needed in their properties when it will arise and whether alternative options such as demolition, disposal, change of use or stock rationalisation could improve the worth – both financial and social – of their housing and other assets." The National Housing Federation encourages members to measure the performance of their stock in-use, suggest national policy should be combined with local need, provide examples of the tools and data that may be required and conclude that single criteria measures will not provide the depth of knowledge required. However, they don't provide landlords with an approach to assimilating performance data in order to inform their asset management strategy.

Asset management strategies and business planning should be linked and account for;

- Sustainable assets need a long term approach to investment (an asset management strategy is typically planned over a 30 year period although previous regulatory auditing and the spending review forced a short term approach to be taken)

- A proactive approach to asset management is needed so that decisions can be made about individual properties
- The wider aims of the organisation.

Whilst the strategy itself should achieve;

- "Effective stock investment: a stock investment programme designed to keep all properties to the required standards and deliver carbon reduction;
- Active asset management: identifying properties which have a poor social, economic or environmental performance, because of low demand or high costs, and either improving them or replacing them with properties which are fit for purpose;
- Supporting wider objectives: being clear where and how asset management is supporting wider objectives, such as new development or supporting wider community activities." (Jones et al, 2011)

According to the Housing Forum (2006) the "greatest barriers to improvement of the existing stock were the lack of focus on, and expertise involved in, many client organisations' Asset Management Strategies, Stock Condition Surveys and Options Appraisals as well as the more commonly referred to issue of the availability of funding. As a result the 'Asset Management Process Model' (Figure 2.15) was produced for LA and RSLs. The model presented is a decision tree aimed at limiting (or at least identifying) the risks associated with strategic planning and pre-programming which could block procurement and construction processes as well as the risk associated with "balancing estate need against budget constraints."

The traditional approach to housing management (which still prevails within the strategic asset management approach to housing) involved taking stock of the condition of a landlord's housing assets and then using some form of life cycle analysis combined with a strategic housing asset management policy to plan maintenance, refurbishment, acquisition and disposal. This approach however does have a number of weaknesses as far as long term strategic housing asset management is concerned which stem from the theoretical basis on which the life cycle model is based.

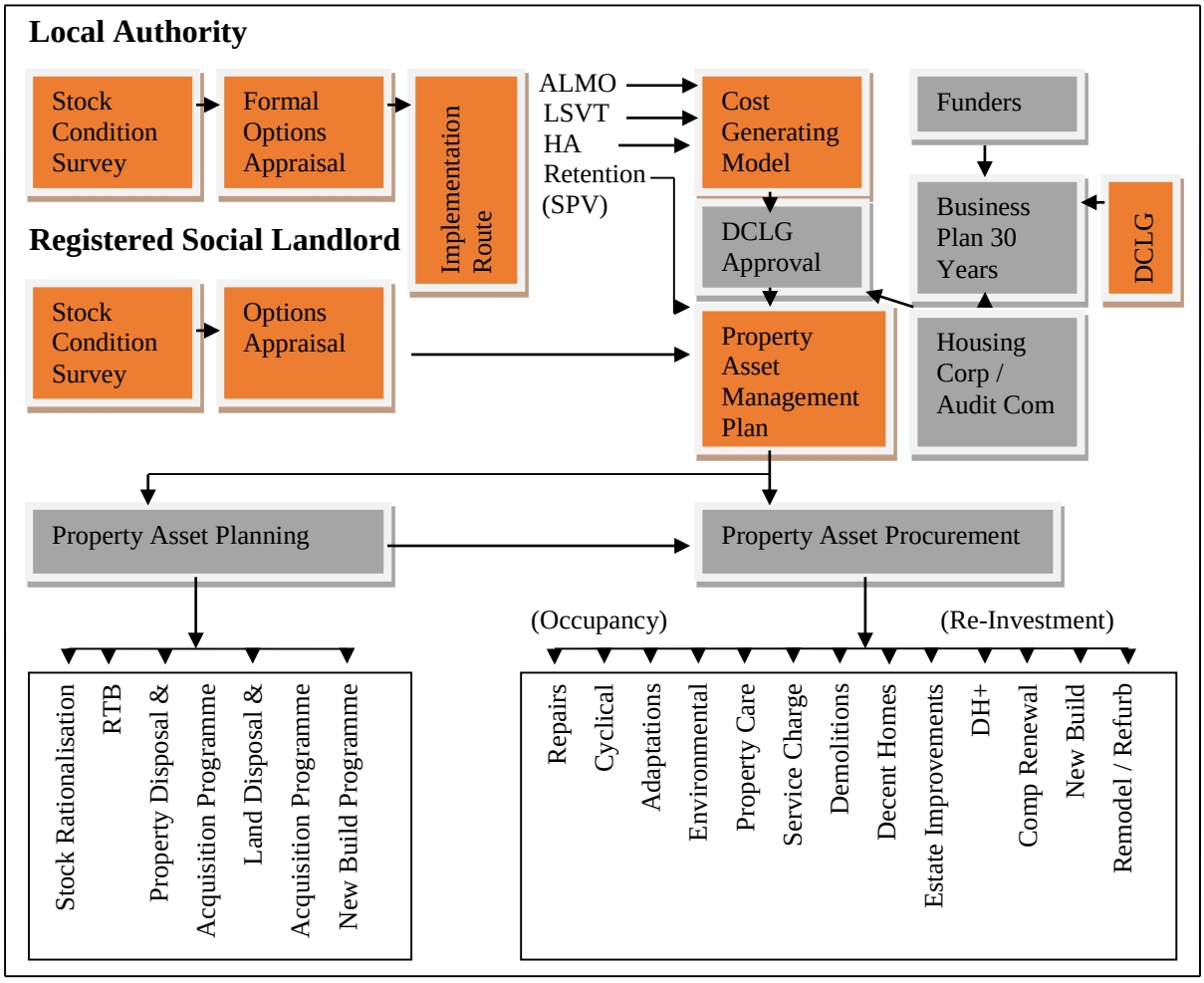



**Figure 2.15 Social Housing Asset Management Tool (Housing Forum, 2006)**

The illustration by Finch (Figure 2.16) shows that in essence life cycle modelling is an incremental process in which you start at a given position along the time-performance line and project maintenance and refurbishment forward to return the built asset to a pre-defined level of performance. There are a number of problems with this scenario;

- Changing definition of performance; in the past the main function of the house was to be weatherproof, and is now to provide an opportunity for all to have a decent home
- Assessing the future need and function of the building stock
- The changing role of the social landlord - The traditional role of a social housing landlord was to provide homes at below market rent for low-income households. This role has changed and expanded as landlords have become more socially and environmentally accountable.

- Climate change predictions; as discussed in section 2.2.1.2, the Stern Report highlighted the problems associated with determining the consequences of climate change with any certainty due to the long-time horizons involved and its global nature.

Therefore rarely are future demands built into the modelling process, and even when they are they tend to look no more than 3-5 years ahead and as such throughout the building's life-cycle maintenance/refurbishment cycles invariably play catch up. The performance gap that occurs is also known as obsolescence (Figure 2.11). Whilst built asset management strategies seek to minimise this gap through routine maintenance to repair physical decay and periodic refurbishment to address changes in user demand, the economic constraints on managers are such that this gap is never entirely closed. The widening obsolescence gap may eventually become too large for cost effective refurbishment to resolve and eventually renders the building a liability to the organisation, at this point the building is either sold or demolished.

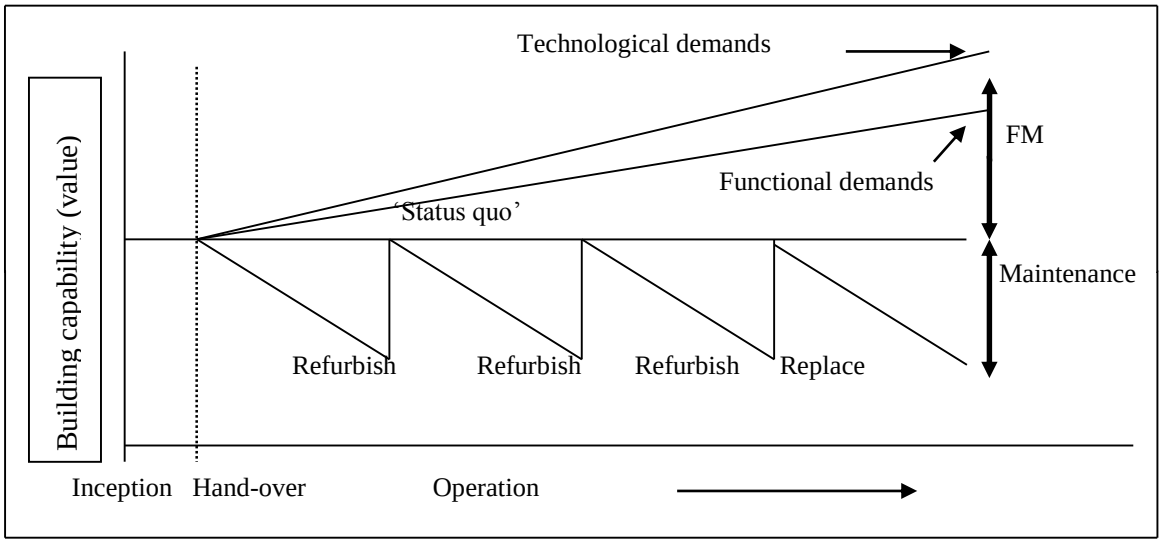



**Figure 2.16 Building Life Cycle** (Finch, 1996)

During the DHS tranche of maintenance and repair work a property would become obsolete to a landlord if the cost of achieving the DHS didn't represent value for money, in this instance the decision could be made to sell the property to fund repairs to other properties and so ensure the viability of the remaining stock.

The crux of social housing asset management is to ensure there are sufficient funds available for maintenance and refurbishment to prevent insurmountable performance gaps occurring and rendering assets obsolete. The implications of climate change on asset management are

significant and will result in increased demands on performance of the social housing stock. Increased flood risk will require greater resilience measures to be incorporated for vulnerable properties and increasing temperatures will lead to further overheating requiring cooling measures, both of which are expected to be very expensive. The most cost effective way of implementing such measures is to integrate adaptation and mitigation into the asset management strategy to spread the cost over a longer period of time. Climate change mitigation is currently supported by Government policy and associated initiatives and grants, whilst adaptation is seen as a cost burden (much like maintenance was prior to the DHS) competing for the same funds as other maintenance and refurbishment actions. This will add another level of complexity for social housing landlords, how do they balance maintenance and refurbishment action to sustain building quality now with stock adaption for an uncertain future climate.

## 2.4 Social Housing Maintenance

> *"All buildings start to deteriorate from the moment they are completed, and at that time the need for maintenance begins"* (Arditi and Nawakorwit 1999).

A crucial element of a proactive housing asset management strategy is housing maintenance.

Management of social housing can be split into two main functions; management of people in the dwelling, such as management of tenancies, enforcement of contractual and statutory tenancy conditions and management of the property itself, in the maintenance that is carried out to ensure that is fit for occupation and remains a viable asset. Whilst social housing management is important in terms of providing a good quality of life for tenants through the provision of services which meet their aspirations whilst representing value for money, the question raised by this project is whether or not the sustainability of existing social housing can be improved through routine maintenance only and therefore will concentrate on the maintenance of the property itself rather than the management of people in the dwelling. Together these two aspects make up the central activity of any social housing landlord and whilst housing maintenance is being examined in isolation in this project it is important to note that one impacts the other. For instance if a poor quality repairs service is carried out there will be greater dissatisfaction amongst tenants which could lead to tenants being less inclined to care for their estates and properties and greater levels of non-payment of rents. This in turn puts greater pressure on housing management teams as they handle more tenant complaints and higher levels of rent

arrears. Therefore it is imperative that high levels of quality are sustained across both maintenance and management.

Maintenance isn't just about the physical completion of work to a dwelling and is defined as "work undertaken in order to keep, restore or improve every facility, its services and surrounds to a currently acceptable standard…." (CIOB 1990)

However the internationally recognised BS ISO 15686-1:2000 Building and the constructed assets – service life planning: General principles, defines maintenance as the "combination of all technical and associated administrative actions during the life of a building to retain a building or its parts in a state in which it can perform its function".

In the context of social housing, the function required of such buildings is that they are able to provide "the opportunity of a decent home" and provide the improvements in the quality of that housing as defined in the governments 'Quality and Choice: A decent home for all' (DETR, 2000b)

The subtle difference between the two definitions highlights the sometimes confusing role of maintenance as it's a term used liberally when discussing planned and unplanned works to buildings including activities such as inspection, servicing, replacement and improvement. The two definitions help to differentiate between maintenance and social housing management, but indicate that maintenance goes beyond that of physical work carried out to a dwelling and includes all work

- Preceding technical activity – stock condition surveys, routine inspections, handling tenant requests for repairs etc.
- Consequential to technical activity – post work inspections, payment authorisation, obtaining tenant feedback etc.
- Supporting technical activity – keeping and updating building records, preparing technical aspects of tenant handbooks etc.

This definition suggests that the aim of maintenance work was to retrain a certain level of building performance and as such obsolescence can occur.

In recognition of the existence of obsolescence the Charted Institute of Buildings produced this definition "work undertaken in order to keep, restore or improve every facility, its services and surrounds to a currently acceptable standard…" which implies that some degree of improvement over the life of the building is acceptable. Improvements can be made to try and reduce the obsolescence gap but are also necessary to meet rising standards in comfort levels, amenity and changing tenant demographics.

Housing stock is a major asset of any social housing landlord representing many billions of pounds of private and public investment. Thus the repairs and maintenance service is one of the most important services a landlord provides in terms of overall tenant satisfaction and resources (approximately £9billion a year is spent on repairs and maintenance (CIH 2011)). It is the function that brings them in most direct contact with their tenants; therefore overall satisfaction is heavily influenced by the quality of this service. The TSA 'Existing Tenants' Survey' reported that top of the list for a good rating was 'the perceived effectiveness of repairs services and the extent to which the landlord was seen as maintaining the home in a 'decent condition''. A good repairs service not only ensures provision of homes people wish to live in but ensures that the condition and value of the housing stock is protected in the long term. Current government policy (Sustainable Communities 2003, Warm Homes and Conservation Act 2000 and the DHS, Localism Act 2011 etc.) presents technical challenges in implementation as well as financial challenges to funding but haven't changed the manner in which maintenance is planned.

Housing maintenance consists of Planned Maintenance, Responsive Maintenance and Void Maintenance, the objectives of which are,

- To ensure that buildings and their associated services are in a safe condition
- To ensure that buildings are fit for purpose
- To ensure that the condition of the building meets all statutory requirements
- To maintain the value of the building stock
- To maintain or improve the quality of the building

### 2.4.1 Planned Maintenance

Planned maintenance is usually a large-scale programme of work to a property or number of properties, organised proactively, usually based upon a comprehensive stock condition database

of the existing and projected repairs needs of the landlords stock. It is through planned and cyclical maintenance that the DHS, DDA, gas and asbestos regulations can be addressed. Planned maintenance is landlord driven and seen as the most cost effective form of maintenance. In planned maintenance predicting the time interval between maintenance interventions can be estimated with a certain degree of accuracy due to the number of resources available such as, recommendations of component manufacturers, life-cycle data from HAPM Component Life Manual and the Charted Institute of Building Services Engineers' Guide to ownership, operation and maintenance of buildings, as well as data on the life-cycle of subcomponents and frequencies of cyclical work.

### 2.4.2 Responsive Maintenance

Also known as reactive or day-to-day maintenance and is most often the service that brings residents into contact with their landlord, prior to the requirement that all homes become decent by 2010, maintenance replied more upon this type of repair than any other. This is an expensive form of maintenance despite the low individual repair costs (usually no greater than £500). This form of repair may be tenant or landlord driven and is the result of wear and tear, accidental or deliberate damage or the effects of weather making it largely unpredictable. Responsive repairs are more difficult to predict as an activity only occurs when triggered by an external agent, such as severe weather or vandalism. Still, BRE (2005) believe it is possible to express such occurrences in terms of frequency but acknowledge that they will not be as accurate as those used for planned maintenance.

The distinction between planned and responsive maintenance is that responsive maintenance is event driven and planned maintenance is time driven.

There was increasing pressure on providers of social housing to take a more business-like approach to maintaining their properties. It was recognised that a more systematic approach was needed with a greater emphasis on planned preventative maintenance (PPM) rather than on responsive maintenance (RM) (Larkin, 2000). This was reinforced by the ODPM who suggested maintenance strategies should have a greater emphasis on PPM works as RM work was invariably more expensive because as an unplanned one-off item of work it cost more than the same item which was carried out as part of a larger planned piece of work (ODPM, 2003). In this

respect the Audit Commission recommend that 60-70% of maintenance works by cost is a good-practice benchmark for PPM works.

### 2.4.3 Void Maintenance

Void Maintenance is work carried out to a vacant property to enable it to be re-let. As void properties only occur as a result of tenancy turnover the frequency and therefore annual allowance for such works is fairly straight forward and is based on the total number of dwellings becoming vacant each year as a proportion of the total stock. It is important to note however that works in respect of voids represents a disproportionately large proportion of housing maintenance cost (ODPM, 2003).

### 2.4.4 The Built Asset Maintenance Model

In terms of housing maintenance decision making, Larkin (2000) found that "in general, the assessment is that associations are now only coming to focus on the performance, location and viability of their existing stock". Research within this field was problematic because of the lack of systematic information on the decision making processes of social landlords, however there were a number of case studies available from within the RSL sector (Larkin, 2000; William Sutton Trust, 2000; and Newey, 2002). RSLs were recognised as the most innovative in this area as Walker (2001) found that they had more fully embraced the New Public Management and its associated management approaches (in part due to mixed funding regimes) than LAs. This could also be a reflection of the status placed upon RSLs by the government in the 1980s as the preferred provider of social housing and the fact that they are considered to be more independent of government than LAs (Walker and Van der Zon, 2000). However in 2000 (Larkin), illustrated little evidence of strategic influence on maintenance practices.

In the current approach to social housing maintenance, the Stock Condition Survey (SCS) is central to the decision making process (Figure 2.17). The survey provides a snapshot of the physical condition of the housing stock at a particular point in time from which a stock condition profile model is developed that predicts maintenance demand and the associated budget requirements over a 25-30 year period (although a rolling 12 month budget is also determined). The demand for maintenance action is predicted using data relating to the length of time remaining before a component fails or requires maintenance. Maintenance need has until

recently, been determined by considering the physical condition of components and compliance with the DHS (with the exception of the HHSRS the standard is not an absolute but relative to individual organisations), however under the current co-regulatory regime landlords will develop their own maintenance goals and could be expected to include mitigation and adaptation measures to climate change which to-date have not been a priority within asset management strategies. Budgetary constraints and specification standards (e.g. legislation) are applied to the demand profile and maintenance options and risk are assessed to ensure that the housing stock remains viable over the period until the next refurbishment stage. Finally, for cash flow purposes the demand model is 'smoothed' using algorithms and alternative maintenance strategies (e.g. responsive or planned maintenance) are assessed.

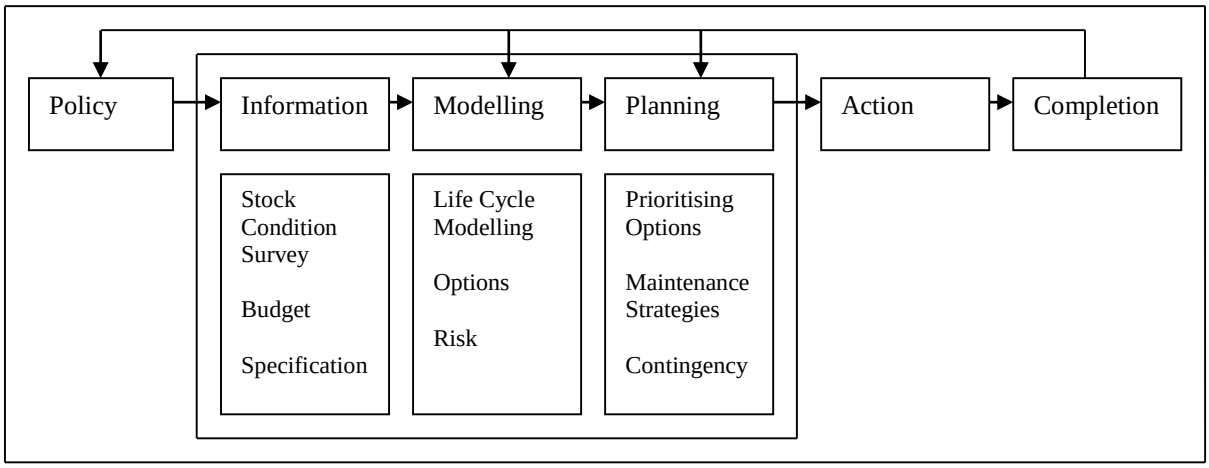



**Figure 2.17. The Built Asset Maintenance Process Model (source: Wordsworth, 2001)**

There are a number of well documented problems with the model just described (Sharp and Jones, 2006). In the past, maintenance priorities have generally been determined upon what could be afforded and not by the needs of the building stock (Bowles et al, 1997), and for most organisations maintenance is still viewed as a necessary evil and a cost burden (Moua & Russell, 2001). So not surprisingly, as maintenance budgets fluctuate in response to the economic conditions of the day it usually results in maintenance works being conducted to the barest minimum standard resulting in no improvement being made to the quality of housing stock.

Sharp and Jones (2006) identified further problems with this model, although it is assumed that organisational policies drive the maintenance planning process, in many instances policy objectives were unclear and an organisation's strategic objectives were not linked to its maintenance programmes. The effectiveness and efficiency of using the stock condition survey

process as the basis for developing planned maintenance programmes also attracted criticism. Chapman (1999) identified: poor specification of initial requirements; unclear aims and objectives and inappropriate frameworks; an inability to predict long term cost requirements; variations in levels of experience of those conducting surveys; unrealistic claims by consultants selling survey services; inappropriate or unusable data; poor links to organisational objectives; and a lack of fit of survey data to maintenance programmes as the key factors that contributed to high levels of dissatisfaction amongst social landlords. Dissatisfaction is further heightened by approaches to priority setting which are often simplistic, introducing subjective elements into the decision-making process which makes it difficult for maintenance managers to justify their decisions (Shen et al, 1998) to others. The stock condition survey still has fundamental problems despite its continued use as a method of collecting data upon which long term maintenance programmes are determined and despite attempts to improve the process (Staub, 1998; Damen & Quah, 1998; Jones et al, 1999). Finally the process model implies a feedback loop which in reality rarely occurs resulting in the same mistakes being made over and over again (Arditi & Nawakorawit, 1999). Given the above concerns there must be doubt about the ability of such a system to accommodate the wider range of criteria that need to be considered if the objectives of improving the sustainability of existing social housing is to be achieved through routine maintenance/refurbishment (Cooper and Jones, 2008).

As discussed in section 2.3.2, the backlog of repairs and concerns for housing quality which resulted in the implementation of the DHS was itself the result of economic constraint (and perhaps a lack of strategic asset management planning). Social housing asset management and particularly housing maintenance could once again be entering a period of uncertainly, or at the very least additional complexity due to the combination of a double-dip recession and the consequences of the welfare reform, most notably the universal credit, capped housing benefit and ‘bedroom tax’. Youde (2013) has reported that members of The London Assembly are concerned that the universal credit will lead to increased arrears and evictions, Labour Assembly Member Fiona Twycross has stated that “All the evidence suggests that when housing benefit is paid directly to tenants, more people get into arrears and that means housing association losing out on the cash they need ...”

### 2.4.5 Occupancy Behaviour

Much has been said about the current maintenance development programme, the basis for which

is the physical condition of the dwelling in question and much has been said about predicting the system/element remaining life in the production of PPM programmes. Whilst tenant participation is acknowledged as being an important part of the decision making process, none of the research quoted to date reflects the impact the occupant can have on the condition of the dwelling, and hence on maintenance need, maintenance cost or impact on resource use and its associated problems (e.g. emissions). This issue was partially revealed when Holmes (1985) stated, "available data on local authority maintenance costs reflect global costing without including social environmental and technical factors common to local authority estate". Without resolving this issue and ".. without proper integration of information relating to property and the users of dwellings, housing maintenance need prediction will remain an intractable problem for housing managers" (Olubodun, 2001). It is acknowledged that dwellings on the same estate, with the same architectural attributes and building services produce different maintenance demands dependent upon tenants' personalities, life styles and attributes. Olubudun's research concluded that the most significant (tenant characteristic) factors effecting maintenance demand are; the tenants age; presence of disability or limiting illness; vandalism index; length lived in last home; right-to-buy speculation and the likelihood of moving from present home against the maintenance cost; satisfaction and property condition models. El-Haram and Horner (2002) added to this line of argument by concluding that "maintenance cost is greatly influenced by factors which can only be evaluated subjectively, such as high expectations of tenants and improper use of the property."

Maintenance requirements are multi-facetted, with tenant attributes being just one contributing factor. Olubudun, 2011 (supported by Al-Haram and Horner) suggests that in order for a maintenance manager to understand and be able to predict the maintenance need of the housing portfolio, it is necessary to understand the physical condition of the dwellings but also appreciate the "variation in tenant profiles and their effects on maintenance generation." Tenant influence can have a significant impact on maintenance funding contributing up to 25% of the total maintenance need predicted.

It is too early to tell if the welfare reforms will result in an alternative approach to social housing maintenance, at the time of writing it still appeared to be business as usual.

### 2.4.6 The Role of Refurbishment

The Oxford dictionary defines 'Refurbish' as the verb 'to renovate and decorate (something, especially a building)'.

Riley and Cotgrave (2011) define refurbishment as "Extending the useful life of existing buildings through the adaptation of their basic forms to provide a new or updated version of the original structure". The extent of work this entails will be dependent upon a number of factors including, but not limited to, the existing condition of the building, size and location and may be carried out on a small or large scale. Retrofit, renovation and conversion are terms that are commonly used interchangeably with refurbishment.

There can be some blurring between actions undertaken as part of planned preventative maintenance and those of refurbishment. However, the building life cycle illustrated in Figure 2.18 implies that refurbishment is undertaken when the occupier's threshold of performance acceptability is reached, beyond which the building is deemed no longer fit for purpose. Refurbishment thus plays an important role within the building lifecycle and in maximising the viability of a property. There is no set time-point within a building's life-cycle when refurbishment will take place, as this is dependent upon the extent of maintenance and changing user demands and nor are levels of performance specified as they too are specific to the building and building user. Jones and Sharp's (2007) re-interpretation of Finch's building life cycle diagram (Figure 2.16), concurs with this theory in which a series of maintenance cycles is followed by a point where the building fails to satisfy the occupants requirements at which point refurbishment takes place in an attempt to improve the building performance.

In terms of social housing, one of the major differences between maintenance and refurbishment is the way in which it is funded. Historically maintenance works have been funded by the revenue account whilst refurbishment works are funded from alternatives such as the 'Major Repairs Fund'.

There are political, environmental, social and environmental benefits to refurbishing existing properties (especially in comparison to demolition which is the counter-argument in the creating more efficient homes); they are socially more acceptable and protect existing communities, able

to tackle fuel poverty, prevent urban sprawl and re-use existing materials and infrastructure (Power, 2008).

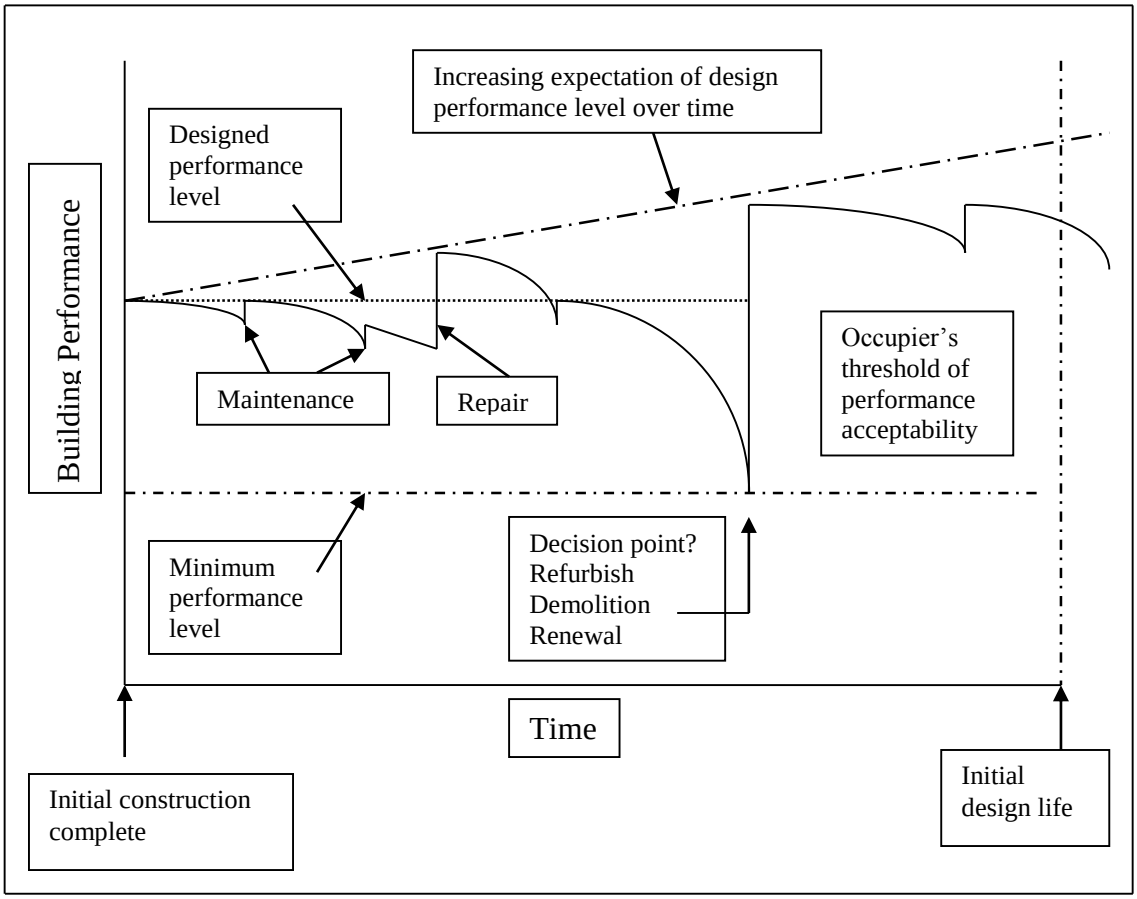



**Figure 2.18 Life Cycle of a Building** (source Riley and Cotgrave, 2011)

### 2.4.7 The Role of Life Cycle Assessment

It is not unrealistic for buildings to have physical lives of 50+ years, even with minimal maintenance (Chanter and Swallow, 2007); testament to the durability of building stock is the large number of early 1900's terraced housing stock still in use today. The life cycle of a building consists of a number of phases; preconstruction (planning and design), construction, occupation or operational (includes maintenance, refurbishment and has been described above) and finally demolition and recycling. The building itself consists of many different materials and technologies which have varying service lives, some of which will require replacement more frequently than others. The service life (life cycle analysis) of building elements and components is used with the SCS to determine the level of maintenance need throughout the 30 year maintenance plan, as discussed in section 2.3.3. There are a number of issues with this approach

which have been already been discussed, one of which is the level of subjectivity involved in estimating the remaining functioning service life of a building element / component.

Life Cycle Assessments (LCA) are becoming increasing important in terms of national and international environmental regulation (specifically ISO14040, 14041, 14042, 14043). ISO 14040 defines life cycle assessment as "the collection and assessment of the inputs and outputs of any potential environmental impacts caused by the product system throughout its life cycle". Thus the Life Cycle of a product starts with the extraction of its raw materials (cradle) through to its end of life when it is discarded (grave) or recycled. In order to assess the life cycle of a product or service, information on all the material, energy and waste flows are evaluated to calculate the overall impact on the environment of that product/service from cradle to grave as illustrated in Figure 2.19. This can be a very complex and time consuming process, however it can help design products and services which have less environmental impact and can help organisations better understand their environmental impact (Hyde and Reeve, 2006). Clearly identifying the system boundary is critical to completing a LCA.

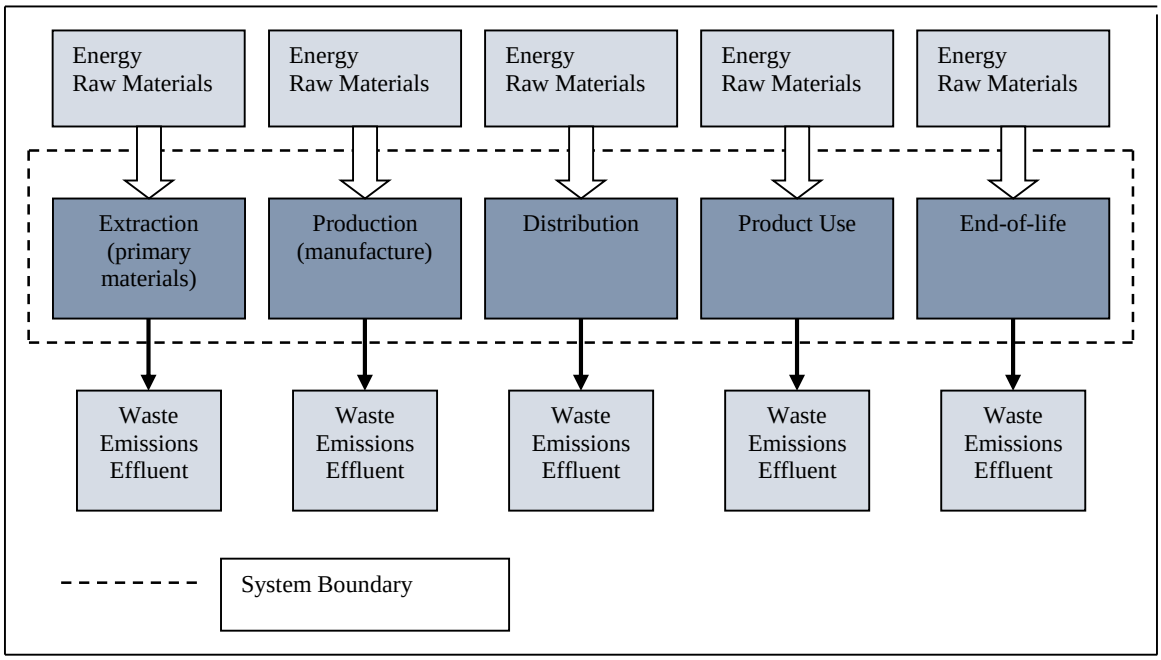



**Figure 2.19 Product Life Cycle System (Hyde and Reeve, 2006)**

The Green Guide to Specification (Anderson et al, 2009) provide LCA rankings from A+ (high environmental performance) to E (low environmental performance) for a variety of construction products, whilst Envest and TEAM are software tools to assist in the calculation of LCA of an entire building (all are discussed in further detail in section 2.2.3) although Halliday (2008)

determines these are still primitive in form. Erlandsson and Borg (2003) describe these tools as level 2 tools incorporating a top-down approach as the starting point is the building as a whole. They go on to suggest that toolkits such as BREEAM are Level 3 LCAs but in this discussion they are classed as Environmental Assessment Methods with the purpose of rating a building or benchmarking against others. LCA is not carried out in its entirety for all aspects of the building. The Level 1 is a bottom-up approach in which the LCA of an individual material or component is calculated, they are then summed to generate an overall LCA for a particular building.

There has been a propensity to form decisions based upon the initial cost of a building element or technology rather than on its 'life cycle cost' (LCC). LCC "of an asset is defined as the present value of the total cost of that asset over its operating life, including initial capital cost, occupation costs, operating costs, and the cost or benefit deriving from disposal of the asset at the end of its life." (Chanter and Swallow, 2007). Thus, LCC can be applied at the building, element, and component level and will aid decision making where, high capital cost, low maintenance and long service life elements / technologies are compared against low capital cost, high maintenance and short service life. In 2002, El-Haram et al stated that a major barrier to whole life costing was a lack of "useful, reliable and consistent WLC data".

### 2.4.8 Summary

Maintenance and refurbishment have the potential to improve the sustainable performance of social housing but only if sustainability is considered during decision making, the reliance upon condition may preclude this. However, social housing reforms have resulted in a shift from regulatory prescribed housing management to a proactive style of asset management, the content of which is now determined by individual landlords in conjunction with their tenants. This could provide the freedom for landlords to place sustainability at the heart of their decision making.

### 2.4.9 Implications for Research

Through its housing policy the UK government aims to deliver mixed sustainable communities (DCLG, 2006) and as the effective financier of social housing this policy needs to be reflected through social housing policy. Currently social housing maintenance need is determined upon a single attribute condition model. In this sense physical condition has become a proxy for performance which was acceptable in the past when the main function of a house was to be

weatherproof; it could be argued that the level of weatherproofing was a performance indicator, but with the sustainability agenda now driving UK governments housing policy this is no longer the case. To accommodate the broader physical and in-use performance attributes of the sustainability agenda, a multi attribute maintenance model is needed and with it a new set of key performance indicators.

## 2.5 Decision Making

This section examines in greater detail the approaches used by social landlords to determine maintenance priorities within the 30 year maintenance plan based upon an appraisal of their stock. It will then provide examples of alternative decision aiding tools which could assist the process to become more transparent, flexible and easier to integrate with the sustainability agenda permitting a more holistic approach to be taken.

### 2.5.1 The Current Approach

There was a number of decision aiding tools available to social landlords, the primary function of which was to prioritise maintenance need throughout the 30 year maintenance plan at an individual building level as well as at a stock portfolio level. It could be argued that the DHS provided direction in this respect, supported by Key Performance Indicators (KPIs) as "many repairs services were designed, at least in part, to meet the requirements of regulatory standards and inspection." (Jones et al, 2011). However the changes to the regulatory regime mean that social landlords must once again determine their own maintenance approach and performance standards based upon their strategic business goals and needs of their tenants. In doing so they must balance government requirements with their own unique circumstance (including, tenant needs, stock profile and its needs, interpretation of the sustainability agenda, available resources and organisational culture). One of the consequences of these reforms is co-regulation (sections 2.3.2.1 and 2.3.3), which requires the greatest level of tenant involvement in landlord decision making ever seen in the history of social housing. Tenant engagement can take many forms, such as tenant board member roles, focus groups, surveys etc. but is notoriously difficult to achieve (Hickman, 2006; Simmons and Birchall, 2007).

In the past, maintenance priorities have generally been determined upon what could be afforded and not by the needs of the building stock (Bowles et al, 1997). Effective decision making is key

to an effective maintenance strategy, certainly it is possible to derive a maintenance strategy based upon a single indicator such as 'repair costs' but this is very simplistic and as such will not allow integration with other indicators (such as tenant satisfaction) which may provide a more holistic approach. On the other hand it is possible to try and balance too many indicators making the whole process complex, time consuming, expensive and ambiguous. Shen et al, 1998 identified two issues which have contributed to the inadequacy of the current prioritisation process; subjectivity within the decision making process makes it difficult to justify priorities given to specific maintenance items and broad priority categories can result in the cut-off point occurring mid priority category and hence the difficult decision of which maintenance items should be placed within the current programme and which should be backlogged. Shen and Lo (1999) thus called for a new "framework in which maintenance can be prioritised rationally and limited resources can be allocated more wisely …"

An alternative approach is that identified by Holmes and Shen (1994) who surveyed forty six Local Authorities in England and Wales and established 5 levels of priorities. Works relating to health and safety and required to comply with legislation are given level 1 priority. Works required for the operation and safeguarding the fabric of the building are given a level 2 priority. Cyclical maintenance such as decorating is given a level 3 priority and the bottom priorities (level 4 and 5) are given to preventative work and that which is required to bring a building in line with current regulations.

Analysing single indicators is a simplistic approach to a complex problem and as such won't provide the asset manager with the depth of knowledge necessary to determine the performance of their entire stock, for example repairs costs data doesn't inform the landlord in regards to neighbourhood sustainability. However assimilating all the performance data available into a single stock performance measure is complex. Therefore social landlords can 'traffic light' or 'band' maintenance need based upon stock condition information, market information, financial appraisal and evaluation and neighbourhood information (Jones et al, 2011)

In recognition of the difficulties facing landlords, the Chartered Institute of Housing (CIH) developed a charter to assist social landlords "... identify what outcomes a good quality repairs service can deliver" (CIH, 2012), at the time of writing however this only covered the delivery of responsive repairs and not planned preventative repairs.

Key Performance Indicators and Balanced Scorecards have been identified as the preferred performance measurement framework for the construction industry and are discussed further in sections 2.5.2 and 2.5.3.

### 2.5.2 Key Performance Indicators (KPIs)

Key Performance Indicators (KPI) help organisations define and measure progress towards organisational goals. KPIs are quantifiable measurements that reflect the critical success factors of a particular organisation against which clear targets can be set, and provide a method of benchmarking an organisations performance against others within their sector to help drive further improvements. Successful KPIs can lead to improved staff motivation and tenant satisfaction by providing a clear picture of what is important and what is required to achieve improved housing performance. Bassioni et al 2004 (cited in Meng and Minogue, 2011) concluded that KPIs are the construction industry's preferred performance measurement framework as 26.4% of the leading construction firms implement them. Originally the construction industry focussed on 3 indicators; time, cost and quality which were extended following the Egan Report (Rethinking Construction) to include (amongst others) safety, productivity, and predictability. Hinks and McNay, 1999, (cited in Meng and Minogue, 2011) focused on developing KPIs for facilities management, producing a list of 23 including customer satisfaction, service reliability and effective utilisation of space. Numerous benefits of using KPIs within FM have been identified, however Loosemore and Hsin, 2001 identified " help to focus managerial efforts on relatively important areas of performance. … for the selection of FM service providers …" Meng and Minogue's (2011) study of performance measuring frameworks within FM focused on their use from a business perspective rather than an operational perspective and concluded that KPIs and Balanced Scorecards (BSC) were the most widely adopted frameworks by the FM industry. Limitations to their use include the difficulty of amending KPIs once they are implemented to reflect changing needs, KPIs thus tend to remain static so that current performance can be compared to previous performance and benchmarked against other organisations (Meng and Minogue, 2011). The Lam et al 2010 study developed a set of KPIs for maintenance projects rather than maintenance priority setting as is the focus of this research. This paper confirmed that the performance measurement approach to undertaking maintenance projects provided "opportunities to improve cost, risk and quality" (Straub, 2002) and that objective and subjective measures including satisfaction (Chan and Chan, 2004) should be considered. Various authors (Allen 1993; Chanter and Swallow 1996; Headley and Griffith

1997; and Sherwin 2000) have identified a set of KPIs which they believe should be included in the performance measurement of maintenance projects, which include the basic objective measures of time, cost and quality but in recognition that KPIs should provide a broad perspective also included age of building, disruption to the operation of the building, safety of occupants and users, functionality, environmental friendliness, environmental legal requirements. These KPIs cover (to a degree) social, environmental and economic criteria. As this demonstrates it is it important to select not only the correct (most appropriate for the organisation and task) performance measurement framework but also to carefully select the indicators and the number of indicators. To this end, Shahin and Mahbod (2007) discovered during their literature review that SMART was the most referenced set of criteria for developing KPIs. A SMART KPI is as **S**pecific as possible and avoids broad, general and ambiguous criteria; is **M**easurable either quantitatively or qualitatively; is **A**ttainable, out of reach criteria may be demoralising or criteria which is below minimum standards are meaningless; is **R**elevant and **T**ime-sensitive, there is a timeframe within which the criteria must be achieved.

### 2.5.3 Balanced Scorecards

Kaplan and Norton, 1992 (cited in Rasila et al 2010) created the balanced scorecard (BSC) as an alternative approach for assessing business performance, following 2 decades of criticism of the traditional tools (Johnson and Kaplan, 1987; Johnson, 1992; Wallander, 1999, cited in Johanson et al, 2006). More specifically traditional tools were accused of being too abstract and simplified (Johnson, 1992), short-sighted (Miller, 2003) and money-orientated (Johnson and Kaplan, 1987) (Johanson et al, 2006). BSC should represent the organisations shared vision and "evaluate whether a business is moving towards its strategic goal from four different perspectives financial, customer, internal processes and learning and growth" (Meng and Minogue, 2011). Those are the four viewpoints suggested by Kaplan and Norton (1992) which are popular and attempt to "combine financial and non-financial measures at multiple levels within organisations, and to make strategy and learning about value creation …" (Johanson et al, 2006), however they could be replaced with human resources, the environment, sub-contractors and social impacts (Rasila et al, 2010). The most common goals associated with the viewpoints are defined and transformed into numerical measures. Malmi et al, 2005 (cited in Rasila et al, 2010) found two potential problems with measurement development, firstly the temptation to produce too many measures and secondly allowing measures to remain loose so that their relationships to each other are difficult to understand. Ideally 8 – 26 measures should be created (and data collected

against them) which look backwards and forwards, over the long and short term, with approximately the same number of measures against each of the viewpoints for balance. The BSC contents should be regularly reviewed and updated to ensure the measures remain valid, reliable and functional; the frequency depends upon the specific organisation but as a minimum should take place when large strategic changes occur. The BSC approach proved successful at understanding the "facilitated management-related issues from the viewpoint of the support services and working spaces [however despite the methods being easy to understand and apply in principle, the creation of] "an entire BSC and measures is an immense workload" (Rasila et al, 2010). Epstein and Manzoni, 1998; Nörreklit, 2000; Marr and Adams, 2004, McCunn, 1998, (cited in Johanson et al, 2006) also found that a high proportion of BSC applications failed. Chan, 2004 (cited in Johanson et al, 2006) considered these failures to be the result of "lack of highly developed information systems, inadequate top-management support and/or excessive management focus on short-term issues. Johanson et al (2006) identified 3 critical issues; (1)'Implementation and Employee Mobilisation' this is a top-down approach in which "strategies, goals and measures [for non-financial measures] cascade down through the organisation", this is a paternalistic approach in which the voices of those being implemented upon are not heard. (2)'One-Size-Fits-All' the approach designed by Kaplan and Norton appeared to have large corporations in mind and neglected the requirements of the public sector and SME's. (3)'Time Dimension' the BSC approach measures a range of activities at a single point in time and doesn't allow a time lag, Nörreklit 2000 (cited in Johanson, 2006) concluded that on this basis the BSC was floored and was "often based on false estimations of the cause-effect relationship". Of course this could be overcome by regularly updating the BSC. Bassioni et al 2004 (cited in Meng and Minogue, 2011) considered the 4 viewpoints a limitation of applying BSC and Brackertz (2004) concurred with the suggestion that 6 viewpoints (service, physical, community, financial, utilisation and environmental) were necessary for the application of BSC in the context of facility performance. On a positive note Bassioni et al, 2004 (cited in Meng and Minogue, 2011) determined that 13.2% of the top 100 construction contractors and top 70 construction consultants adopted BSC as their performance measurement framework whilst Meng and Minogue (2011) believe it is becoming a more accepted framework for FM practitioners.

Within maintenance decision making, problems arise because,

- decisions are unclear and subjective,
- there is a need to evaluate subjective and objective criteria, yet a single criteria approach

is ostensibly taken,

- it is unclear why certain maintenance decisions are given priority,
- maintenance budgets are rarely equivalent to the actual maintenance costs, and
- there is an increasing requirement to incorporate the opinions of other stakeholders (mainly tenants).

This process is made all the more complicated when landlords propose to incorporate sustainability into their decision making. As pointed out by Xing et al, 2009, "one of the principal challenges ... is the difficulty of comparing apples and pears: that is, of measuring costs and values which are expressed in different units." They also identified problems assessing alternative strategies and effective communication with non-technical stakeholders. For these reasons, this research suggests an alternative multi-criteria decision making system is developed.

### 2.5.4 Analytical Hierarchy Process (AHP)

Analytical Hierarchy Process (AHP) is a well know selection and prioritisation methodology (Vaidya and Kumar, 2006 cited in Mu et al 2012) developed by Thomas Saaty at the Wharton School of Business in the early 1970's (Saaty 1996) which allows decision makers to evaluate a complex problem using a hierarchical structure in terms of; the goal, a statement of the overall objective; objectives, what maintenance is trying to achieve; and alternatives, these are all the possible alternatives in achieving the goal (Cooper and Jones, 2008). As the problem is broken down into its constituent parts the importance of each criterion is made clear (Macharis et al, 2004). Its main advantages according to Saaty and Sagir (2009) are its ability to measure both tangible and intangible criteria (Saaty, 1990 cited in Shahin and Mahbod, 2007 and Ramanathan, 2001), its ability to measure the consistency and stability of a decision, the ease and convenience of pairwise comparison, its transparency, its ability to incorporate the decisions of various stakeholders and its ability to be used alongside other processes such as goal programming (Sarkis and Sundarraj, 2006). Its use is supported by a large group of practitioners (Bedford and Cooke, 2003 cited in Phillips, 2007) and software tools, such as Expert Choice.

Despite its popularity, AHP does have some weaknesses; such as,

- the possibility of rank reversal;
- it is an additive complete aggregation tool which can allow good scores to compensate

for bad scores;

- as the hierarchy is made up of objectives and various levels of sub-objectives the amount of pairwise decisions to be made can be quite extensive, and
- the process can become quite time consuming (Macharis et al, 2004);
- the 9-point scale can be problematic as a decision maker may not be able to determine the difference between the values during the pairwise process. Hajkowicz et al, 2000 reduced the 9 point scale with a 2 point scale to overcome this problem, in this case the decision maker only had to determine if one criterion was more, less or equal to the other.

Shahin and Mahbod (2007) found AHP had been used in both the private and public sector to aid decision making in diverse areas such as, resource allocation, strategic planning; to rank, select, evaluate and benchmark alternatives. They found "Operations research practitioners around the world have repeatedly embraced AHP as a methodology that can produce insightful results for difficult real-world decision problems" There have been investigations by the research community to examine the use of AHP within the maintenance and social housing fields, (see Cho and Parlar, 1991, Kobbaccy et al, 1995, Labib, et al 1997, 1998, Saaty, 1990, Shen, et al, 1998, Shen and Lo 1999 and more recently Lo et al, 2013 (cited in Mu et al)). All of the above identify that there is a need to make an objective decision, based on $n$ alternatives and their comparative pairwise comparison $a_{ij}$ is an approximation to the ratio of $w_i/w_j$ which is the weight of alternative $i$ to alternative $j$. Whilst Fu et al 2007 (cited in Mu et al, 2012) confirm that AHP has been widely used in multi-criteria decision making.

## 2.6 Summary and Implications for Research

Managing and maintaining social housing and improving the sustainable performance of that stock is a complex and complicated issue. As a consequence of repeated government policy England has an existing social housing stock profile of 2.1 million HA (mainly 1945-1980 and post 1990, refer to Figure 2.13) and 1.9 million LA (majority of which are 1919-1980 age profile, refer to Figure 2.13) owned properties. Despite the DHS programme there was an estimated 305,000 non-decent properties at the end of 2010 to which an additional £2.1bn of funding has been allocated for LAs. The benefits reform is expected to reduce the funds available for repairs and maintenance whilst challenges of climate change will place greater demands on adaptation and mitigation.

The literature review has demonstrated that maintenance need is a function of; building characteristics, tenant factors, maintenance factors, political factors and other factors, and consists of objective and subjective measures (El-Haram and Horner, 2002). The literature review also identified a range of tools available to help landlords measure the sustainable performance of their housing stock.

The aim of this research was to develop a new social housing maintenance model based upon the performance of a house in-use rather than on its condition, that provides a transparent and robust system for prioritising maintenance works which integrates social, environmental and economic criteria to improve the overall sustainability of existing housing stock through planned maintenance. AHP is the proposed mechanism for such integration and through completion of a worked examples aims to;

1. Establish whether sustainability can be represented in a hierarchy form.
2. If it can, can consistent metrics (KPIs) be developed that assess performance in-use?
3. If so, would such an approach be perceived as a useful tool for housing asset managers?

# Chapter 3

# Theory

## 3.1 Introduction to the Theory Chapter

This chapter sets out the gaps identified in the literature review which need addressing in order for existing social housing to become more sustainable using routine maintenance measures (3.2). It then introduces the theoretical basis of maintenance and building performance, upon which the research was based (3.3) and the subsequent alternative approach for social housing maintenance prioritisation (3.4). This section provides a review of the performance based sustainable social housing maintenance model and how social landlords would interpret it, together with an overview of AHP.

## 3.2 Gaps Identified

The previous chapter determined that sustainability is a complex and long term horizon issue with the broad remit of balancing social inclusion, economic growth with environmental protection (section 2.2.1) and that it was currently dominated by climate change. It contextualised the important role that housing and specifically social housing (section 2.2.2) have in terms of the climate change agenda. It explained the traditional condition based (single criteria) approach to social housing maintenance with its numerous problems (section 2.3.4.4) which have not yet established a systematic approach to incorporating the sustainability agenda (multi criteria).

The starting position of this research was that sustainability cannot be addressed through a single condition based assessment, that in order to address the sustainability agenda systemically within social housing maintenance, multiple criteria need to be assessed and therefore a multiple criteria approach needed developing that addressed the environmental, social and economic performance of the dwelling. At the outset of the research it was unclear exactly what measures should be included under those headings but it was possible to speculate, for instance, environmental measures would need to include those that addressed the building as well as the maintenance

process; social measures would need to address fuel poverty, living costs, wellbeing; and economic measures would need to cover tenant and landlord perspectives. Some of these criteria may overlap but ultimately need to be analysed and a way of completing that analysis needs to be determined.

From the outset this research proposed that in order for the UK climate change targets to be met, existing social housing emissions needed to be addressed and hence routine maintenance should be used to address the broader sustainability agenda more systematically. In order for this to be achieved it was supposed that the traditional approach to social housing maintenance needs to change from a condition based approach, which relies upon the prediction of the remaining life of a building element/system/component, to a performance based approach which relies on the ability of the building to meet the users expectations, if the weaknesses of current practice are to be addressed and the sustainability agenda is to be systematically incorporated.

## 3.3 Established Theory

### 3.3.1 Performance In-Use

The idea of building performance is not new, Hammurabi (King of Babylonia 1955-1913BC) produced the Code of Hammurabi (one of the first written laws) part of which are inscribed on an obelisk displayed at the Louvre Law 229-232 "If a builder build a house for someone, and does not construct it properly, and the house which he built fall in and kills its owner, then that builder shall be put to death ….." (Yale, 2008). This law provides guidance on building performance by stating what the end result should be and what the builder liability is, it does not state what the regulations say or provide a list of building element details. However there has been a growing interest in the measurement of building performance since (at least) the late '90s when the International Council for Building (CIB) instigated their Performance Based Building Program which ran between 1998 and 2001. This program focused on developing computational procedures and /or computer programs for the design for new buildings where the performance-based building code was a function of Safety, Comfort, Health & Hygiene, Durability and Sustainability, where sustainability was further broken down into Energy Conservation, Green-house Gas Depletion, Economics and Deconstruction/demolition and disposal, (Foliente, 2004) this approach is somewhat limited in terms of the building lifecycle phase and criteria measured.

### 3.3.2 Maintenance

Whilst social housing maintenance focuses on the condition of a building (discussed in greater detail in section 2.4), other industries focus on the performance of a component, system, or asset. Maintenance is integrated into the component life cycle within the service based industry where component reliability is viewed as critical to its performance (Sharp and Jones, 2012). The defence, aviation and oil industries use a range of techniques under the heading of Integrated Logistics Support (ILS) to link user satisfaction, performance (in which maintenance is a central criterion alongside reliability, durability and quality) and whole life costing. El-Haram and Horner (2003) sought to apply the ILS principles to existing building maintenance, the objective thus was to "develop a package of logistics resources that optimizes the operation, maintenance and support regime and that meets the users' requirements at lowest maintenance costs." They concluded that the ILS techniques most appropriate for identifying and selecting maintenance actions were FMEA (failure modes and effects analysis) and RCM (reliability centred maintenance). These techniques integrate the buildings' physical elements with their function to identify failure modes, (their cause and effect) and develop cost effective, appropriate maintenance actions. Vanier et al, 1996 (cited in Sharp and Jones, 2012) supported the use of performance measures for the determination of building maintenance actions. They believed a buildings' performance could be defined by the functional requirements of the end-user to create standards and performance indicators against which maintenance actions could be considered.

Jones and Sharp (2007) identified a theoretical model for addressing performance based maintenance in consultation with two case study organisations. Their model (Figure 3.1) was based upon Built Asset Maintenance Process Model developed by Wordsworth (2001) and linked a commercial landlord's critical success factors (CSF) to the performance of a house-in-use. In this model maintenance interventions would be based upon the ensuing performance gap and benchmarks and KPIs founded on the landlord's CSF against which each property (in-use) would be assessed. Should a property fail to meet any of the benchmarks, inquiry and design toolkits would be used to determine the reason for the underperformance and to set improvement targets. Following the identification of the cause of underperformance an action statement would be written to quantify the required improvement against which a range of solutions would be determined using a multi criteria approach. The action statement would then be used to evaluate the success (or not) of the solutions employed and maintenance impact models used to evaluate the consequences of deferral. Once maintenance actions have been completed the improved

performance of the property in-use would be evaluated using a range of impact toolkits. The final action in this process is the feedback loop, lessons learnt and the improved property performance levels should inform future property assessment and the landlord's performance against their CSFs.

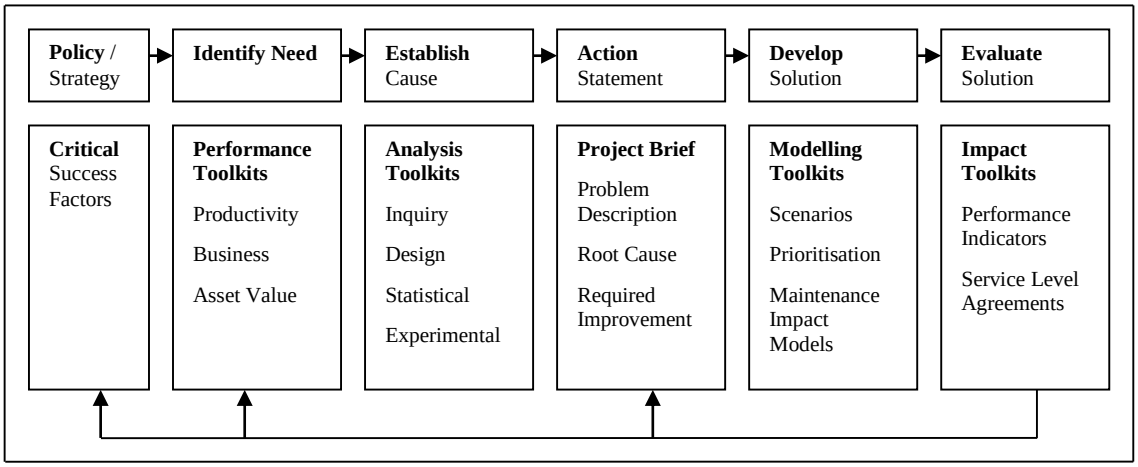



**Figure 3.1 Performance Based Built Asset Maintenance Process (Jones & Sharp, 2007)**

## 3.4 New Approach to Maintenance Prioritisation

### 3.4.1 The Performance Based Sustainable Housing Maintenance Model

The key difference between the new "sustainable" maintenance model and the traditional model is a shift in thinking from 'condition measurement', where maintenance actions are based upon a prediction of the remaining life of a building component/element/system, to 'performance measurement' where maintenance actions are determined by user-expectation. In developing a performance based model maintenance managers will need to move away from the use of a (predominantly) single, subjective criteria model to a multi-criteria model supported by a new range of toolkits that: allows need to be identified against a range of sustainability drivers; takes a holistic, long-term view of the underlying cause behind poor performance (in essence maintenance moves from a repair/replace paradigm to an improve/enhance paradigm); prioritises maintenance actions against the broad sustainability agenda, including the impact that changing demands may have on long-term need (e.g. climate change); measure the performance of the maintenance action against pre-set targets; and be flexible enough to incorporate individual Landlord requirements that reflect their interpretation of the sustainability agenda.

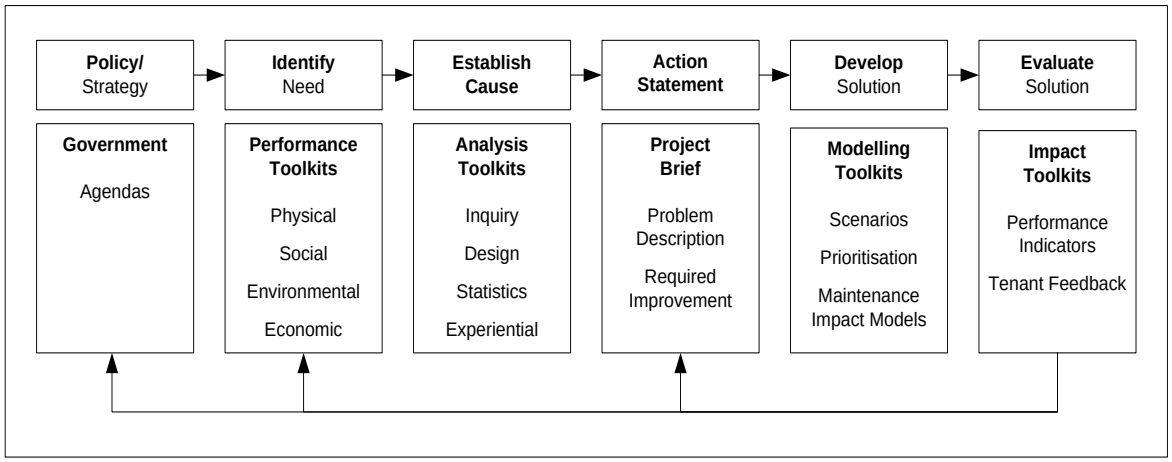



**Figure 3.2 Performance Based Sustainable Social Housing Maintenance Model**

This research updated the model proposed by Jones and Sharp (2007) to make it more applicable to social housing (Figure 3.2). It is therefore proposed that in order to utilise the performance based sustainable housing maintenance model, managers will have to develop the following;

3.4.1.1 Organisational Context - Policy/Strategy

Approaches that allow local interpretation of the sustainability agenda to inform the development of the performance toolkits. Social housing landlords assemble maintenance strategies with organisational key strategic drivers to ensure efficient use of resources so that operations portray strategic aspirations. In order to do this the landlord will need to define what sustainability and sustainable development means to their organisation and determine their Key Strategic Drivers incorporating the sustainability agenda. This will improve efficient use of resources and provide clarity for the different stakeholders in terms of what sustainability means to social housing and will ensure that the term is given suitable importance.

3.4.1.2 Performance Toolkits

A range of toolkits that reflect performance-in-use of dwellings against robust quantitative and qualitative indicators.

Maintenance action should be identified through a series of performance toolkits that asses how well a house / component is performing against the landlord's sustainability agenda (examples of such toolkits are provided in Table 3.1).

To overcome the perceived problems associated with measuring performance the toolkits established must be quick and easy to use and cost effective. They must be able to effectively identify and measure social impacts and establish a robust and unobtrusive method of identifying the impact occupancy behaviour can have on housing performance. By incorporating tenant attributes maintenance budgets will be more efficiently allocated (by as much as 25% according to Olubodun, 2001)

Any single or combination of criteria then identifies those houses / components that require further investigation.

**Table 3.1 Performance Toolkits**

| **Physical Performance** | **Social Performance** | **Environmental Performance** | **Economic Performance** |
|---|---|---|---|
| Health & Safety<br>Statutory Requirements | Tenant Wellbeing<br>Community Engagement<br>Community Security<br>Household Running Costs | Water Consumption<br>$CO_2$ Emissions<br>Material Use & Sourcing<br>Pollution<br>Waste<br>Energy | Asset Value<br>Future Exposure & Risk<br>Climate Change<br>Whole Life Costing |

3.4.1.3 Analysis Toolkits

A range of approaches that seek to identify why a dwelling is under performing and not just to recognise that it is under performing. Simply knowing that a house / component is under-performing is not enough to justify maintenance intervention. In many cases under-performance may be a symptom and not the cause (e.g. an above expected consumption of energy could be the result of poor levels of thermal insulation, or the life style of the tenant, or both). Triangulating performance data to establish the cause of under-performance should help establish the most appropriate cause of action whilst managing tenant expectations at the same time.

The performance based maintenance model suggests a number of inquiry toolkits be used such as qualitative analyses (interviews, surveys and case study reports) which will seek to identify whether underperformance is unique (i.e. to a specific house) or systemic (across a number of house units). Statistical and experiential toolkits using quantitative analyses (e.g. level of repairs

analysis) will seek to identify underlying patterns in responsive maintenance actions (e.g. to identify components that have a higher than expected failure rate) and Whole Life Costing and Portfolio Analysis will consider the impact of the physical state of the house on portfolio asset value. Finally, Design Toolkits will seek to relate the reasons for an underperforming house to building issues (e.g. problems with building components or in design philosophy). These analysis toolkits (Table 3.2) are similar in approach to the Integrated Logistics Support toolkits suggested by El-Haram & Horner (2002).

**Table 3.2. Analysis Toolkits**

| **Inquiry (Unique or Systemic Issues)** | **Design** | **Statistics** | **Experimental** |
|---|---|---|---|
| Interviews<br>Surveys<br>Case Study Reports | Root Cause Analysis<br>Failure Mode Effects Analysis | Repairs Analysis<br>Whole Life Costing<br>Portfolio Analysis | |

3.4.1.4 Brief

A project brief should be developed that communicates the cause of the problem and the expected improvements necessary so that solutions can be proposed and evaluated.

Following the analysis of an underperforming house / component an Action Statement should be produced which clearly articulates the problem and the expected improvements. In essence it forms a project brief against which potential solutions can be proposed and evaluated. This will help maintenance managers evaluate the facts, (examine the positives and negatives), structure decisions which can be re-evaluated and communicated to other members of the team and board/council members. The Action Statement should be used to incorporate the non-financial benefits of a particular course of action as a means of addressing some of the current shortfalls of whole life cycle costing by way of addressing the triple bottom line of sustainability.

3.4.1.5 Modelling Toolkits

A range of whole-life approaches that will allow alternative solutions to be evaluated against current and future (expected) needs. One of the complaints with the traditional social housing maintenance model is that approaches to priority setting are often simplistic with subjective elements introduced into the decision-making process making it difficult for maintenance managers to justify their decisions (Shen et al, 1998) to others. To this end it is proposed that a multi-criteria approach to maintenance planning to taken. This would not only accommodate a

much wider range of criteria than is currently considered (including non-financial benefits of a maintenance action) but the AHP model can help assess objective as well as subjective data in a repeatable and transparent manner. In this way priority setting would be able to fully incorporate life-cycle costs.

Such modelling toolkits (Table 3.3) would not only allow alternative solution scenarios to be assessed against a range of sustainability criteria reflecting the strategic objectives of the social landlord but will also be able to consider the consequences of inaction to ensure that the most appropriate maintenance strategy is identified.

**Table 3.3 Modelling Toolkits**

| Scenarios | Prioritisation | Maintenance Models |
|---|---|---|
| Climate Change<br>Population Trends | Multi-Criteria Decision Making<br>Balanced Scorecard | Maintenance Strategies, Impact Models (which consider the consequences of inaction) |

3.4.1.6 Impact Toolkits

A range of toolkits that measure performance of the solution in-use. These will be aligned to the performance toolkits thus closing the maintenance feedback loop. Whilst the traditional social housing maintenance model implies that a feedback loop exists, in reality this is rarely the case which means the same mistakes keep reappearing and no learning takes place within the design process (Arditi & Nawakorawit, 1999). Therefore this research recommends that a set of toolkits should be established to compare actual improvements in performance (that result from the maintenance intervention) against the improvement requirements contained in the action statement. The results of the feedback will inform future problem identification and ultimately future housing design. The use of KPIs and collection of tenant feedback are primary functions undertaken by Social landlords so a radical departure from current practices is not required. Examples of Impact Toolkits are;

- Performance Indicators – Contractor Performance as well as Physical, Social, Economic and Environment performance
- Tenant Feedback – Questionnaires, Focus Groups etc

3.4.1.7 Methodological Approach

As discussed above, the model presented by Jones and Sharp (2007) provided the theoretical basis for the performance based social housing maintenance model which subsequently identified the methodological approach (Figure 3.3) in the form of questionnaire, interviews and case study to establish the content of the toolkits and indicators.

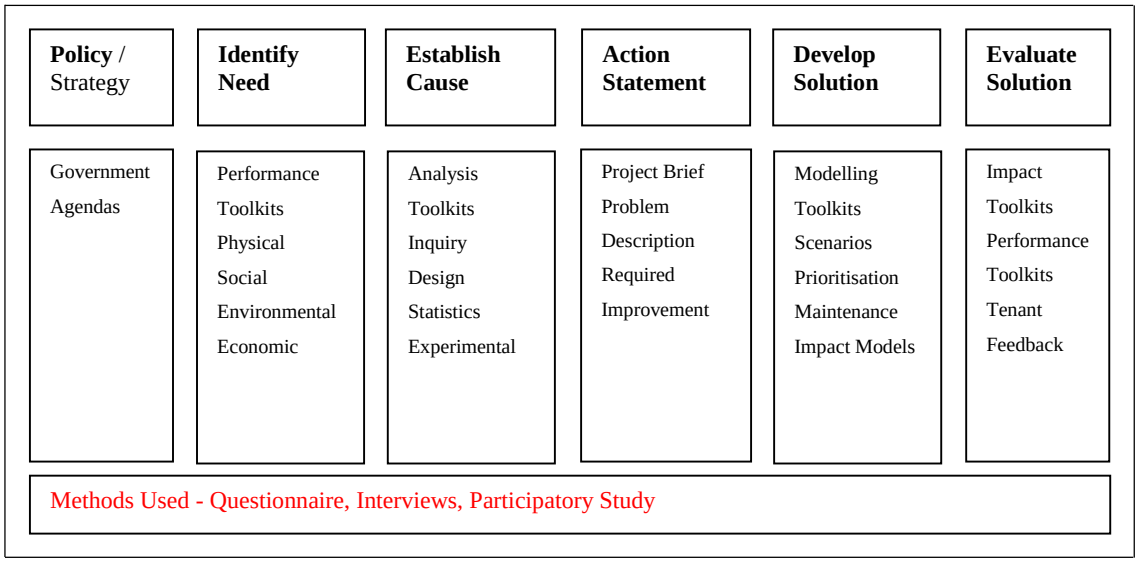



**Figure 3.3 Methodological Approach**

The benefits of such an approach address the environmental, economic and social drivers of sustainability. From an environmental perspective measuring the actual performance in-use of a property will provide landlords with a clearer measure of their environmental impact and progress against their strategic goals. For instance one goal maybe to reduce the GHG emissions across their stock portfolio by 80% by 2050 and thus actual in-use data will be more accurate than the current approach of using SAP to measure energy consumption and emissions. At the heart of the performance model, maintenance actions are based upon user (tenant and landlord) expectations and as a consequence tenant satisfaction would expect to rise. Finally, the performance based approach is expected to be cheaper to operate than the condition based approach. Only those properties under-performing (as flagged by the landlord's KPIs such as tenant satisfaction) would be identified as requiring a survey to establish root cause, action statement etc, as opposed to the condition approach which requires a SCS of properties which is inefficient and costly. This has the additional benefit of helping to manage tenant expectations as house surveys (or any interaction with the tenant) can lead to the expectation that work will be

carried out on the home when in many cases the SCS identifies maintenance action for the long term and not the short term.

### 3.4.2 Multi-Criteria Decision Making

Whilst it can be argued that landlords already make maintenance decisions based upon a number of different criteria (condition of building elements and SAP), this is done implicitly rather than explicitly and as a result these decisions are not transparent, don't support justification to board members, nor allow easy reflective updates. The more progressive landlords may use a traffic light system to aggregate different criteria but these are still based upon the physical aspects of the building rather than on its performance and on fewer criteria than is suspected of being needed to fully incorporate the broader sustainability agenda. For instance 'quality of life' is one criteria which presumably should be measured if sustainable housing maintenance is to be carried out, yet this in itself can be made up of many other sub-criteria and will differ depending on the perspective taken i.e. landlord or tenant. It is expected that sub-criteria may overlap (parent) criteria suggesting that a hierarchical approach may be the most suitable to resolve such a complex problem as sustainable social housing maintenance.

Section 2.5.4 of chapter 2 argued that AHP was an appropriate approach to prioritising sustainable social housing maintenance work. The following 5 sections explain how the AHP process would be undertaken.

#### 3.4.2.1 Develop Hierarchy

The initial stage requires the problem to be broken down into its component parts in the form of a hierarchy (Figure 3.4). The first level of the hierarchy comprises the 'goal', which in this instance is 'sustainable maintenance', levels 2, 3 and 4 contain the various objectives[1] pertinent to sustainable maintenance (in this instance established via the interview and case study phases of the research) arranged as objectives, children of objectives and grandchildren of objectives. The final level contains all the alternative approaches to the resolution of the problem, which in this case will be a variety of maintenance actions.

[1] In choice models the word 'criteria' is substituted by the word 'objective', this is to demonstrate the difference between a principle or standard by which an idea or objective is judged by (criterion) and that 'something' which is sought (objective) (Expert Choice, 2014).

Although not included in the standard AHP methodology, it is useful at this time to make explicit the assumptions made regarding the criteria (Mu et al 2012) and this will help explain the mental models of the decision makers and the frameworks against which decisions were made (Kahneman and Tversky, 2000 cite in Mu et al 2012). Furthermore as decision processes mature the assumptions associated with them will change, thus making them explicit allows changes to be tracked, challenges to be made and assists successful negotiation (O'Toole 1995 cited in Mu et al 2012). A final point made by Mu et al is the importance of decisional context of all decision makers.

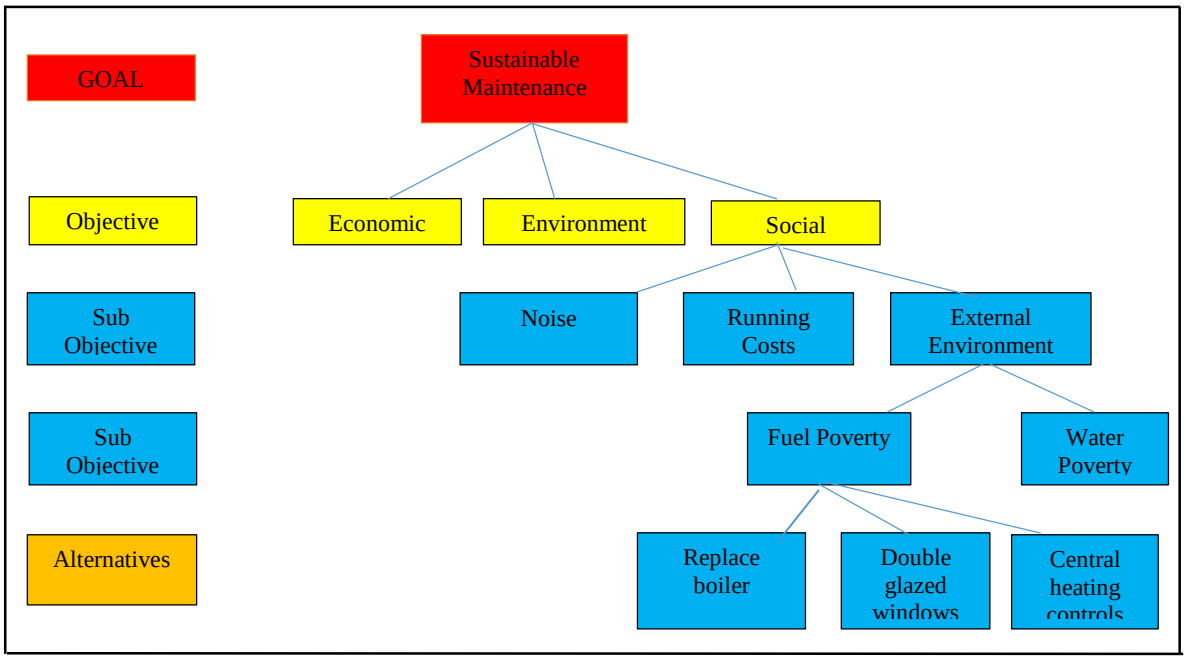



**Figure 3.4 Abstract of the Sustainable Maintenance AHP Hierarchy**

3.4.2.2 Establish Priorities

The second stage is to establish the priorities by determining the importance of the objective in achieving the goal through pair-wise comparisons. Each objective is compared against the other in relation to its importance in achieving the goal. (Many levels can be included to account for sub-objectives, alternatives, scenarios, players etc. should it be necessary.) Standard scales are not necessary as a ratio of relative importance of one against the other is established. A commonly used scale for pair-wise comparison is given in Table 3.4. There are two approaches available for this process, the approach taken by this research is established as the more accurate of the two (Mu et al, 2012) as software (expert choice) was used to create eigenvectors whereas the judgements in the alternative approach are noramalised and the average of each level provides the priority.

**Table 3.4 Fundamental Ratio Scale in Pair-Wise Comparison (Saaty 1990)**

| Intensity of Importance | Definition | Explanation |
|---|---|---|
| 1 | Equal importance | Two activities contribute equally to the objective |
| 3 | Weak importance of one over another | Experience and judgement slightly favour one over another |
| 5 | Essential or strong importance | Experience and judgement strongly favour one over another |
| 7 | Very strong or demonstrated importance | An activity favoured very strongly over another; its dominance demonstrated in practice |
| 9 | Absolute importance | The evidence favouring one activity over another is of the highest possible order of affirmation |
| 2, 4, 6, 8 | Intermediate values between adjacent scale values | When a compromise in judgement is needed |

3.4.2.3 Eigenvectors

(Stage three) The pair-wise comparison information is represented by the pair-wise comparison matrix, which allows for subjective and objective data to be used. The actual order of priority is calculated using eigenvectors and eigenvalues. A total of $n(n\text{-}1)/2$ judgements are needed to produce a matrix where there are $n$ items to be compared. Each pair-wise comparison matrix produces an eigenvector which provides the regional priority ordering whereas the eigenvalue measures the consistency of the pair-wise judgement.

3.4.2.4 Synthesize

(Stage 4) The global priority order and global consistency for each objective/alternative is calculated by synthesizing the results (Saaty 1990).

The measurement of inconsistency is an important by-product of this process. Usually a maximum 10% inconsistency is considered acceptable but in certain circumstance a higher inconsistency may be more accurate. Although consistency is thought of as a necessary component of clear thinking, perfect consistency does not necessarily mean the right answer. It is possible to be consistent but consistently wrong, so it is more important to be accurate than consistent. High inconsistency on the other-hand should indicate that there is a problem.

3.4.2.5 Sensitivity

(Stage 5) The priorities of each criterion should be varied to determine their influence on the resolution which allowed the stability of the decision to be tested (Saaty 1990). The maintenance action plan can be varied to evaluate the impact of deferring an action or number of actions and to evaluate the improved performance of additional actions.

## 3.5 Summary

This chapter has presented the performance based building maintenance theory upon which the research was based and how it was translated to speak more directly to social housing. It then presented the theory of AHP, how it was applied will be discussed in the next chapter.

# Chapter 4

# Research Design

## 4.1 Introduction to the Research Design Chapter

This chapter introduces the research design used to answer the research questions identified in chapter 2. All research design is guided by philosophical assumption and so before describing how the research was conducted it is important to state the paradigm within which the research sits. Therefore this chapter commences with an overview of the dominant philosophical worldviews before stating the philosophical premise for the research undertaken (4.2) the research design is then explained (4.3), followed by the methods employed (4.4, 4.5 and 4.6), and finally the chapter is summarised (4.7).

## 4.2 Philosophical Worldview

Cresswell (2009) suggests answering the following 3 questions in order to fully establish the worldview proposed by a piece of research;

- The philosophical worldview proposed by the study
- A definition of the basic considerations of that worldview
- How the worldview shaped the approach taken to research

### 4.2.1 The Philosophical Worldview Proposed by the Study

The philosophical worldview can be considered as "a basic set of beliefs that guide action" (Guba, 1990) or research paradigm and according to Blaxter et al (2010), there are 5 dominant philosophical worldviews: positivism, post-positivism, interpretism, critical and postmodernism which favour either a qualitative or quantitative approach to research as shown in Table 4.1.

**Table 4.1 Worldviews (adapted from Cresswell 2009 and Robson, 2011)**

| World Views | Typical Features | Critiques |
|---|---|---|
| **Positivism** (Quantitative Approach) | Objective knowledge gained from direct observation or experience<br>Science separates facts from values<br>Propositions are founded on fact<br>Develop universal causal law | Direct experience is not a sound basis for scientific knowledge<br>Science should also deal with hypothesis and abstract<br>Facts and values cannot be separated |
| **Post-Positivism** (Quantitative Approach) | Deterministic<br>Reductionism<br>Empirical observation and measurement<br>Theory verification | Degree of control required may be impracticable<br>Design requirements e.g. randomisation may be impossible to fulfil<br>Expected level of objectivity may not be possible |
| **Interpretivism** (Also called social constructivist) (Qualitative Approach) | Causal explanation<br>Multiple constructs of knowledge and meaning<br>Social and historical construction<br>Focus on the individual<br>Theory generation | Generalising results from such research is problematic |
| **Critical** | Focus on society<br>Human emancipation<br>Explanatory, practical and normative<br>Reflective | Identifying the theories, methods and norms |
| **Postmodernism** (Qualitative Approach) | Challenges the idea of progress through reason<br>Reality is a state constructed by the mind<br>Rejects natural scientific methods | Doesn't add to analytical or empirical knowledge (Chomsky 1995)<br>Contradictory – presupposes concepts it seeks to undermine. (Habermas, 1987) |
| **Pragmatism** (Mixed Methods Approach) | Consequences of actions<br>Problem centred<br>Pluralistic<br>Real-world practice orientated | Two separate paradigms |

At one end of this worldview spectrum, positivism takes the view that social science should mirror the natural sciences, the researcher should be objective and detached from the research and use tools such as experiments and questionnaires (quantitative tools) to establish explanations which lead to control and predictability. In this instance the research was based on some already established theory. Robson, 2011 summarised the criticisms of Positivism including the point that "science becomes credible and possible because every scientist looking at the same bit of reality sees the same thing" when in reality the observer is influenced by their own characteristics and perspectives and not merely by what they are observing.

Postmodernism, at the other end of the spectrum takes the position that realities are social constructs only and as such are subject to change. Cresswell (2009) adds a further position, 'pragmatism' which is a dualistic, mixed methods approach to research and takes the middle position. Pragmatism is not committed to a particular system of philosophy or reality and therefore provides the researcher with the freedom to use all approaches available to understand the problem (Rossman & Wilson, 1985). The logic of this approach to research "includes induction (or discovery of patterns), deduction (testing of theories and hypotheses), and abduction (uncovering and relying on the best of a set of explanations for understanding one's own results)" (Johnson and Onwuegbuzie, 2004).

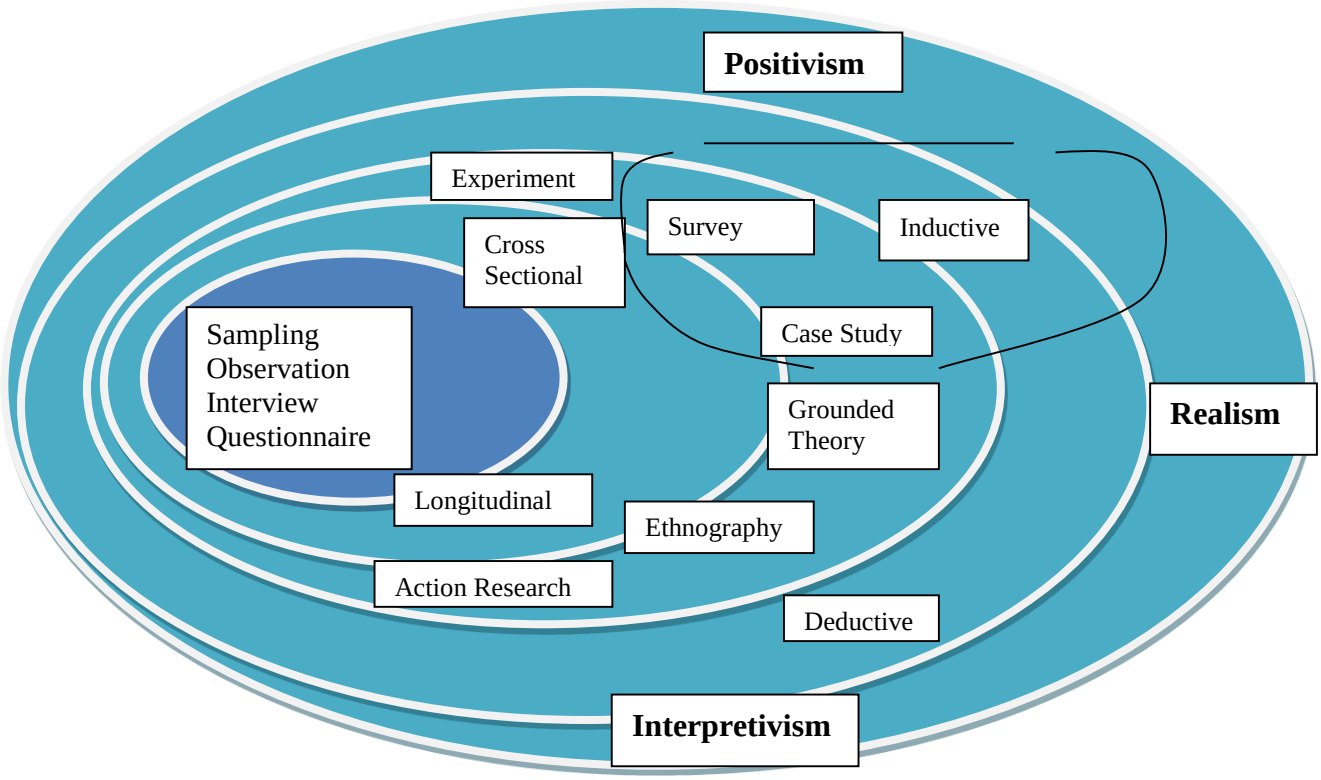



**Figure 4.1 (Abridged Version) The Research Onion (Saunders et al, 2011)**

The research started from the theoretic perspective of performance measurement provided by Jones and Sharp (2007) which could suggest a positivist paradigm. According to Saunder et al (2011) representation of methods and worldviews in Figure 4.1 this locates the research between Positivism and Realism. However, in light of severe criticisms (Table 4.1) a post-positivist approach was initially embarked upon in acknowledgement of the researcher and the researched being independent of one another whilst at the same time conceding that "the theories, hypotheses, background knowledge and values of the research can influence what is observed" (Reichardt and Rallis, 1994 cited in Robson, 2011). Whilst the theoretical model identified a

range of toolkits and informed the assessment procedure, the data collection (interviews and participatory study) identified the content of those toolkits and indicators and progressed to a paradigm more towards social-construct seeking out the opinion of staff and tenants on a range of (what could be) highly subjective areas. From an ontological perspective social-construct allows subjective meanings (conceptions of reality) to be developed by people through their interaction with others and through historical and cultural norms (Cresswell, 2009) and as such is in a constant state of revision (Bryman and Bell, 2003). So whilst it may not be possible to determine if the reported opinion is undeniable, it is non-the-less "a useful device" (Wall, 2006) for relating opinion to actions in the real world. This study lends itself well to a combined quantitative and qualitative methodological approach, as, with all construction and built environment research, it draws on a number of established subjects/disciplines such as natural science, social science, engineering and management. Therefore a pragmatists approach was taken as it allows the use of various paradigms such as post-positivism and social construct.

### 4.2.2 A Definition of the Basic Considerations of the Worldview

The Concise Oxford Dictionary defines Pragmatism as 'a philosophy that evaluates assertions solely by their practical consequences and bearing on human interests'. Pragmatism is an American philosophy based upon the work of Charles S Pierce, William James and John Dewey developed during the first half of the twentieth century which identified the nature of truth with the principle of action, i.e. truth is not an abstract existing independently of social relationships or actions but is a function of an active process of engagement with the world and verification through application to real-world situations. In this instance truth, meaning and knowledge are viewed as 'current' and subject to change over time (Robson, 2011).

The pragmatic approach to research focuses on the consequences of research and places greater importance on the questions being asked than on the methods being used to answer them (Creswell and Clark, 2011).

### 4.2.3 How the Worldview Shaped the Approach Taken to the Research

The research sought to answer the question 'Can performance based decision making be used to integrate sustainability into the Built Asset Management (BAM) process?' and as such dealt with research within building management and social contexts and ideally from the perspective of

professionals and (non-professional) housing occupants. The toolkits required by the sustainable performance based social housing maintenance model adapted from Jones and Sharp 2007 included subjective and objective measures, themselves consisting of a mix of qualitative and quantitative data and analysis. It therefore stood to reason that the methods used to determine the content of such toolkits and their indicators should include both quantitative and qualitative data collection. The essence of the pragmatic approach is to develop 'something that works' which is peculiar to their aim and circumstance.

A potential limitation of the pragmatist approach to this research may be that truth, meaning and knowledge are subject to change but this actually fits quite well with this approach, certainly in 2013 when the sector was undergoing the biggest change since social housing was established.

### 4.3 Research Design

There are numerous research design models, Maxwell's (2005) interactive model for qualitative research, allows continuous and simultaneous revision of the research contents to occur throughout the entire research process and consists of 5 interconnected components, goal, research questions, conceptual framework, methods and validity. Robson (2011) proposes a similar model for real world research, albeit with slightly different headings (purpose(s), research questions, conceptual framework, methods and sampling strategy). Johnson and Onwuegbuzie (2004) propose an 8 phase circular process for mixed methods research. The research design proposed by this research combines Maxwell's and Johnson and Onwuegbuzie's models, presented in Figure 4.2.

In essence the research design commenced with a research question and the theoretic perspective of performance measurement which identified a model for sustainable performance based social housing maintenance. The remainder of the research was fundamentally committed to establishing the content of the performance, analysis, modelling and impact toolkits and testing the feasibility of the model. The questionnaires provided theory and the interviews and participatory study placed that theory in context.

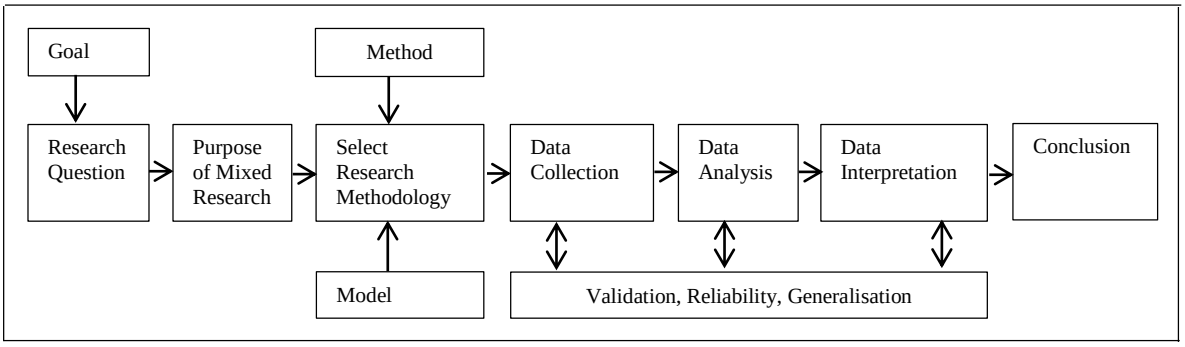



**Figure 4.2 Research Design Model (adapted from Maxwell 2005 and Johnson and Onwuegbuzie 2004)**

### 4.3.1 The Goal

When setting a research goal, Maxwell (2005) suggests that the researcher question why their research is of importance, what practices and policies will be influenced by it and why the researcher wishes to conduct it. In this instance the overall aim of the research was to develop an approach to maintenance (and refurbishment) that systematically improved the sustainability of existing social housing. The main limiting factor of the current approach to social housing maintenance is that maintenance is determined upon a single attribute condition model in which physical condition has become a proxy for performance (section 2.3.3) this prevents the systemic sustainable improvement of a dwelling from taking place. To overcome this problem, broader physical and in-use performance attributes of the sustainability agenda must be taken account of via the development of a multi attribute maintenance model capable of incorporating the objective and subjective attributes associated with the sustainability agenda. Therefore the realisation of this goal was the development of a new theoretical performance based sustainable social housing maintenance model and AHP toolkit to enable reprioritisation of maintenance need so that housing maintenance is carried out on the basis of what the building needs, within the landlord's budget constraints and which satisfies the requirements for Sustainable Development.

In a policy context this will provide a clear route-map to social housing landlords of how to improve the sustainability of their housing stock with the additional benefits of addressing fuel poverty, carbon emissions targets whilst at the same time help create and maintain housing in which people want to live. The model proposed needs to be flexible enough to incorporate the

individual requirements of landlords, be able to adapt to changes in government policy (local and central) in a timely, robust, transparent and inclusive format.

### 4.3.2 The Research Questions

Considering both the research goal and conceptual framework, the overall question posed by this research was 'Can performance based decision making be used to integrate sustainability into the BAM process?' Chapter 2 identifies the gaps in knowledge and areas for improvement which combined together outline the necessity for this question;

- Section 2.2.2 from a literature perspective the influence the occupant can have on dwelling performance was explored, together with the interdependent nature of the three pillars of sustainability, neither of which were systemically incorporated into current maintenance practices.
- Section 2.2.3 identified that whilst toolkits were available to measure the 'sustainable performance' of a dwelling, there was no universal methodology specifically for social housing landlords to support maintenance planning which fully integrates the sustainability agenda, is flexible enough to incorporate national as well as local goals, allows the integration of objective and subjective attributes and permits all stakeholder input.
- Section 2.3.2 identifies the increasing role tenants play in social housing landlord's decision making processes as part of the new regulatory reforms.
- Section 2.3.3, identifies the limitations of the traditional approach to social housing maintenance planning which are two-fold; those associated with life cycle modeling and those associated more generally with the condition based approach to maintenance planning.
- Section 2.5.1 identifies the lack of scientific process for determining maintenance priorities, which in the past was generally determined upon what could be afforded and not by the needs of the building stock. Two issues were identified as contributing to the inadequacy of the maintenance prioritisation process; subjectivity within the decision making process and broad priority categories.

And through doing so explored the meaning of sustainability, social housing regulation and maintenance, and multi-criteria decision making. However in order to answer the main research question it is first necessary to establish;

1. Has the sustainability agenda influenced the way that social housing maintenance is perceived, planned and implemented in England?

2. Are the current practices/toolkits used by maintenance managers conducive to improving the sustainability of the existing social housing stock?

3. What is the range of criteria social housing maintenance managers believe they need to address when assessing the sustainability of their existing social housing?

4. How can these criteria be integrated into a decision making model that is robust and defendable?

5. How can the new model be applied practically?

In addressing the research questions identified above, a three stage sequential mixed method research approach was adopted; a questionnaire survey to social housing landlords, interviews with selected social housing landlords and a participatory study with Octavia Housing.

### 4.3.3 Methods

Research Methods are the tools and techniques by which data is collected and analysed whereas methodology is used to "… explain and justify the particular methods used .." (Clough and Nutbrown, 2007).

Phase 1 addressed the first two research questions and provided the theoretical background for each heading within the Performance Based Sustainable Housing Maintenance Model (Figure 3.2). The questionnaire consisted of a large scale questionnaire survey (open and closed questions) developed and circulated to all registered Arms Length Management Organisations (ALMO), all Local Authorities (LA) who still retained responsibility for the maintenance of their housing stock and to all parent Registered Social Landlords (RSL) whose chief executives' details were available via Housingnet, within England. The key issues of interest were the current approach to maintenance, housing quality of the responding landlords and their sustainability strategy together with questions to help contextualise the responses received such as stock profile. Breadth of opinion was necessary to establish current maintenance practices and the degree to which the sustainability agenda was integrated in order to determine whether or not a new approach was indeed necessary. As the majority of social housing was owned and managed by parent organisations and LAs and ALMOs, supplemented with a number of relatively small (in terms of stock profile) landlords, the sector structure made it possible to survey the whole population rather than use a sample. The Housingnet was used as it was the broadest publicly-accessible database of social housing landlords across the UK and was

recognised as the most comprehensible source of information on social housing organisations' housing stock and management teams.

Phase 2 was a series of in-depth, semi-structured interviews with senior management who participated in the questionnaire survey. All landlords who participated in the questionnaire survey were invited to participate in an interview. It was necessary to gain opinion across the different social housing providers (ALMOs, LAs and RSLs) to establish where convergence and divergence of opinion occurred and the underlying reasoning behind such opinion. Of particular interest was the influence organisational context and participant perceptions had on the integration of the sustainability agenda within the current maintenance process. This qualitative research not only built upon and clarified answers provided in the questionnaire survey but also established the environmental, economic and social criteria landlords wished to measure their stock against and how it could be integrated into maintenance decision making (questions 3 and 4).

Phase 3 was a participatory research project carried out in conjunction with a London Housing Association (Octavia Housing) to validate the results and turn the theoretical sustainable maintenance model into a practical toolkit.

The three phases adopted a sequential mixed methods approach to research where each phase capitalised on the use of qualitative and quantitative data in a triangulated way so that the disadvantages of the individual approaches could be reduced. Mixing methods allowed the social housing maintenance theory to be tested through the questionnaire and followed by the interviews and participatory study for detailed exploration (Cresswell, 2009). The study lended itself well to a combined methodological approach as it draws on a number of established disciplines such as natural science, social science, engineering and management. By combining the approaches, qualitative data was able to supplement, validate and explain the quantitative data collected.

The three phases taken together provided the technical background to how social housing maintenance was implemented and the broader view of whether the sector was ready for a change in maintenance direction from one which was condition based to one which was performance based. That being the case the combined approach would establish the drivers

necessary to ensure its successful implementation and provide a new model for maintenance and approach to decision making.

The three phases are described in more detail in section 4.4.

### 4.3.4 Validity

Validity, the procedures used to ensure the validity of the data, results and interpretation (Creswell and Clarke, 2011) are discussed for each research phase within the research methods section 4.3 as they differ according to the approach (quantitative or qualitative) taken, however the overall validity strategy is presented. "Validity is concerned with whether the survey is measuring what [was] intended to be measured" (Knight and Ruddock, 2008).

Validity Strategy

- Those responsible for housing maintenance were surveyed and senior management interviewed.
- The performance maintenance model was presented to the sector during interviews and the participatory study.
- Triangulation was used. Themes were established where data from several sources (literature review, questionnaires and surveys) converged.
- A report based upon the initial analysis of the questionnaire survey was issued to all participants to receive feedback and as preparation for the interview stage.
- Varying perspectives were recorded within the results and discussed, including those that didn't support the theme being established.
- As much time as possible was spent in the field.
- Peer debriefing was used where possible.

### 4.3.5 Generalisation and Reliability

"Reliability is concerned with whether the instrument would produce the same results if the study was repeated with a similar sample ..." (Knight and Ruddock, 2008) and generalisation is the extent to which the findings can be generalised to "individuals, sites, or places outside of

those under study" Creswell, 2009. Reliability will be discussed in each phase of the research within the research methods section, 3.3 as they differ according to the approach taken.

It is said with some confidence that the questionnaire findings can be generalised across the broader social housing sector due to the nature of the distribution and the extent of the responses received. However the qualitative nature of the methods used in phases 2 and 3 may not automatically be associated with the generalisation of findings. Nevertheless, it was not necessary to interview all social housing providers in order to produce findings which were of relevance to the whole sector but to interview sufficient numbers that convergence of themes appeared across it, which was the intention of phase 2. The interviews allowed a hierarchy of sustainable maintenance criteria to be developed for use within the performance based sustainable social housing maintenance model and AHP toolkit. From the outset it was accepted that criteria would be specific to individual landlords (although a certain degree of overlap would be expected) and therefore generalisation in this instance refers to the application of the general performance based maintenance model and supporting methodological approach which this research aims to develop which would be of relevance to the sector as a whole, rather than developing a set of criteria applicable to all.

The aim of the model was to be flexible enough to incorporate local interpretations of the sustainability agenda and local housing maintenance needs of individual landlords (the subjective and situation based issues). The preferred model validation approach would have been to run a variety of maintenance scenarios with Octavia Housing to help determine the level of flexibility within the model and therefore its applicability to the wider sector. The objective of reliability within a participatory study is that a different investigator would produce the same findings and conclusions by conducting the same participatory study, not that they would produce the same findings and conclusions by conducting another case study.

### 4.3.6 Ethics

Ethics concerned every aspect of research and as such was not a separate item within the research design model (Figure 4.2) but was implicit to all phases. Cresswell (2009) has stated that ethical issues can arise from specifying research questions or during the collection and analysis of data. During data collection and analysis ethical issues were addressed by ensuring all data associated with individual participants (staff and tenants) was kept either in a password

protected electronic file or within a secure filing cabinet, access on both occasions was only available to the researcher. A reference system was established and applied to all responding questionnaires and subsequent interviews so that personal details of participants were not held with transcripts. Limited personal information was taken from professional participants and none from tenants, all data was used in an anonymised format so that specific comments could not be attributable to individuals or individual organisations. All participants were given the option of withdrawing themselves and their data from the research should they wish to do so without having to give an explanation why.

The anonymised results of a tenant survey were made available for use by the researcher. The questions were devised by Octavia Housing with assistance from the researcher and administered by Octavia Housing staff via telephone interviews; no personal information relating to participating tenants was shared with the researcher. The participatory study phase also consisted of two facilitated workshops. The participants of the first workshop consisted of staff members only, whilst the second workshop consisted of staff members and tenant representatives. Octavia Housing was responsible for recruitment of both workshops.

### 4.4 Research Methods Phase 1 – The Extensive Questionnaire Survey

#### 4.4.1 Aims

The aim of the questionnaire survey was to establish that support for the basis of the research existed, to identify gaps in current practice and suggest improvement that could result in routine maintenance being used to plan improvements in the sustainability of existing social housing. Details of the questionnaire survey are given in Appendix A.

- Section 2.2.2 Showed that until 2011, new housing was the mechanism by which the housing sector was addressing the sustainability agenda when the Green Deal was introduced, therefore the extent to which it had penetrated maintenance practices was uncertain. Indeed there appeared to be no unilateral approach by social housing landlords to incorporate the sustainability agenda (section 2.2.3)
- Section 2.3.2 identified the DHS as a mechanism for delivering improved housing quality and section 2.2.2 identified it as a central theme of the government's sustainable community's agenda, but the extent to which the DHS influenced the sustainability of the existing stock was disputed.

- Section 2.3.1 identified the DHS as having faults; however for the first time since the 1960s focus returned to existing properties and in so doing raised the profile of social housing maintenance enabling a more planned approach to be taken.
- The traditional condition based approach to maintenance planning was still utilised and still the preferred route to maintenance prioritisation (section 2.4 and 2.5.1)

As such the questionnaire sought to identify;

1. the extent to which current maintenance practices were perceived to contribute to improving the sustainability of existing social housing;
2. the impact the DHS and the sustainability agenda was having on maintenance priorities and to assess whether these were perceived to have had a positive or negative impact on the sustainability of the existing social housing stock;
3. the usefulness of the existing toolkits used by maintenance mangers in developing maintenance plans that deliver improvements to the sustainability of social housing;
4. the extent to which the maintenance process, both planned and reactive, could be used as a means to improve the sustainable performance of the existing UK social housing stock;

The questionnaire also established issues to be explored during the interview phase in section 4.5.

### 4.4.2 Methods

A self-administered questionnaire (comprising of 5 sections; organisation details; stock profile; housing maintenance; housing quality; and sustainability strategy) was developed and administered, firstly as a pilot study and following revisions, as part of the main study. Copies of the questionnaire surveys can be found in Appendix A.

The questionnaire survey combined analytical as well as descriptive type questioning permitting both inductive and deductive research to take place. With analytical type questions, such as ‘number of properties within the stock portfolio’, the emphasis was on reliability of data, statistical control and population size with the main aim to explore associations between variables (usually the domain of the positivist epistemological point of view resulting in deductive type research and the development of quantitative data). Descriptive type questions such as ‘what maintenance activities could be undertaken to improve the sustainability of existing housing stock’ aimed to establish ‘what’ happened at a particular point in time and seek

to gain an understanding of attitudes and perspectives (usually the domain of the interpretive epistemological approach resulting in inductive type research and the production of qualitative data), in this case the attitudes of social housing maintenance executives concerning housing maintenance, housing quality and the sustainability agenda. By mixing descriptive with the analytical it was possible to find associations between classifications of respondents such as those who were ALMOs, LAs or RSLs and their attitudes, such as the importance of the sustainability debate in relation to their work.

The following is a description of each of the 5 sections which made up the questionnaire survey.
Section 1 collected organisational details and was used to ensure that the most appropriate person(s) was completing the questionnaire in terms of the department they worked in and their level of responsibility. This would help put the answers in context and to maximise validity and reliability. The questions mainly required simple yes/no answers with instructions guiding the respondent accordingly and as such simple descriptive statistics were applied.
Section 2 collected information regarding the size and type of stock within the landlord's stock portfolio. The purpose of this question was twofold. Firstly it provided data which would allow the respondent landlord to be profiled against, and thus determine how representative respondents were of the whole social housing sector. English Homes Condition Survey (later to become the English Housing Survey) dwelling type and age categories were used to enable direct comparisons between responding landlords and the English social housing sector. Secondly it provided context for questions relating to maintenance practices and strategy and the impact of the sustainability agenda. Nominal and interval scales were used to match the descriptive statistics used in the English Homes Condition Survey.
Section 3 the main purpose of this group of questions was to determine if the maintenance practices employed by the respondents followed the traditional maintenance model outlined in section 2.4. Therefore methods for setting maintenance budgets; prioritisation techniques employed; toolkits used, for what purpose and frequency of surveys; procurement; sources of complaint and barriers to operations were examined and compared to sector averages (where possible). This group of questions was also used to start exploring questions 2 and 3 in section 4.4.1, as shown in Figure 4.3. Nominal scales were used in the majority of questions to allow comparisons to sector wide descriptions but an open ended question provided further detail on the use of EcoHome within the maintenance strategy. Chi square was used to test for association such as maintenance spend and portfolio size.

Section 4 focused on housing quality and the impact the DHS had on maintenance strategies and priorities and its relationship to the sustainability agenda. In doing so this group of questions could contextualise maintenance prioritising techniques as well as start exploring question 2 in section 4.4.1. Nominal (e.g. does the DHS impact your maintenance strategy) and interval scales (e.g. percentage of dwellings achieving DHS) were used to develop descriptive statistics which could be compared against sector frequencies provided in the English House Condition Surveys. A seven point Likert scale was applied to measure respondents' level of agreement that the DHS will improve the sustainability of the existing housing stock. This was a labelled scale running from 'Strongly Agree' to 'Strongly Disagree' with a neutral position centre point (as in Likert's original scale (Likert, 1932)). Mode was used to calculate central tendency and distribution of responses to compare responses between LAs, RSL, and ALMOs.

Section 5 explored questions 1, 3 and 4 in section 4.4.1, as shown in Figure 4.3 and was used to examine actual practices as well as opinion as to the relevance of the sustainability agenda on maintenance practices and how it could be better incorporated. This was where the extent to which the sustainability agenda had infiltrated the practice of maintenance was studied and centred around respondent's sustainability strategy and supply chains, impact on maintenance practices, tenant engagement, sustainable measurement of stock. A mix of nominal and interval scale type questions and open questions was used. The interval scale questions were labelled 7 or 9 point Likert scales with neutral as the central position and measured impact, relevance, rating of existing maintenance practices and preferred criteria for sustainable maintenance. Chi square was used to test for association such as the impact of the sustainability agenda on maintenance strategy.

The main purpose of the pilot was to check the appropriateness of the questionnaire, the results of which can be found in section 5.2. The pilot questionnaire was issued to 43 RSLs and 56 LAs who still maintained responsibility for the maintenance of their housing stock. The pilot questionnaire was sent to either the Chief Executive or Maintenance Manager of randomly selected organisations within London and the South East of England on the 17th August 2006, and respondents were given until the 2nd October 2006 to reply. A reply paid envelope was included with the questionnaire. Once the deadline was reached chase up letters were not issued, although late responses were accepted and the data included in the results.

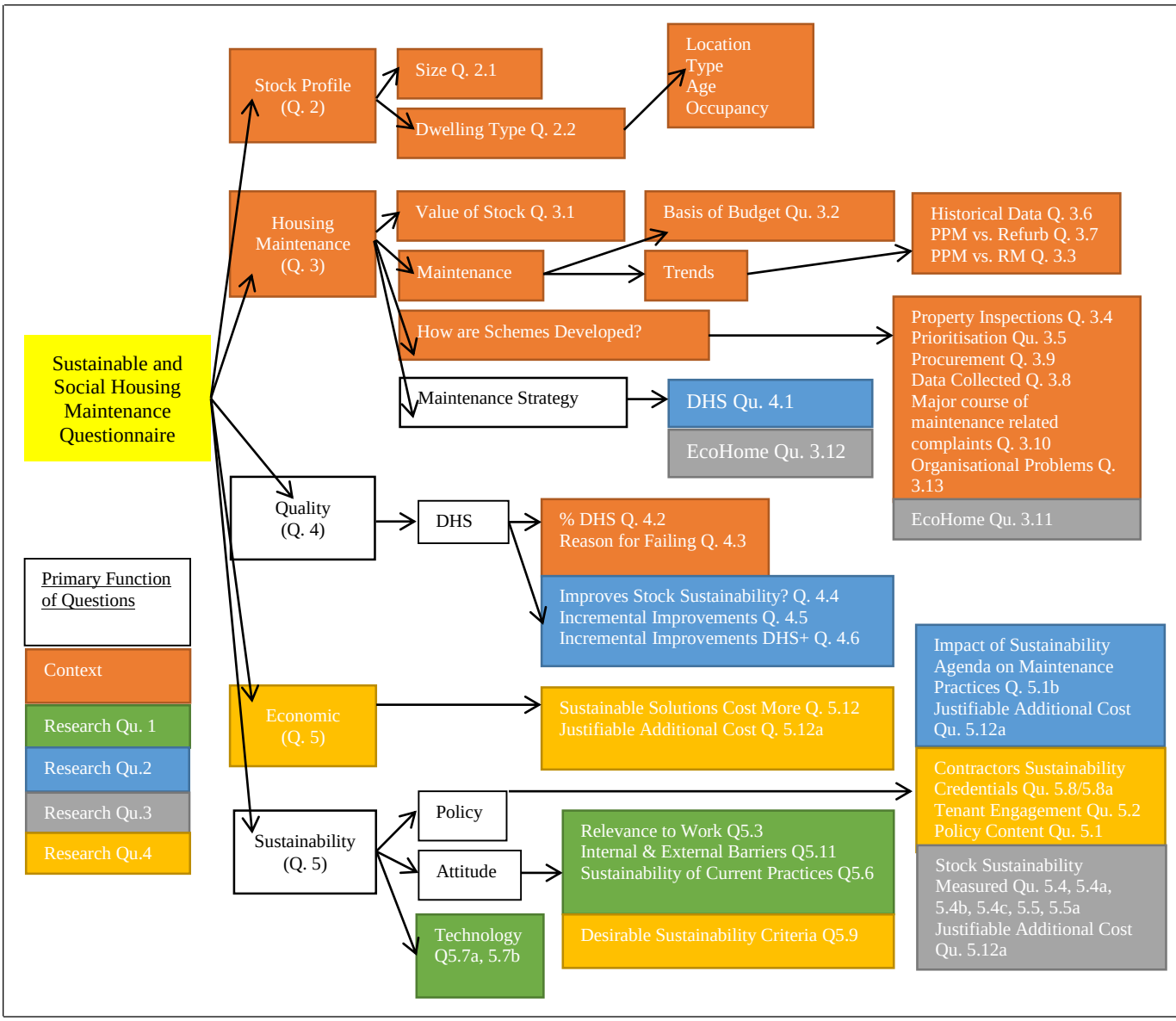



**Figure 4.3 Questionnaire Map**

Following the pilot study the questionnaire was amended to correct clerical errors and to reflect textual comments made by respondents, including lack of resources as an option for internal barriers to more sustainable practices and making requests for ratings clearer, and 2 versions were developed to reflect the different operating circumstances of RSLs/ALMOs and LAs. The questionnaire was modified slightly prior to being distributed to the LA/ALMO. These modifications included; a request for examples of historical data collected to identify maintenance trends; if stock condition surveys were carried out in-house; in-house labour criteria for procurement of RM and PPM work and to provide examples of tenant engagement regarding energy use and other sustainability issues. The questionnaire was modified slightly prior to distribution to the LA/ALMO group. These modifications included; a request for examples of

historical data collected to identify maintenance trends; if stock condition surveys were carried out in-house; in-house labour criteria for procurement of RM and PPM work and to provide examples of tenant engagement regarding energy use and other sustainability issues.

The main postal questionnaire was self-administered to all parent RSLs who's Chief Executive was known (published on the housing net website), all LAs who retained responsibility for the maintenance of their housing stock and all Arms Length Management Organisations (ALMOs), throughout England. In this way the largest organisations would be targeted and the results would be based upon a greater percentage of the total social housing stock.

- 567 RSL questionnaires were distributed on the 26th October 2006, with respondents asked to reply by the 1st December 2006. Due to software constraints the questionnaire was posted and not e-mailed.
- 201 postal questionnaires were issued to LAs and ALMOs on the 18th 29th and 30th January 2007 with subsequent response dates of the 16th and 23rd February 2007 and 2nd March 2007
- Thank you letters were issued upon receipt of the completed questionnaires
- Once the response dates were reached chase up letters / e-mails were issued
- All returned questionnaires were included in the results regardless of when they were received.

### 4.4.3 Analysis

Initial analysis of the quantitative data was carried out on the RSL responses and a summary report was posted (14/3/2007) to all those who had responded and similarly the LA/ALMO questionnaire analysis was reported 24/5/2007. This was done with the express purpose that those organisations participating in the interviews would have the results of the initial survey before the interviews were held and to provide an opportunity for participants to comment on the findings.

The quantitative data from the main questionnaire survey was analysed using a combination of SPSS and Microsoft Excel from one data-file using population data. The quantitative coding was established prior to the distribution of the questionnaire survey and was based upon the numbered questions. When the questionnaire was modified for the LA and ALMO the original coding remained but was subsequently combined (rather than re-editing) so that the integrity of

the initial model remained and one data-file could be used for all three landlord types. In this way the data received during the second and third survey distribution could be directly inputted.

Where data was missing from the returned questionnaires (which was minimal), this was treated as missing and the actual number of responses to such questions was presented in the results, no attempts were made to recalculate. From the returned questionnaires it was possible to ascertain that on some occasions the questionnaire had been completed by more than one person and on occasion (and as the interviews showed), more than one department.

The qualitative analysis was carried out using a modified form of content analysis. Manual methods of analysis were used instead of using computer software because the answers to the open questions were short. Each open ended question was analysed in isolation with the response from each participant being transferred to post-it notes and randomly stuck on an empty wall. The post-it notes were moved around to help identify categories under which the responses could be grouped, the results of which were tabulated within a word document, for example the responses given to the question, 'types of historical data collected to identify maintenance trends' were grouped into KPIs, Life Cycle Modelling, Management Information System (MIS), Components, MIS/Life Cycle Modelling and No Category.

### 4.5 Phase 2 – Interviews

In accordance with Arksey and Knight (1999), the interview process aimed at providing validity to the data by, ensuring that the interviews were based on the questionnaire survey and literature review, sufficient time was allocated to each interview so that topics could be sufficiently probed (where external pressures impacted the duration of the interview, the number of topics discussed was reduced rather than sacrifice the quality of discussion), where necessary interviewees were prompted to expand and illustrate initial responses (either given in the questionnaire survey or interview) and rapport was built between the interviewer and interviewee prior to the interview taking place (during the course of arranging the interview, discussing interview topics, confirming arrangement details and distribution of the initial questionnaire results). By interviewing ALMOs, LAs and RSLs (the three types of landlord currently providing social housing within the UK) external validity was sought by having a sample which permitted the subject to be viewed from all relevant perspectives. However the sample did not include any tenants or tenant representatives, this is justified at this stage because the interviews were

primarily concerned with the maintenance of social housing and the impacts of the sustainability agenda. The tenant perspective, as an end-user and integral component of sustainable social housing maintenance was obtained during the participatory research project in phase 3. In addition to the sample content the size of the sample aimed to reach a saturation point where no new viewpoints emerged. Arksey and Knight (1999) suggest a sample size of 8 is usually sufficient, which was exceeded by the total number of landlords interviewed but not by the individual landlord type.

### 4.5.1 Aims

The aim of the interview was to build depth to the answers given in the questionnaire survey and to find answers to the two research questions below;

- What is the range of criteria that social housing maintenance managers need to address when assessing the sustainability of their existing social housing?
- How can these criteria be integrated into a decision making model that is robust and defendable?

### 4.5.2 Method

All landlords who completed the questionnaire survey were requested to attend an interview. The initial interview request was made via e-mail and post on the 13th February 2007. Twenty nine landlords, representing RSLs, LAs and ALMOs from the North West, Midlands, Humberside, Greater London and Home Counties consented to face to face interviews but due to unforeseen circumstances, the maintenance managers and Chief Executives of only 27 were actually interviewed. All interviews took place in the landlord's office between April 2007 and June 2007 with a list of interview topics to be discussed distributed prior to the interviews taking place. In order to address the research questions identified in 3.5.1 the interview protocol was developed consisting of three major topics; sustainability, maintenance and toolkits. The interview protocol is located in Appendix B.

Sustainability

Where the questionnaire had started to query the level of impact the sustainability agenda had on maintenance practices and landlords' functions more generally, the interview was able to discuss the reasoning behind the answers provided in greater detail. It was also necessary to build a

picture of the types of projects landlords were undertaking to improve the sustainability of their housing stock and neighbourhoods more generally, the reasoning behind those decisions, what their aspirations were for those areas and what prevented them from going further. How landlords measured the sustainability of their stock and the improvements made to them through such schemes was considered during questions under the toolkits heading. This series of questions was also used to establish the range of criteria that social housing maintenance managers needed to address when assessing the sustainability of their existing housing stock and to establish their ranking of the three pillars of sustainability in relation to improvement of social housing through maintenance. The idea of switching from a predominantly condition based approach to social housing maintenance to a performance based approach was also discussed.

Maintenance

The interview was used to further probe the answers given in the questionnaire, and to discuss the data collected to establish maintenance trends. The research was particularly keen to establish if occupant behaviour was considered, and if so, how it was incorporated into maintenance planning. The DHS had a major influence on maintenance works, and positive and negative aspects of the policy were identified by the literature review (2.3.2), the interview was therefore able to explore these issues with landlords who had experienced first-hand the benefits and detriments of the scheme and what impact it had on tenants and the organisations aspirations in terms of sustainability.

Toolkits

Landlords had a range of toolkits available to them to help determine maintenance priorities and to measure the sustainability of their stock, but to what extent these toolkits were actually used or bespoke ones developed and how they were integrated into the maintenance decision making process was discussed. This discussion would help determine the readiness for the performance based sustainable social housing maintenance model and how the sustainable housing criteria established above could be integrated into the decision making model.

Semi-structured type interviews using a topic list (sustainability, maintenance and toolkits) and agenda of questions was used so that where appropriate, additional questions could be asked to probe more deeply into issues of interest, taking account of previous responses, taking account of individual responses given in the questionnaire survey and to accommodate the specifics of each organisation. Twenty four of the interviews conducted were attended by 1 interviewee; the remaining 3 were attended by 2. Only brief notes were taken during the interviews, taking continuous notes would have detracted from the discussion and with permission from the

interviewee all interviews were audio recorded and transcribed at a later date into a word document. To maximise reliability the questions within each topic were asked in the same sequence although the sequence of topics was sometimes reversed to accommodate time constraints, deviation from the question list was kept to a minimum and interviewer bias minimised.

By interviewing only the most senior members of staff involved in the social housing maintenance process, credibility of responses, whilst not guaranteed was more likely to occur than not. Such seniority provided a basis for honest discussion brought about by the confidence in their position. Where personal opinion differed from that of the company line, which was clearly expressed when it occurred, was considered of little consequence as it was the organisations approach to maintenance and attitude towards sustainability which were sought, however such disparity rarely occurred as maintenance, (as will be seen later in the discussion) is internally driven by the principles of senior management.

### 4.5.3 Analysis

Due to the extent of the raw data accumulated during the interview process, the qualitative analysis was broken down into the interview topics. The first topic to be analysed related to the development of the sustainable maintenance decision making hierarchy where interviewees were asked to balance the social, environmental and economic aspects of sustainability and then to identify criteria pertinent to each.

The first exercise was to balance the triple bottom line of sustainability which was completed by tabulating the different sequences chosen and noting the number of times they occurred. From this it was possible to determine the number of times economic had been chosen as most important, second and third most important, a process which was repeated for social and environmental and initial weightings produced. The importance of this exercise was two-fold; firstly it would help identify the (implied) sustainable development models used by social landlords (triple bottom line, nested, one planet living or ‘another’ as discussed in section 2.2.1). Secondly, sections 2.5.1 and 2.5.2 have identified the AHP as an appropriate new approach to maintenance planning, which allows decision makers to evaluate complex problems using a hierarchical structure and as such this was the first step towards build the AHP hierarchy.

The second exercise was to build the sustainable maintenance hierarchy. The hierarchy goal is 'to improve the sustainability of the existing housing stock through routine maintenance', the top tier of the hierarchy consists of the three nodes; Economic; Social; and Environmental which represents the triple bottom line of sustainability. The children to those nodes were determined by tabulating the literal responses of the maintenance managers and chief executives to the questions;

- From an environmental perspective what do you think is most important in terms of sustainability?
- From a tenant perspective what is important to them in terms of sustainability?
- From an economic perspective, what is important in terms of sustainability and what will improve the economic situation.

The third exercise reviewed the audio recordings and transcribed responses and determined which could be grouped as a single item; and which could be grouped as children and/or grandchildren to the nodes. From this analysis it emerged that the responses given were dependent upon two courses of action 'maintenance practice' (the maintenance process) and the 'house going forward' (maintenance work carried out on the property). From the final examination of the data in this format it was evident that a number of economic responses were related to budgets and were removed from the hierarchy.

The fourth and final exercise was the qualitative analysis of the transcripts for this group of questions. Content analysis was carried out using NVivo 8 software which helps manage and store unstructured data, with purpose built tools for coding, sorting and arranging data, to aid analysis. Because there was a clear and predetermined product required from the coding of this raw data it was possible to establish tree nodes prior to coding as shown in Figure 4.4.

Coding was carried out in two phases; in the first phase all transcripts were read through and manually coded for all nodes within the 'positive and negative statements about sustainability' tree node; and phase 2 was a repeat of phase one but for the 'sustainable maintenance hierarchy' tree node. Two documents were produced as a result of the coding exercises; the node document (which displays, amongst other things, the reference details and the coded text pertinent to that node) and the 'key points' document (a memo document containing all the emergent key points which were then electronically linked to the references within the transcript).

The remaining topics were also analysed using a similar approach and coding both in a deductive and emergent format, using tree and free nodes.

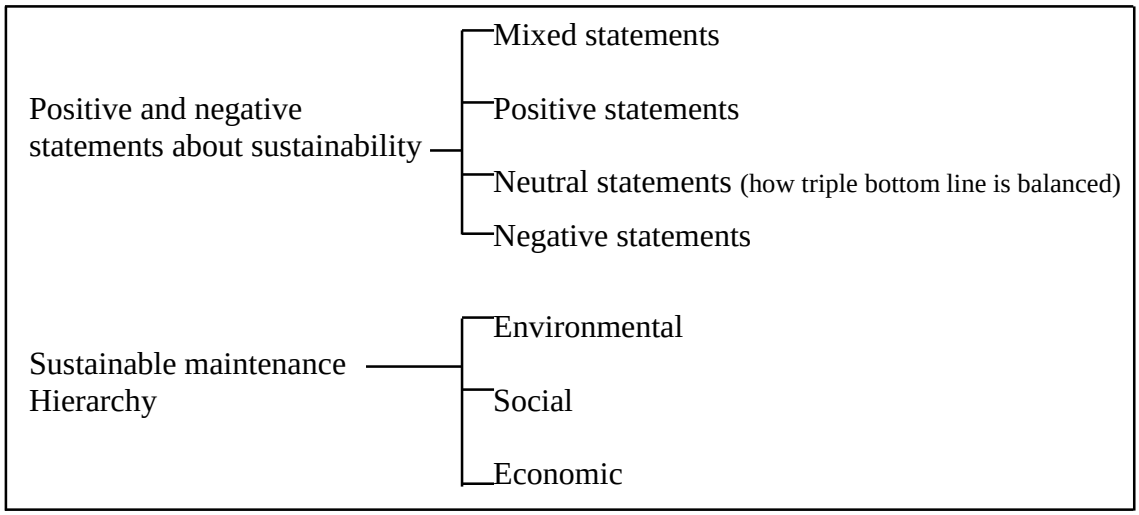



**Figure 4.4. Tree Nodes**

### 4.6 Phase 3 – Participatory Research Project

The final stage was to transform the theoretical model into a practical toolkit. Octavia Housing was chosen to participate as the Director of Asset Management had contributed to the previous 2 research phases albeit whilst working for a different landlord. This phase was initially designed as an action research project in which Octavia Housing would be considered a colleague, not data, and who would act as research participants and critical learning party, however due to landlord constraints the final design resembled more of a participatory study approach.

#### 4.6.1 Aim

The aim of the participatory research was to populate the 'Performance based sustainable social housing maintenance model' and demonstrate the use of Analytical Hierarchy Process (AHP) in sustainable maintenance decision making. As such the research would evolve from a hypothetical theory into a practical model.

#### 4.6.2 Method

The initial strategy built upon Lewin (1946) 'Action Research Spiral' Figure 4.5 heeding the warning of McTaggart (1996) 'Action research is not a 'method' or a 'procedure' for research

but a series of commitments to observe and problematize through practice a series of principles for conducting social enquiry'.

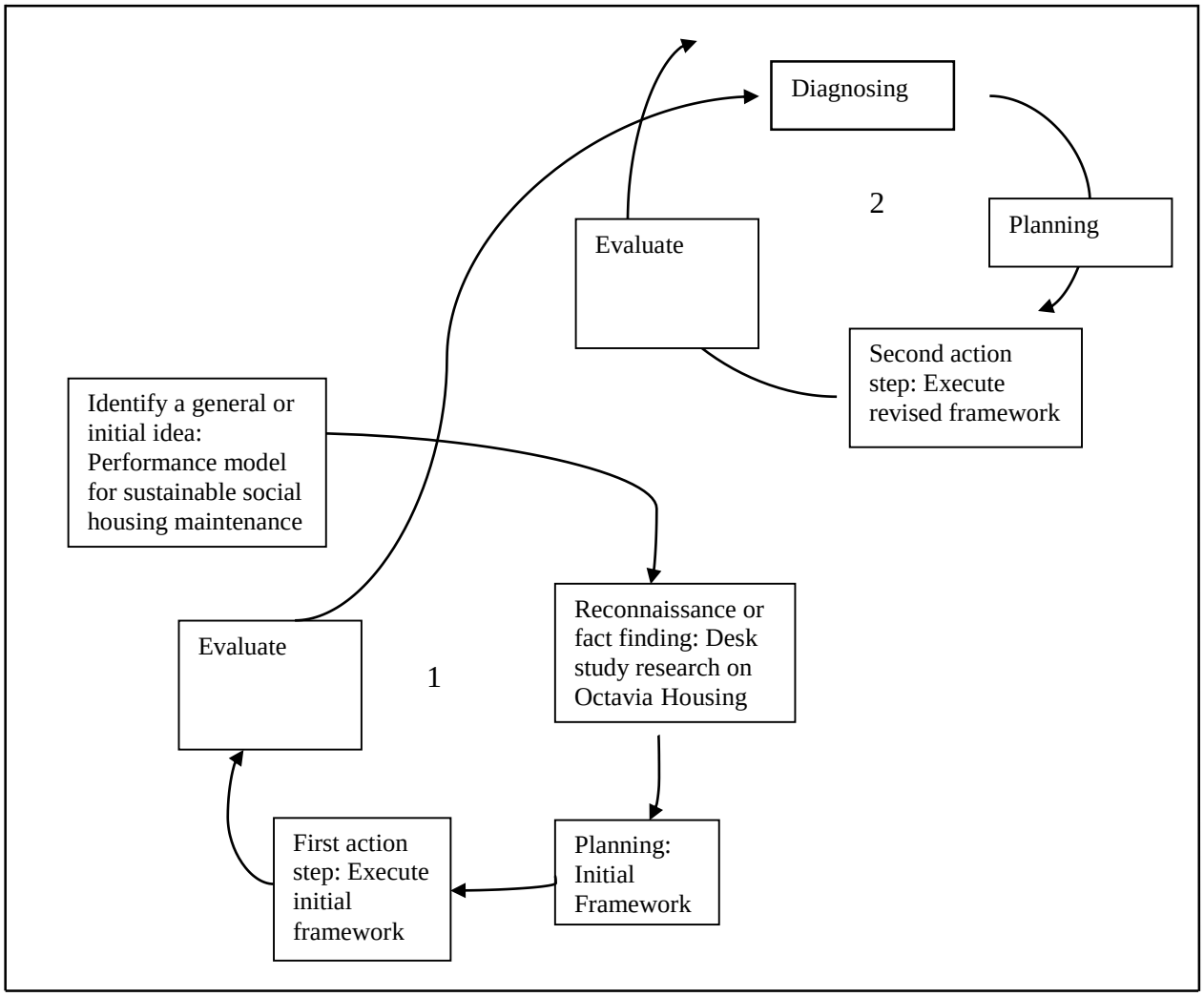



**Figure 4.5 Revised Kurt Lewin (1946) Action Research Spiral**

The action research approach took on a critical theoretic approach which was then extended to include the development of a real life model, in agreement with Zuber-Skerritt (1992) than following the interpretive approach or the living theory approach which are other well-known forms of action research. The critical theoretic approach was taken to overcome the negative aspects of interpretive research upon action research, in that the researcher may develop a rhetoric for democracy and inclusion of others in decision making when in actual fact that is not the case. The work of Stringer helped visualise this approach as for him one of the fundamentals of action research "is to be knowing and understanding what's happening for people and the process of working with them; and to help them explore their experience and to extend their own understanding of their own situation" (Dustman et al, 2014) thus the research was framed in the

language and experiences of Octavia Housing staff and tenants and the researcher became the facilitator to enable Octavia Housing to develop their own understanding of how sustainability may be incorporated into maintenance planning and how the performance of a house in-use could be used in such a process. Action research does not attempt to provide generalizable explanations but instead "focuses on specific situations and localised results" (Stringer, 2007) the crux of the participatory research was to populate the performance based sustainable social housing maintenance model with Octavia Housing's local requirements (set against government policy) and interpretation of the sustainability agenda (section 1.3, 2.2.1.5, 2.5.1, 3.4.1) to demonstrate its practical application.

Therefore an action research model and framework was initially established in order that the critical learning party (Octavia Housing) understood the level of commitment required and the duration of that commitment to coordinate staff time with the researcher. Octavia Housing confirmed their commitment (March 2008) and a final framework was developed as shown in Figure 4.6 so that the aspirations of the tenants could be explored in greater detail and a model could be developed in which these could be realised within a routine maintenance programme. This understanding would then go some way to satisfying Octavia Housing's ultimate strategic goal which was to have 'happy tenants' and thus have a better understanding of tenant psychology whilst reducing the level of reactive maintenance and increasing the level of planned preventative maintenance.

As can be the problem with participatory research, the commitment required of Octavia Housing and the researcher to complete the proposed project was underestimated and neither party were able to provide the necessary resources for the duration required. The case study was commenced as planned but not fulfilled, instead workshops with staff and tenants were used to establish a new set of KPIs and to initially populate the model. The tenant telephone survey was used to better understand tenant needs and aspirations and further populate the model. A third workshop was held in November 2013 attended by the senior management team responsible for new build and existing housing stock to check the reliability and currency of the populated model and develop the final list of criterion to be weighted and inserted in the AHP model. The participatory research was concluded on the 8th April with a meeting with the Director of Asset Management and the Building Services and Energy Manager to pair-wise that criteria (as discussed below in section 4.6.2.5).

The important roles various stakeholders play in defining sustainability, housing performance and decision making have been discussed (sections 2.11, 2.2.2.1, 2.33, 3.4.2 and 4.2.3) as has the criticality of the new model to incorporate the decisions of stakeholders, including tenants (section 2.3.2.4). The participatory research reflected this by incorporating as many stakeholders as possible (Octavia Housing staff represented a number of departments plus tenants) in the process. Stringer (2007) advocates this approach "action research works on the assumption that all people affected by or having an effect on an issue should be involved in the process of enquiry".

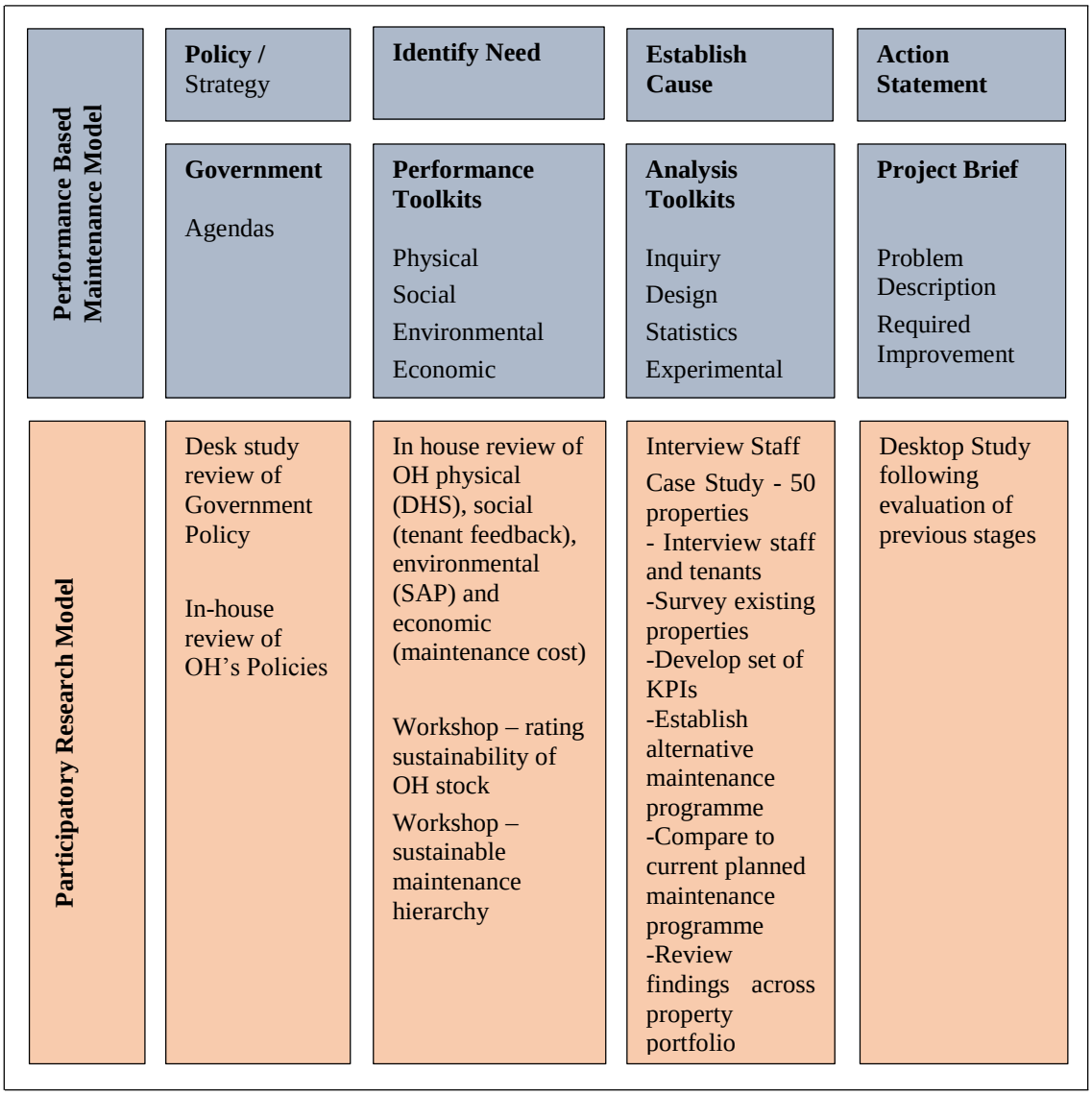



**Figure 4.6 Participatory Research Design Model Highlighting Activities with Octavia Housing and How they Relate to the Performance Based Sustainable Social Housing Maintenance Model**

The AHP model was developed in five stages; (1) develop hierarchy, (2) establish priorities, (3) software produces eigenvectors, (4) model was synthesised and (5) the sensitivity analysis was performed. Each stage is discussed in greater detail in the following paragraphs.

4.6.2.1 Octavia Housing Staff Workshop (Workshop 1)

Aims and objectives; To develop a methodology for rating the sustainability of Octavia Housing existing housing stock by;

- Establishing Octavia Housing's starting position;
    - Determining their key strategic drivers
    - Analysing the highest ranking drivers

The workshop consisted of two tasks, was held on the 3rd June 2008 from 11am – 1pm at Octavia Housing offices in Kensal Green and was attended by; 11 Members of Octavia Housing's Asset Management and New Development Departments.

Method - Task 1 – Determine Octavia Housing's key strategic drivers

- Attendees were asked to form 2 groups of 4 and 1 group of 3,
- Each group was asked 'What are the key strategic drivers applicable to Octavia Housing, incorporating the sustainability agenda?' and to write their answers onto a sheet of flip chart paper,
- Each group was asked to present their findings to the other 2 groups (an average of 10 drivers per group was provided),
- The key strategic drivers were pinned to the wall and each of the 11 participants was given 6 green dots and 6 yellow dots and asked to vote for the drivers they considered were most;
    - Important to Octavia Housing (green dots) and
    - Relevant to maintenance (yellow dots)
- Each participant could put as many dots next to the drivers as they wished to reflect how important/relevant they felt that particular driver was, e.g. if they thought there was one driver which was the most important to Octavia Housing they could assign all 6 green dots to it.
- Once voting was complete all the sheets were collected, duplicate drivers grouped as were there scores e.g. reduce cost was a driver each group had selected

Method - Task 2 – Analysis of Octavia Housing's Strategic Drivers

- From Task 1 the top four ranked drivers were established
- Participants were asked to form two groups consisting of different members (as much as possible) to the groups in task 1 and to analyse the top 4 ranked drivers in terms of;
    - Maintenance actions and
    - How can they be achieved / measured
- A representative of each group was asked to present their findings to the other group.

4.6.2.2 Octavia Housing STAFF and TENANT Workshop (Workshop 2)

Aims and objectives; To develop a methodology for rating the sustainability of Octavia Housing's existing housing stock by;

- Establishing issues which effect residents quality of life
- Build upon Octavia Housing's sustainable performance maintenance model established during workshop 1;
    - Determining how to measure performance
    - Determining Octavia Housing's KPIs

The workshop was held on the 13th November 2008 from 6.30pm until 9pm at Octavia Housing's office in Kensal Green and was attended by 1 Responsive Maintenance Contractor, 5 Members of Octavia Housing Staff (resident's liaison team and Asset Management team) and 6 Residents (2 of whom were also members of Octavia Housing Asset Management staff team). The staff and residents had been recruited by the Asset Management team. The workshop was split into two parallel sessions, the 'Residents quality of life discussion' was facilitated by the researcher and the 'Staff development of Sustainable Performance Maintenance Model' was facilitated by Professor Jones.

Parallel Session 1 – Resident's Quality of Life Workshop

Tenant Representatives (including the 2 who are also members of Octavia Housing staff) and the Customer Support Officer from Octavia Housing Asset Management team attended this parallel session and were asked to consider what issues impact their quality of life. Figure 4.7 contains the results from the interview phase of this research and presents the criteria social housing landlords felt were important to tenant's quality of life and presented as an aid for discussion. It was the intention of the workshop to have a general discussion regarding quality of life issues

and to then focus separately on social, environmental and economic criteria considering how improvements to each could be facilitated via housing maintenance.

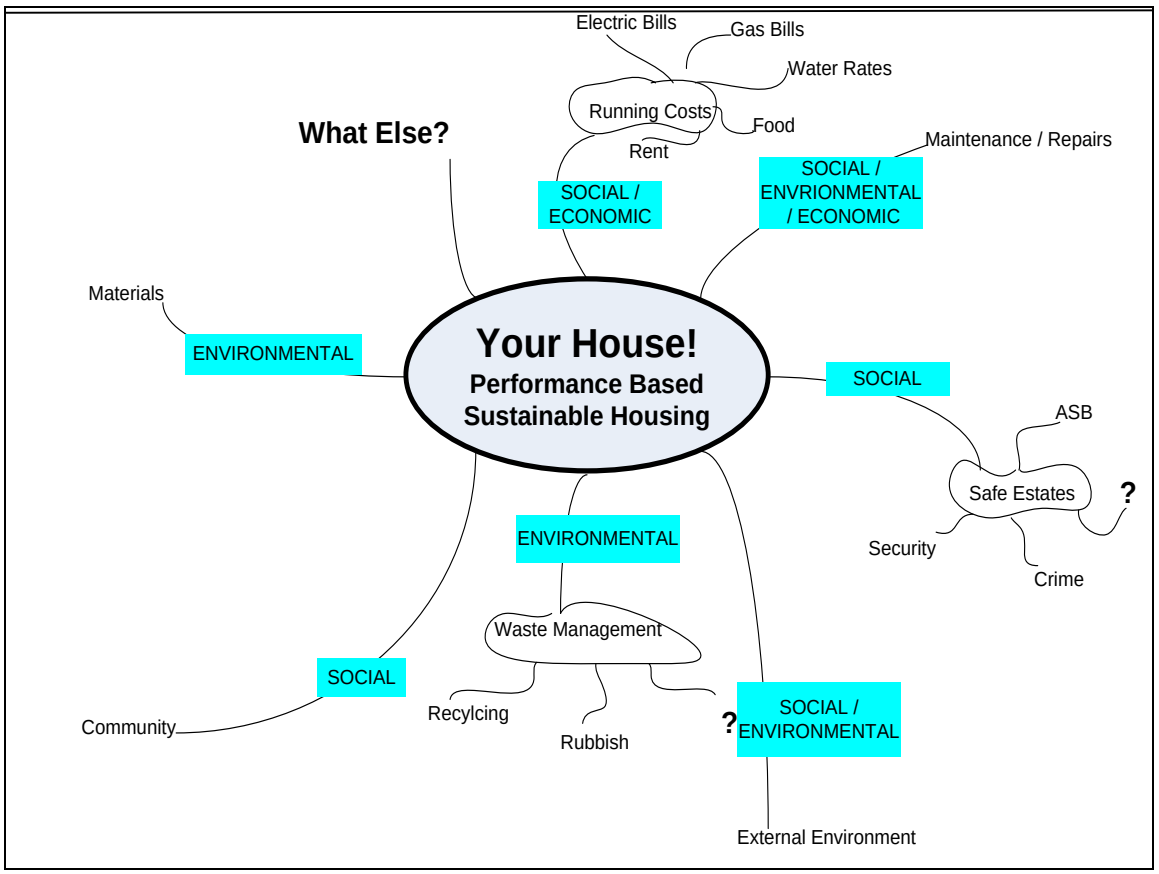



**Figure 4.7. Quality of Life Issues**

Parallel Session 2 – Staff Workshop

The Responsive Maintenance Contractor and 4 staff members from Octavia Housing attended this parallel session with Professor Jones to;

- Build upon sustainable performance maintenance model established by Octavia Housing staff during workshop 1
    - Determining how to measure performance
    - Determining Octavia Housing's KPIs

4.6.2.3 Tenant Telephone Survey

A telephone tenant survey was conducted by Octavia Housing staff between 5pm and 7pm throughout May 2009. The questions were devised by Octavia Housing with assistance from the researcher and administered by Octavia Housing staff. The full questionnaire can be viewed in Appendix E. All surveys were conducted on a voluntary basis but the housing area surveyed was identified by Octavia Housing's stock condition survey as an area in 'maintenance need' and as

such was selected by the Director of Octavia Housing Asset Management for participation. The aim of the survey was to establish the tenant's level of satisfaction with their home and location and to establish how Octavia Housing could better support tenants in their home. Where possible Octavia Housing would then build the results of this survey into their built asset management plan for the area as their priority going forward is to better understand the needs and aspirations of their tenants.

Telephone surveys were conducted during the evening on the 8th April 2009 as a pilot study. As a result of the pilot the number of questions was reduced and the wording refined.

The completed surveys were inserted into SPSS in a single data file by the researcher results and analysed using descriptive statistical analysis.

4.6.2.4 Octavia Housing Staff Workshop (Workshop 3)

The workshop was held on the 22nd of November 2013 at the Isaac Newton Centre, 108 Lancaster Road, London W11 1QS. The workshop was attended by 13 members of Octavia Housings senior management team. The agenda and Power Point Presentation slides for the workshop are given in appendix F.

The workshop comprised of three elements. Firstly Octavia Housing outlined their expectations of the workshop. Then an overview of what a good housing asset management strategy should contain was presented which emphasised the importance of linking asset management strategy to the wider organisational strategy and mapping the organisational drivers to the performance of the current assets. The overview included the Performance Based Sustainable Social Housing Model as the preferred approach to building asset management. The presentation also emphasised the need to test the strategy against existing business processes and systems to ensure that the strategic vision is achievable given current (and future) constraints. Two breakout sessions then followed in which delegates were divided (self-organised) into 3 groups. The groups remained the same for both sessions.

Session 1

- Each group was asked to identify the organisational (business) drivers that they thought should inform Octavia's asset management strategy (yellow post its) and the attributes they would like an Octavia home to exhibit.

- Following feedback from each of the groups the workshop facilitators (Keith Jones and Justine Cooper) grouped the drivers and attributes into generic categories and each delegate was asked to rank the importance of the drivers and attributes to Octavia. Each delegate was given 5 green (drivers) and 5 red (attributes) dots that they could use to register the level of importance. Delegates were free to cast their votes however they wished (e.g. they could cast all their votes for one category or spread their votes amongst categories).

Session 2

- Sought to assess the degree to which Octavia's stock exhibited the desired attributes identified in the first breakout session. Each group were asked to examine each attribute in turn and to identify what they meant in practical terms and whether Octavia Housing currently had the data to measure them. In essence this was the precursor to establishing the Key Performance Indicators (KPIs) that Octavia Housing could use to measure both the performance of its existing stock against its strategic drivers and assess the potential of future maintenance, refurbishment, acquisition and disposal programmes.

4.6.2.5 Octavia Housing Pair-wise

On Tuesday 8th April 2014 The Director of Asset Management and the Building Services and Energy Manager (both of whom have attended all 3 Octavia Housing workshops) were presented with Octavia Housing's performance based sustainable social housing maintenance hierarchy built up using the results of the entire participatory research and provided their (joint) pair-wise decisions. Ideally this process would have been replicated with other stakeholders including tenants; however time constraints meant that this was not possible. This is discussed further in Chapters 8.3.6 and 9.4.1.

### 4.6.3 Analysis

The priority index of the sustainable maintenance criteria was calculated using AHP Model (using Expert Choice 11) based on the pair-wise decisions of the Director of Asset Management and the Building Services and Energy Manager. As discussed in section 8.3.6 the pair-wise decisions based on the row 2 objectives (criteria) and the goal was used to limit any unnecessary complexity. The performance in-use 'score' of a fictional property was calculated combining the priority index (calculated during the participatory research) with a scoring mechanism proposed

by the researcher, discussed in section 9.4.1. Once the property's baseline in-use performance score had been established a maintenance scenario, in this case the installation of uPVC double glazed windows, was run against it to recalculate the in-use performance of the property to measure the improvement in performance that could be expected by that particular maintenance action to assist with maintenance prioritisation.

## 4.7 Summary

This chapter presented the research framework, philosophy, design and methods employed to undertake the research project, which comprised of 3 inter-related but sequential components and culminated in the development and partial population of the 'performance based sustainable housing maintenance model' and a worked example of how AHP can be used to aid the sustainable social housing maintenance decision making process.

# Chapter 5

# Questionnaire Results

## 5.1 Introduction to the Questionnaire Results Chapter

The results will be presented over three chapters. This chapter presents the results from the pilot and postal questionnaire to investigate the issues/problems faced by Social Housing Landlords as they seek to improve the quality of their existing housing stock in a way that is environmentally, socially and economically sustainable. The methods employed for data collection and analysis have already been discussed in detail in chapter 4 and will not be reviewed again here. The pilot questionnaire was used to validate the content of the main questionnaire survey and the results presented in section 5.2 are therefore independent from those reported in section 5.3 which are from the main questionnaire and which address the following research questions:

1. The extent to which current maintenance practices are perceived to contribute to improving the sustainability of existing social housing;
2. The impact the DHS and the sustainability agenda has had on maintenance priorities and to assess whether these are perceived to have had a positive or negative impact on the sustainability of the existing housing stock;
3. The usefulness of the existing toolkits used by maintenance managers in developing maintenance plans that deliver improvements to the sustainability of social housing.
4. The extent to which the maintenance process, both planned and reactive, can be used as a means to improve the sustainable performance of the existing UK social housing stock.

Section 5.4 provides a summary of the main findings from the questionnaire survey.

Chapter 6 presents the findings from the in-depth semi-structured interviews which is proceeded by a discussion chapter (chapter 7) before presenting the participatory research study and results (chapter 8) and the final discussion chapter (chapter 9).

## 5.2 The Pilot Questionnaire Survey

This section presents only brief results from the pilot questionnaire survey as it was conducted as a means of validating the content of the main questionnaire only and was not included in the analysis of the main postal questionnaire, the results of which are presented in section 5.3.

The pilot questionnaire was issued to 43 RSLs and 56 LAs who still maintained responsibility for the maintenance of their housing stock. Eighteen questionnaires were returned including 9 completed, 5 from LAs and 4 from RSL's representing a response rate of 9%. The main reasons for none completion were that the organisation did not undertake maintenance planning (many RSLs were part of a group structure with maintenance being dealt with at the group level) or, in the case of LAs, had transferred their stock to an ALMO and as such no longer dealt with maintenance issues, or that as a matter of policy they didn't participate in questionnaire surveys. Greater success rates appeared to be from those questionnaires issued directly to the Chief Executive. For the main study all questionnaires were sent to the Chief Executive and only Parent (lead RSLs in group structures) RSLs were targeted.

With regards to the appropriateness of the questionnaire, analysis of the pilot confirmed that:

- The questionnaire reached the target audience,
- The primary decision making tool was the stock condition survey, however, other measures were also being used which appeared to indicate a move towards a variety of decision making tools including performance based tools such as SAP 2001,
- Sustainability was having little impact on what RSLs and LAs did but they appeared to understand the importance of a range of issues covering Environmental, Social and Economic;
- All respondents agreed that sustainability of their maintenance strategy could be improved and rated a range of factors which they believed should be included in a sustainable maintenance system, which were;
    - source labour locally, use recycled/reused materials, use low toxicity paints and varnishes, make incremental improvements should be made, monitor construction waste, protect existing ecological features, produce home user guides, provide household security
- Sustainability was not currently monitored

- Questionnaires issued to Chief Executives produced a greater response than those issued to the organisations' housing maintenance manager.

## 5.3 The Questionnaire Survey

The following sections present the results from the main Questionnaire survey.

### 5.3.1 Organisational Details

5.3.1.1 Participating Landlords and Response Rate

Figure 5.1 provides a breakdown of the proportion of responding social landlords by their management structure. In England (at the time of questionnaire distribution) there were approximately 1900 RSLs (parent organisations), 125 LA who still owned and managed their own housing stock and 76 registered ALMOs. Questionnaires were sent to 564 RSLs (whose Chief Executive details were published on the Housing Net) of which 63 were returned completed, representing a response rate of 11%. Questionnaires were sent to all LAs and ALMOs of which 19 and 13 were returned completed, representing response rates of 15% and 17%. Overall survey response was 12%. Thus whilst RSLs represent the greater number of returns by volume, those from LAs and ALMOs represent the largest proportion of their respective populations.

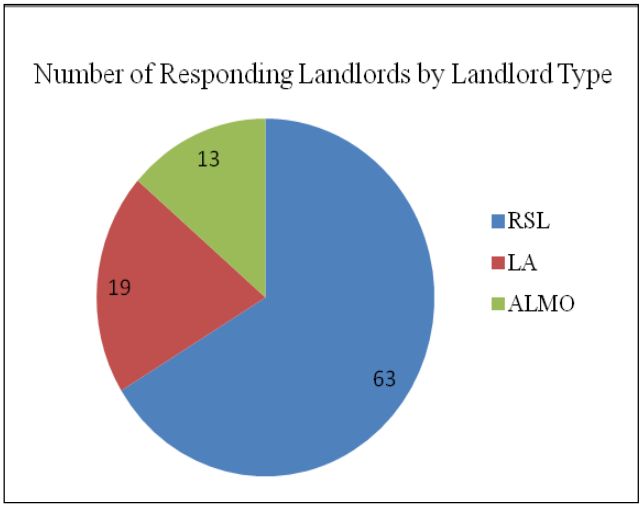



**Figure 5.1 Type of Responding Social Landlord**

5.3.1.2 Primary Activities of Responding Department

Ninety two of the 95 respondents confirmed repair and maintenance was one of the primary activities undertaken within their department, which suggests the questionnaire reached its intended audience. Of the 3 remaining respondents, 2 confirmed that they were responsible for the management of maintenance / repair of the organisation's stock portfolio. One was a LA landlord and the other a RSL, both were relatively small housing providers with between 1001-5000 and 0-1000 properties, respectively, which may indicate that these were not departmentalised. The final respondent who failed to complete this question was an assistant

completing the questionnaire on behalf of others within an ALMO with over 20,000 properties in its portfolio.

5.3.1.3 Primary Activities of Respondents.

Eighty nine of the 95 respondents confirmed they were responsible for the management of the maintenance / repair of the organisation's housing stock. Two respondents did not work in such a department and 3 failed to respond but confirmed that they also worked in a department where one of the primary activities was the repair and / or maintenance of the organisation's housing stock. This could simply be an indication that the questionnaire was completed by members of the team lower down the hierarchy. On the whole it would appear that the questionnaire was completed by its intended audience.

### 5.3.2 Stock Profile

5.3.2.1 Number of Dwellings In Respondents Property Portfolio

Figure 5.2 provides a breakdown of respondents by the number of dwellings they have in their stock portfolio and shows that LAs were fairly evenly distributed across a range of stock sizes whilst RSLs are skewed towards the 10,000 properties and less and the ALMOs were skewed in the opposite direction with a greater emphasis on portfolios with 5000 plus properties. This trend was expected as ALMOs were created to take over the management of LA housing stock to ensure the government's 2010 Decent Homes target was met and LAs have traditionally had large stock portfolios.

Since 2002 the English House Condition Survey (EHCS) has been run on a continuous basis, at the time of the questionnaire survey the current EHCS was the 2006 report (DCLG, 2006b) was based on fieldwork carried out between April 2005 and March 2007. There were approximately 22 million homes in England, approximately 3.9 million (17.7%) properties within the social sector, of which 2.1 million (9%) were owned by Local Authorities (LA) and 1.8 million (8%) were owned by Registered Social Landlords (RSL).

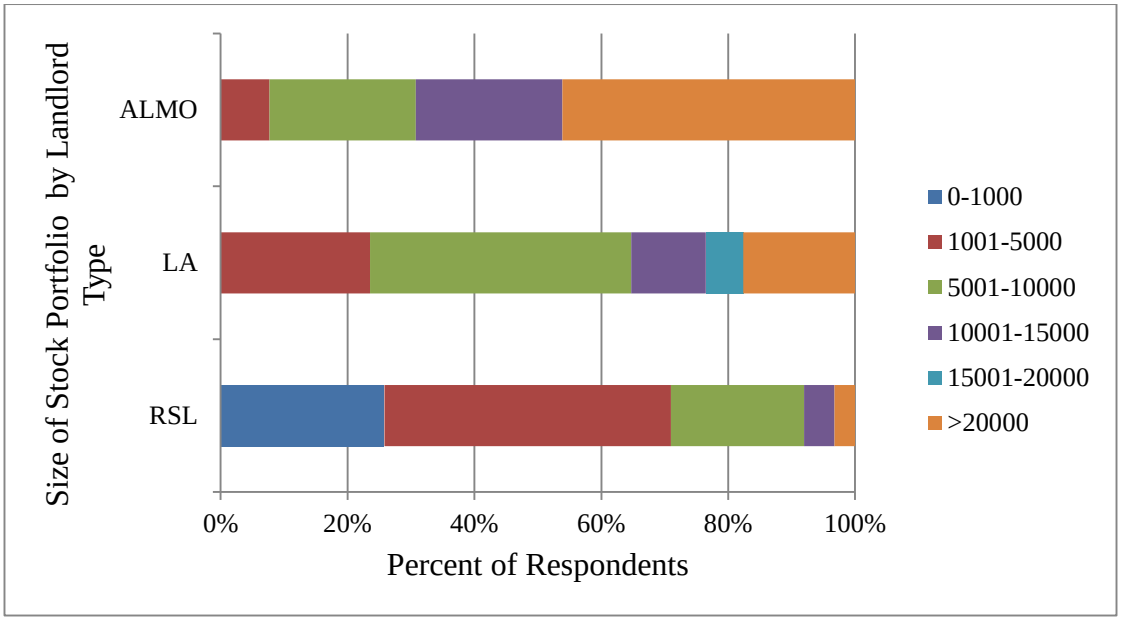



**Figure 5.2 Number of Dwellings in the Property Portfolio**

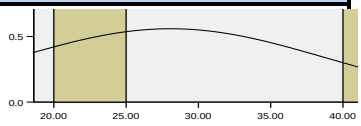
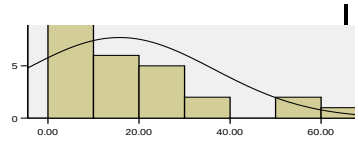
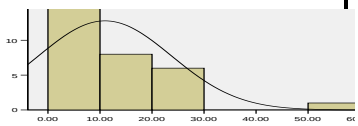
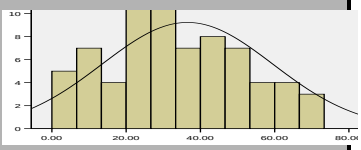
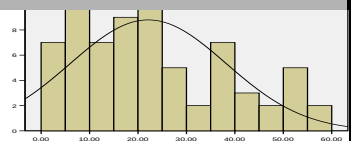
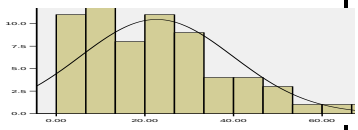
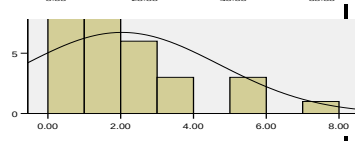
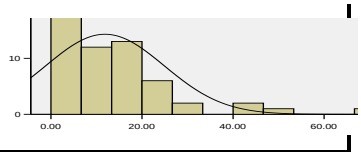
Whilst the questionnaire didn't ask landlords to provide an exact figure for the number of dwellings owned/managed by their organisation, a review of the Housing Net database, has estimated that the responding RSLs within England were responsible for a total of 266,846 properties, which represents approximately 14.5% of the total RSL housing stock; LAs 248,256 properties and ALMOs 237,005 properties which represents 23.1% of the total LA owned stock in England. Thus the respondents to the survey managed approximately 19% of the total social housing stock in England between them and as such it can be assumed that results of the survey provide a good reflection of the current social housing property profile within England.

5.3.2.2 Breakdown of Housing Stock - Dwelling Types

Table 5.1 provides a breakdown of respondents by number of different types of dwelling they have in their stock portfolio. The 'Number of respondents with property' column represents the number of landlords who have a particular type of dwelling, the 'Min. % of stock type' column represents the landlord with the smallest percent of a particular dwelling type within their portfolio, the 'Max. % of stock type' column represents the landlord with the largest percent of a particular dwelling type within their portfolio, the standard deviation has been calculated for each dwelling type and the corresponding profile drawn. The highlighted row shows the most common dwelling type is the purpose built low rise flat with 80 out of the 95 respondents holding such dwellings. The distribution of purpose built low rise flats ranged from 0.5% to 100% of the stock portfolio with an average of 36.5% of a respondents stock comprised of

purpose built low rise flats. The next most common dwelling type was the semi-detached house which contributed to the stock profile of 68 out of the 95 responding organisations.

**Table 5.1 Dwelling Types Owned / Managed by Respondents**

| Dwelling Types | No. Respondent | Min. % | Max. % | Mean | Std. Deviation | Profile |
|---|---|---|---|---|---|---|
| Flats (general) | 3 | 20.00 | 40.20 | 28.1 | 10.69642 |  |
| Converted flats | 40 | .33 | 80.00 | 15.7 | 20.70819 |  |
| Purpose built high rise | 41 | .33 | 64.00 | 11.0 | 12.78901 |  |
| Purpose built low rise | 80 | .50 | 100.00 | 36.5 | 23.04154 |  |
| Terraced | 71 | .70 | 60.00 | 22.1 | 16.10419 |  |
| Semi detached | 68 | .33 | 80.00 | 22.6 | 17.26712 |  |
| Detached | 45 | .01 | 10.00 | 2.0 | 2.66890 |  |
| Bungalow | 70 | .33 | 72.00 | 11.9 | 13.01404 |  |

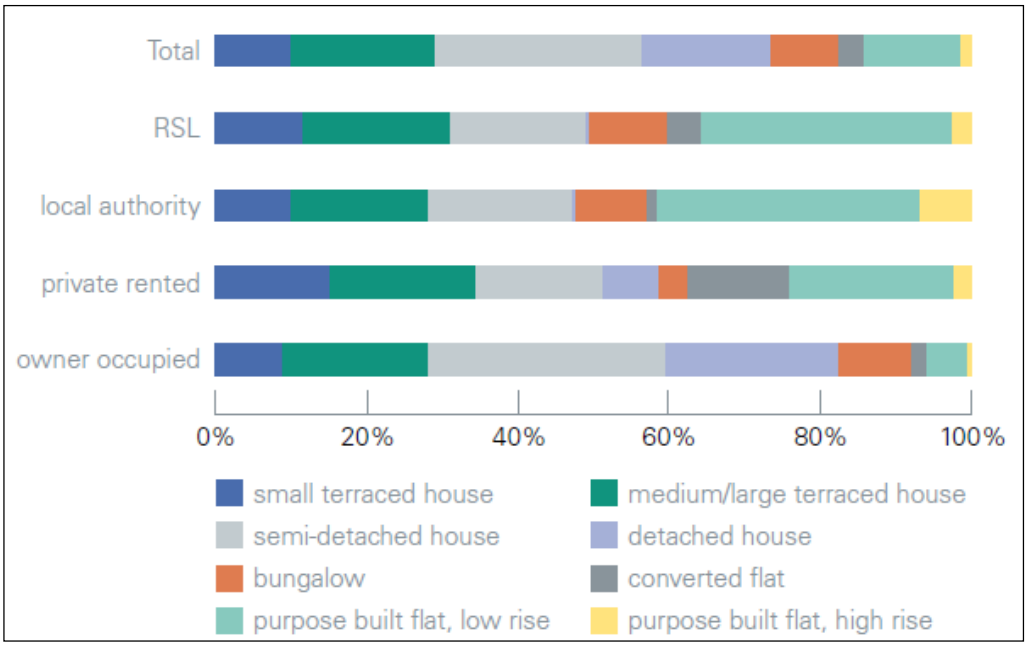



**Figure 5.3 Dwelling Type by Tenure, 2006. Source DCLG 2006b**

According to the DCLG 2006b 42% of social sector dwellings were flats and the remaining 58% were houses (Figure 5.3). Figure 5.4 shows that there was a similar split between houses and flats across the responding LAs, ALMOs and RSLs and that the split was in the region of 50/50 to 60/40. This could suggest that some of the more difficult stock to maintain still resides with LAs.

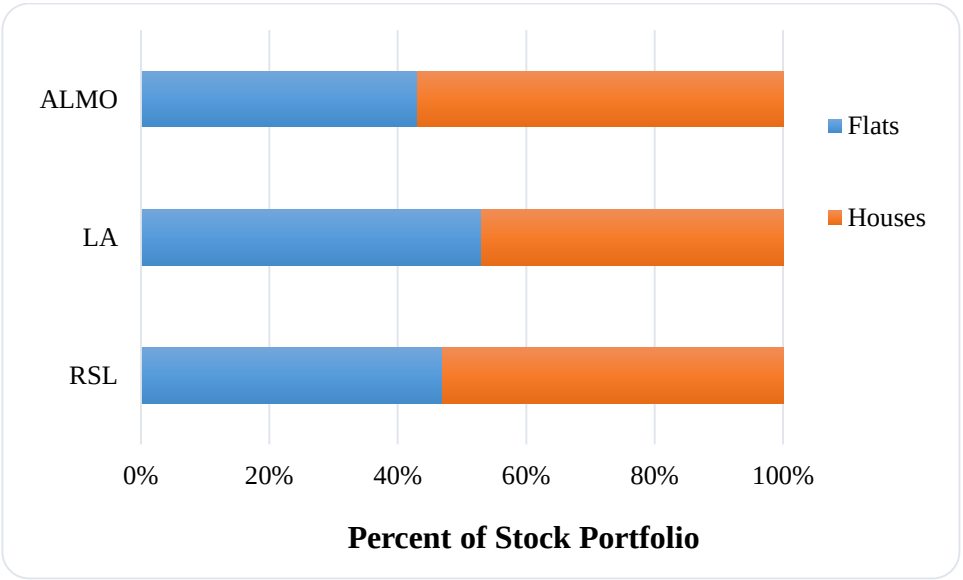



**Figure 5.4 Breakdown of Houses and Flats**

5.3.2.3 Breakdown of Housing Stock – Age

Figure 5.5 provides dwelling age data from the DCLG 2006b and demonstrates that the majority of social housing was built between 1945 and 1980.

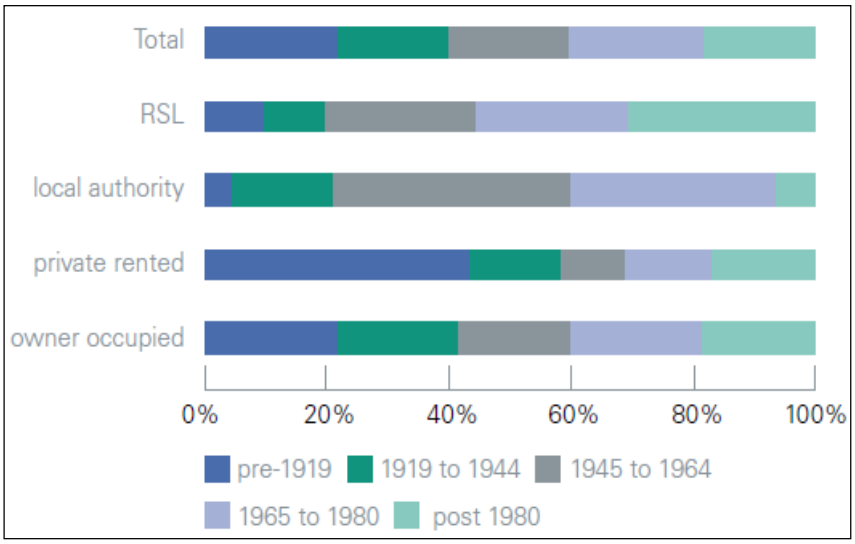



**Figure 5.5 Dwelling Age (provided by the DCLG 2006b)**

Figure 5.6 presents a breakdown of respondent's property age profile for each type of landlord. The most common age groups for social housing owned by LAs and ALMOs was 1965-1980 and then 1945-1964, whilst RSLs favoured post 1980 dwellings and then 1945-1964. This pattern closely replicates that provided by the DCLG 2006b, there also appears to be a similar pattern of distribution amongst all three types of landlord for the age groups 1919-1944, 1945-1964 and 1965-1980. RSLs have a higher proportion of properties constructed post 1980 compared to LA and ALMOs, also reflected in the DCLG 2006b. One reason for this could be that RSLs were able to gain funding to develop their own housing whereas LAs were restricted due to funding mechanisms. ALMOs had the option to develop if they were on the Housing Corporations preferred list, however they were developed primarily to ensure that current housing meets the DHS by 2010. RSLs also had a higher proportion of properties constructed pre 1919 than the LAs and ALMOs surveyed, perhaps as a result of LA large scale stock transfers to RSLs as traditionally LA had large volumes of older housing which has recently been transferred.

Overall it appears that all Social Landlords have stock portfolios consisting of dwellings of a variety of different ages.

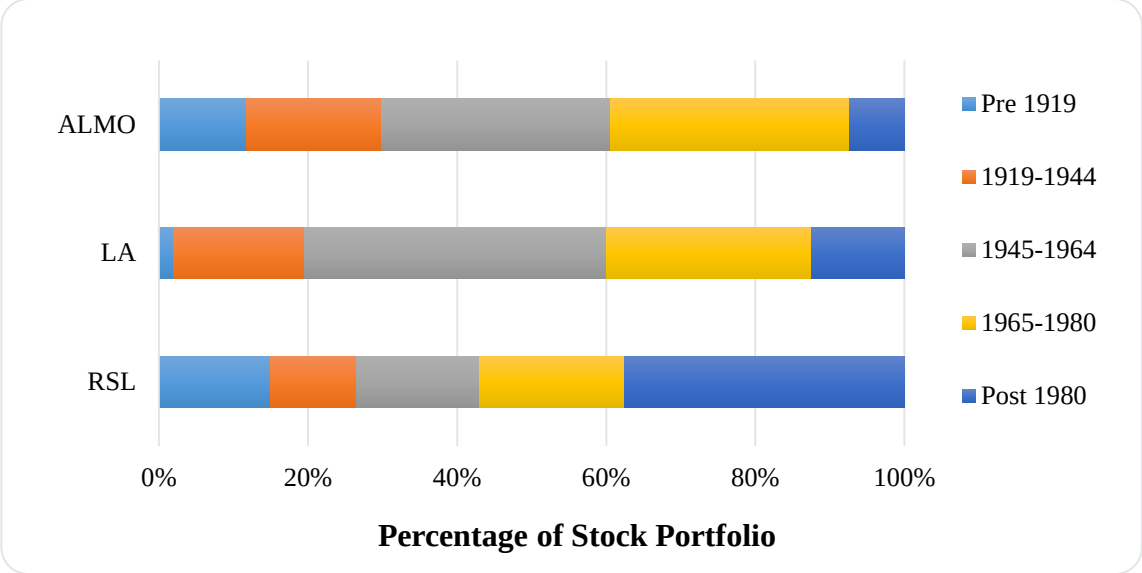



**Figure 5.6 Age of Dwellings within Property Portfolio**

To summarise, from the comparisons presented above it would appear that the respondent's property portfolios were generally representative of the social housing landlords in England in 2007. As such the results from the survey could be considered indicative of the social housing sector in England.

### 5.3.3 Housing Maintenance Practice

5.3.3.1 Value of Maintenance Work

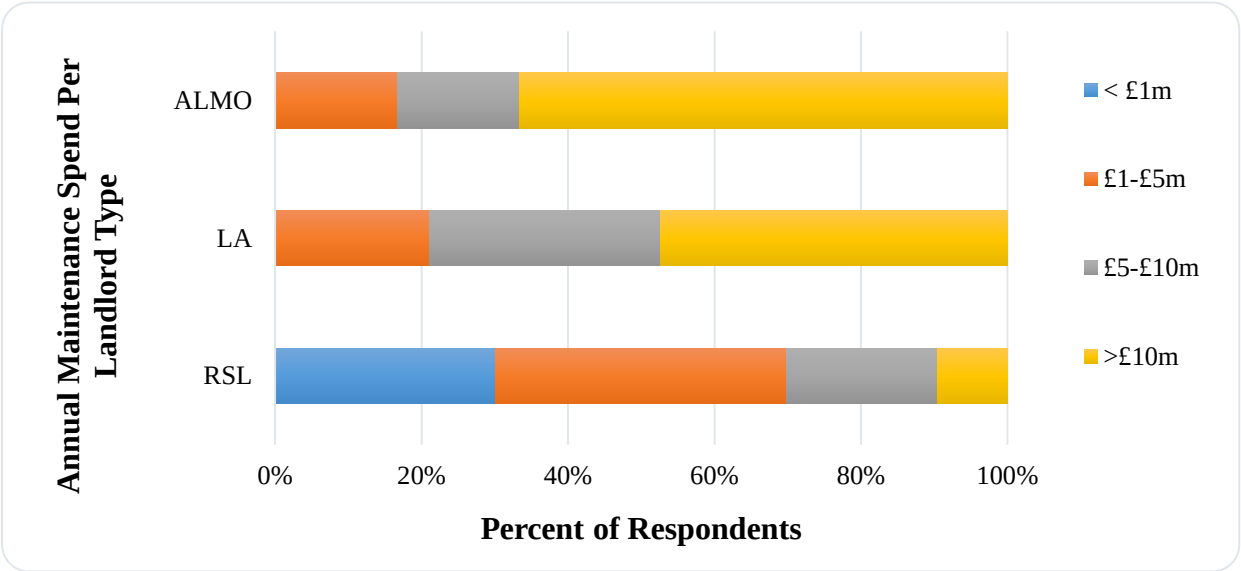



**Figure 5.7 Value of Annual Maintenance Work**

Figure 5.7 provides a breakdown of respondents by the annual value of their maintenance works with RSLs tending to spend £10 million and less per year whereas ALMOs and LAs were more likely to spend £5million or more per year. Cross tabulation between the size of the stock portfolio and annual maintenance spend shows a statistically very strong association between portfolio size and maintenance with a Chi-square value of 132.78 which equates to an association of greater than 99% (with 15 degrees of freedom).

Table 5.2 provides a comparison between the mid points of the 'value of maintenance' and 'size of stock portfolio' and shows that the maintenance value per unit varies considerably from £167 to £6,000, the average spend per property of £800 (based upon the total annual maintenance spend (£490 million) divided by the total stock (612,000 - using the mid points for each as below) is slightly lower than expected (in comparison to UK norms).

**Table 5.2 Estimate of Average Maintenance Spend Per Property**

| Stock Portfolio Size | Mid-Point of Stock Portfolio Size | Annual Maintenance Value | Mid-Point of Annual Maintenance Value | No. of Cases | Spend / Property |
|---|---|---|---|---|---|
| 0-1000 | 500 | <£1m<br>**£1-£5m** | £500k<br>**£3m** | 15<br>**1** | £1,000<br>**£6,000** |
| 1,001-5,000 | 3,000 | <£1m<br>£1-£5m<br>£5-£10m | £500k<br>£3m<br>£7.5m | 3<br>23<br>8 | £167<br>£1,000<br>£2,500 |
| 5,001-10,000 | 7,500 | £5-£10m<br>>£10m<br>£1-£5m | £7.5m<br>£10m<br>£3m | 11<br>5<br>6 | £1,000<br>£1,333<br>£400 |
| 10,001-15,000 | 12,500 | £1-£5m<br>£5-£10m<br>>£10m | £3m<br>£7.5m<br>>£10m | 1<br>2<br>5 | £240<br>£600<br>£800 |
| 15,001-20,000 | 17,500 | >£10m | >£10m | 1 | £571 |
| >20,000 | >20,000 | >£10m | >£10m | 10 | £500 |

***Note. The midpoint for stock portfolio size >20,000 was taken as 20,000 and the mid-point for costs >£10 million were taken as £10 million.***

An average annual spend / property of £6000 (the shaded row) appears high in comparison to the other social landlords. However this is most likely due to the high DHS achievement rate of this organisation (99%), resulting from an extensive maintenance programme coupled with the recent completion of a 17 year major repairs programme costing around £12 million for an organisation

with 700 dwellings. This example was calculated using the total maintenance expenditure and the total number of social housing dwellings, but not all dwellings will be maintained at any one time.

The average cost to make a social sector dwelling decent (DCLG, 2006) was £4,200 (with 40% of non-decent dwellings needing less than £1000) compared to £3,883 for LAs and £2,905 for RSLs in 2005 (DCLG, 2005). Costs to make a dwelling decent was dependent upon the criteria of failure, LA housing failing due to thermal comfort only was reported in the DCLG 2005 as costing £1,272 whilst failure due to other criteria was reposted as costing £7,290, respective figures for RSLs were £1,109 and £6,923. Overall, the average maintenance spend from respondents was similar to UK norms.

5.3.3.2 Basis for Maintenance Budgets

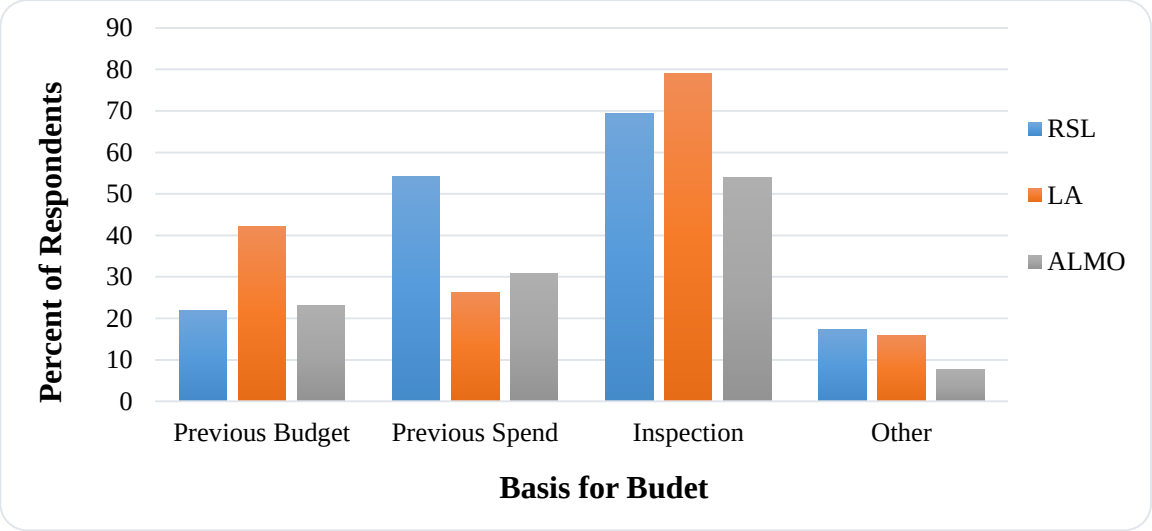



**Figure 5.8 Basis for Maintenance Budgets**

Figure 5.8 provides a breakdown of the criteria used by the respondents when establishing maintenance budgets and shows that property inspection remains the most common method for all three types of social landlord. This is followed by previous years spend, then previous year's budget (except for LAs where these were reversed) and finally other. ALMOs and LAs 'other' consisted of 'agreed with tenants', councillor concerns and 'LA capital and HRA allowance'. RSLs 'other' consisted of 'a combination of previous years spend and property inspection', 'asset management software forecasts', 'resident consultation', 'major repair', 'formula approach to responsive, and planned programmes'.

The combined values shown in Figure 5.8 are greater than 100% as some organisations base their budget on more than one criteria, the most popular combination was spend and inspection.

5.3.3.3 Planned Preventative Maintenance vs. Responsive Maintenance

Figure 5.9 shows a breakdown of respondents by the ratio of Planned Preventative Maintenance (PPM) to Responsive Maintenance (RM) by the type of social landlord. Those responses where the percentage of PPM plus RM work did not add up to 100% were excluded from the analysis. The mode score for each type of landlord suggested that RSLs were more likely to have a PPM:RM ratio in the region of 60:40 to 70:30, ALMOs were in the region of 36:54 to 63:37 and LAs were in the region of 64:40 to 83:17. Very few organisations exhibited predominance for RM work. These results could be a direct result of government pressure to reduce the amount of work carried out in reactive mode which was promoted as the more inefficient way of conducting maintenance. It is acknowledged however that there will always be an element of responsive maintenance repair work.

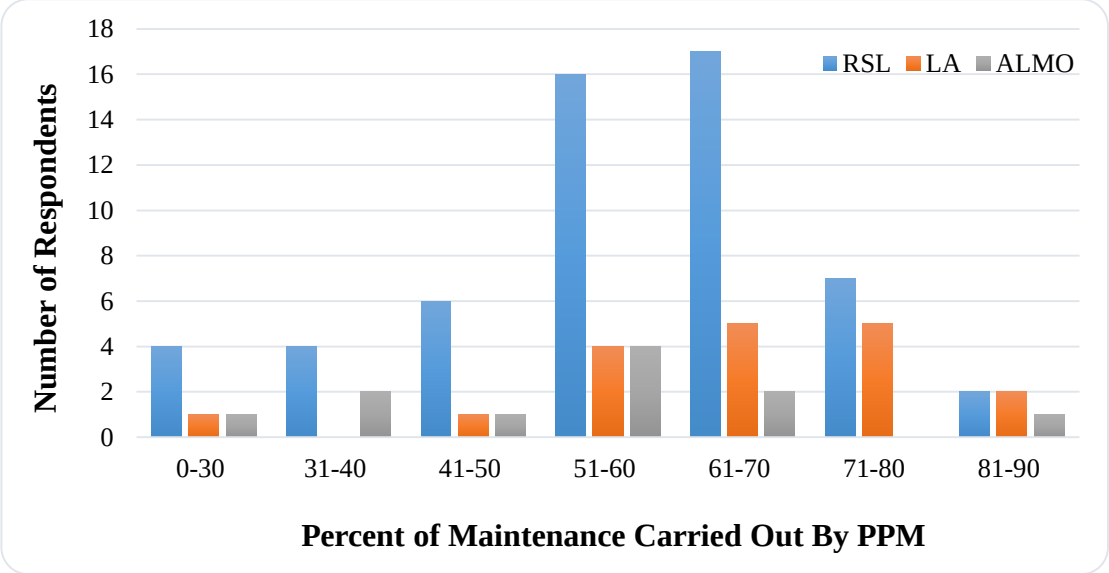



**Figure 5.9 PPM vs. RM**

5.3.3.4 Property Maintenance Inspection Cycles

Figure 5.10 shows the breakdown of respondents by the frequency with which property inspections were carried out and shows that generally inspections were undertaken every 4-5 years (48% of respondents). Further, 77% of those who did inspect every 4-5 years used this as their sole method of identifying maintenance need. There appeared to be a positive association between those organisations who did inspect every 4-5 years and their method for carrying out

maintenance work (predominantly PPM) as 80% of those who did inspect every 4-5 years had a PPM value of ≥60 %.

The major exception to the above would appear to be ALMOs who carried out more inspections as and when defects were reported than RSLs and LAs. (Fifty percent of the ALMOs identified maintenance need by inspecting properties 'as and when defects were reported', half of which did so in conjunction with a 3-5 year inspection cycle and the remaining half as a sole means of property inspection. The group of ALMOs who only inspected when a defect was reported were those with the largest property portfolios and annual maintenance spends. It was not possible to draw a conclusion regarding the preferred method of carrying out maintenance work for this group of 3 as PPM levels were reported as 52%, 6% and no answer given.)

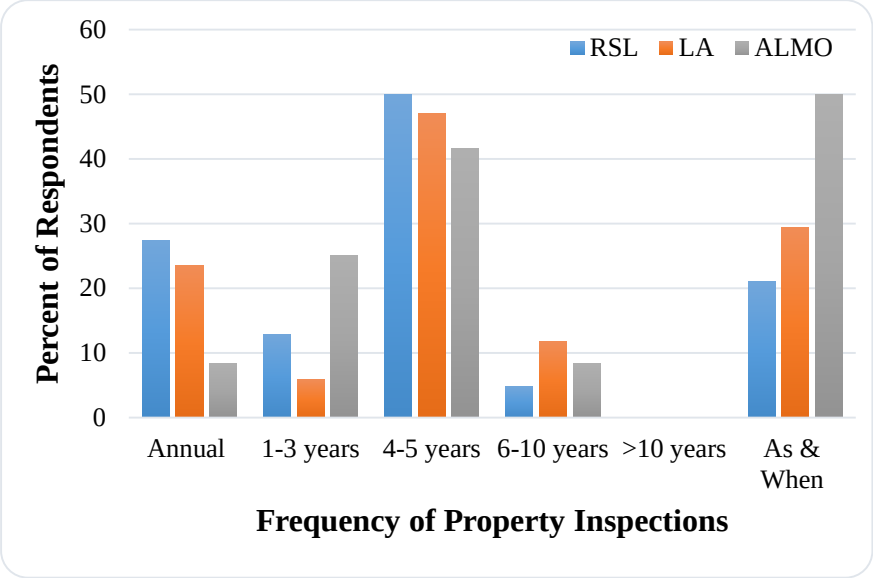



**Figure 5.10 Frequency of Inspection by Landlord Type**

Of the 26 % of respondents who inspected as and when defects were reported, 50% of them did so in conjunction with 4-5 yearly inspections; 25% in conjunction with annual inspections and the remainder in conjunction with other combinations. One organisation who inspected as and when defects arose also inspected on a cyclical basis and differentiated between sheltered housing and general needs housing by frequency of those inspections, i.e. sheltered housing was inspected 1-3 yearly and general needs 4-5 yearly.

Overall 13% of respondents relied solely upon inspections carried out as and when defects were reported which would perhaps suggest that there was a more reactive attitude toward maintenance. However no statistical association between frequency of inspection and level of RM:PPM was found.

Table 5.3 shows the results of cross tabulating maintenance inspection cycles and property portfolio sizes and indicates that the smallest social landlords relied more on annual inspections, whilst the other groups relied on inspections with a frequency of 4-5 years, except for landlords with property portfolios in the region of 10,000-15,000 who relied more on inspecting properties as and when defects were reported. It could be assumed to be easier and less costly for the smallest social landlords to carry out annual inspection of their properties because of the number of properties involved.

**Table 5.3 Cross Tabulating Maintenance Inspection Cycles and Property Portfolio Sizes**

| **Frequency of Inspection** / **Property Portfolio Sizes** | **Annual** | **1-3 years** | **4-5 years** | **6-10 years** | **>10 years** | **As & when reported** |
|---|---|---|---|---|---|---|
| 0-1,000 | 43.7% | 12.5% | 31.25% | 0.1% | 0 | 18.75% |
| 1,001-5,000 | 17.64% | 20.59% | 50% | 8.82% | 0 | 23.53% |
| 5,001-10,000 | 14.29% | 9.52% | 71.43% | 4.76% | 0 | 14.29% |
| 10,001-15,000 | 37.5% | 0 | 37.5% | 0 | 0 | 62.5% |
| 15,000-20,000 | 0 | 0 | 100% | 0 | 0 | 0 |
| >20,000 | 12.5% | 12.5% | 37.5% | 0 | 0 | 50% |

5.3.3.5 Prioritising Maintenance Works

Figure 5.11 indicates the importance respondents placed on a variety of maintenance prioritising criteria and shows that 'need' was classed as the 'most important' criteria by all landlord types. RSLs and LAs selected 'budget' as being 'second most important' but ALMOs considered 'budget' to be joint most important. This could be a reflection of the quality of the properties managed by ALMOs, and could be an indication of the level of work carried out by LAs as part of the transfer deal. All landlords placed the political criteria last as either 'not important'', least important' or 'third important'. This finding was unexpected considering the dominance the DHS had on maintenance decision making and considering all ALMOS stated that their maintenance strategies have been affected by the DHS as did 95% of RSLs and LAs.

It was initially assumed that social landlords did not consider the DHS to be a political criterion but subsequent interview established this was not the case. Those interviewed confirmed that they had placed political as either not important or least important because they felt that the politics involved are dealt with at a higher level and are already established before reaching the

Social Landlords maintenance department. As far as the mechanics of how maintenance works was carried out, all those responding felt that politics had no bearing on it.

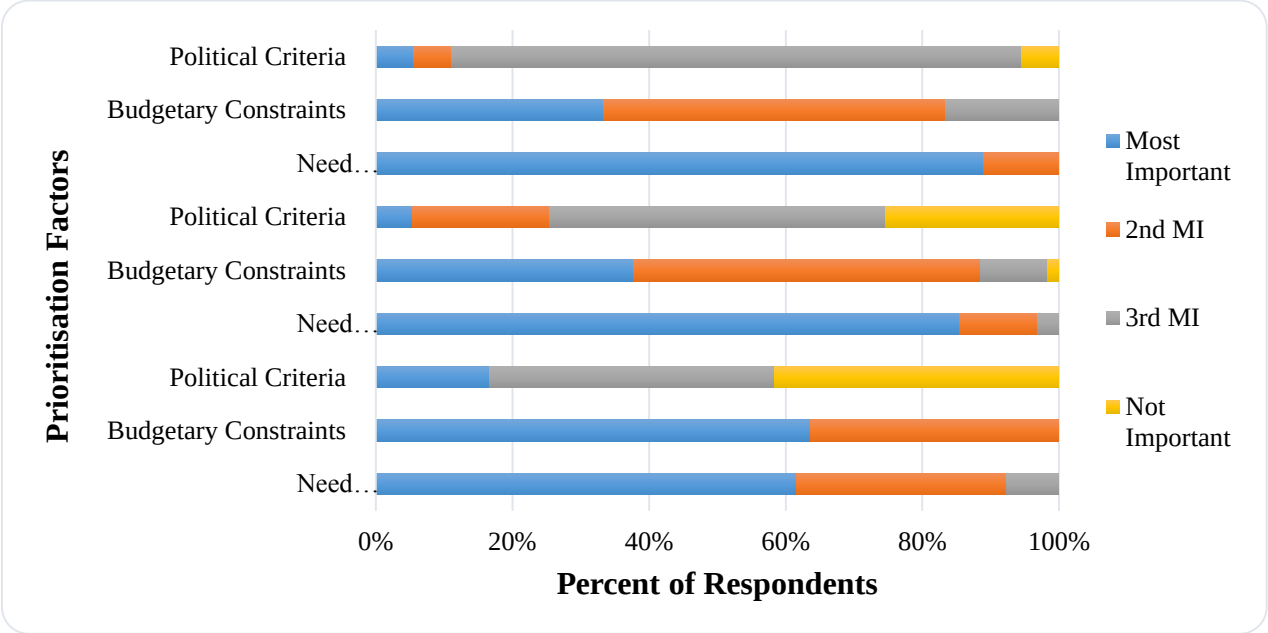



**Figure 5.11 Prioritisation Factors and Their Importance in Determining Maintenance Works**

5.3.3.6 Historical Data Collection and Identification of Maintenance Trends

Eighty percent of RSLs, 85% of ALMOs and 84% of LAs collected historical data to help identify maintenance trends. Respondents who confirmed the collection of historical data for the identification of maintenance trends were also invited to provide examples of the data they collected (and considered to be historical). Table 5.4 provides an analysis of the answers given. There were 23 responses in total which were broken down into 5 categories; Maintenance Information System (MIS), KPI, Life Cycle Modelling, Components and MIS / Life Cycle Modelling.

Twelve respondents effectively used some form of repetitive analysis of their maintenance records to inform their decision making for example “responsive, planned and refurbishment data is used to identify trends and drives elemental replacement”, which has been classified as ‘Maintenance Information System’.

**Table 5.4 Forms of Historical Data Collected by Social Landlords**

| Category | Response |
|---|---|
| **KPI** | ○ Capital programme activity, reactive repairs budget, post contract scheme assessment, day 2 day elemental replacement<br>○ Average repair cost / number of jobs issued, repair stock condition surveys predictions.<br>○ Elemental costs, costs per property / block / estate |
| **Life Cycle Modelling (LCM)** | ○ Department uses a property database containing, construction year and component renewal year. Lifecycle prediction combined with condition surveys is used to plan future works.<br>○ Life cycles, year of installation etc. |
| **Maintenance Information System (MIS)** | ○ Day to day general repairs log, referrals to property teams, M&E records<br>○ RM patterns of expenditure used to inform planned replacement of property components<br>○ Breakdown central heating – generally responsive repair trends<br>○ Date and type of replacement or repair to each dwelling attribute used for cyclical and RM work<br>○ Responsive, planned and refurbishment data is all used to identify trends and drives elemental replacement<br>○ Reports by estate from responsive repairs ordering system<br>○ High levels of component breakdowns will feed into replacement programme<br>○ Asset Database, monitoring responsive trends<br>○ Comparison of monthly reports to those of the previous year<br>○ Types of work needed / historical information on construction / past work to inform decent home planning<br>○ Number of occasion's repairs completed to building elements. Comparison of time taken to carry out repairs<br>○ Number of repairs / trades |
| **Components** | ○ Replacement of gas central heating system<br>○ Gutters / roofing / drainage |
| **MIS / LCM** | ○ Checking defects in streets where the last upgrade was done at the same time<br>○ Maintenance and inspection records |
| **No Category** | ○ Responsive data. Major work data<br>○ Previous section 82 demand and decent homes stock condition information |

Three use measures of the performance contract (KPI), in particular cost and time to inform their decision making regarding maintenance trends. Two respondents each use; life cycle assessment to predict decay in their condition survey. It was not possible to categorise 2 of the responses received.

5.3.3.7 Maintenance Decision Making

Figure 5.12 shows the breakdown of respondents by the information collected to aid maintenance decision making. The stock condition survey was the primary housing maintenance decision making tool (all respondents except one, collect this form of data) for all types of landlord. Further, 92% of respondents rated it as the most important for decision making. However, it was also clear from Figure 5.12 that other toolkits were informing the decision making process. Performance based tools such as HHSRS, SAP 2001, SAP 2005 were not only widely used but also rated as the second most important source of decision making information. EcoHome XB and HQI information were used the least by all three types of landlord. EcoHome XB was only collected by a small number of ALMOs and RSLs despite having been designed specifically for this sector, indicating that it hadn't yet penetrated its intended market. Those who did collect EcoHome XB type data rated it quite highly which may indicate that there was a misconception or lack of understanding regarding the benefits of the toolkit amongst landlords.

ALMOs and LAs preferred to conduct SCS in-house to reduce costs and overcome issues of subjectivity amongst surveyors by providing a mechanism to check consistency and accuracy. RSLs were not included in this analysis.

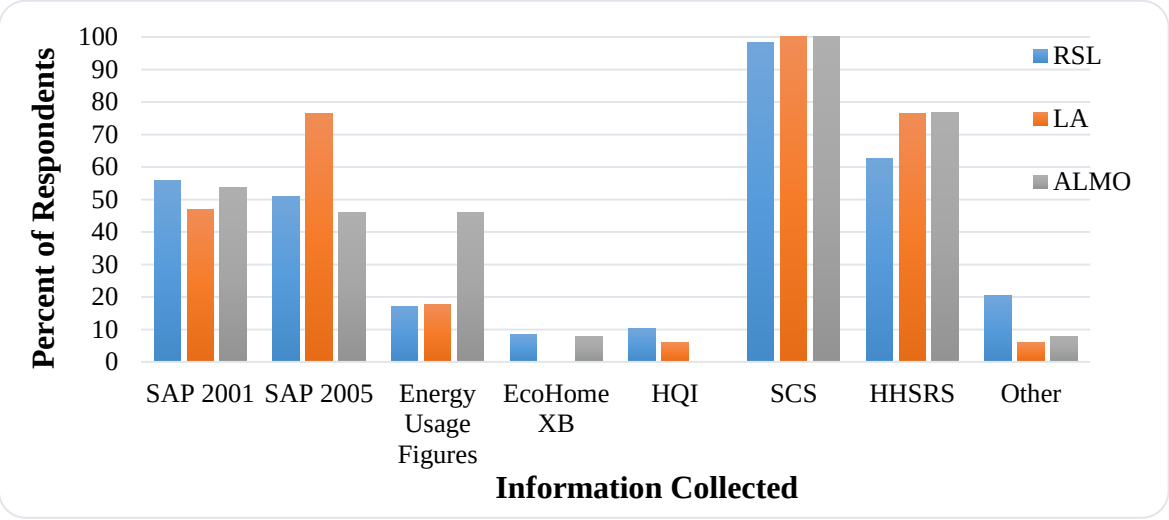



**Figure 5.12 Information Collected to Aid Maintenance Decision Making**

5.3.3.8 Procurement of PPM and RM Work

Procurement of PPM and RM Work Figures 5.13 and 5.14 show a breakdown of respondents by how they procure their PPM and RM works. Partnering, Selective Tendering and In-house contracts were the preferred methods of procurement for both PPM and RM work (note: The

results for in-house labour were skewed in comparison to the other results as this question was only asked of the LA and ALMOs during the second submission of questionnaires and therefore the size of the sample questioned was much reduced and does not include the opinions of RSLs.) Figures 3.13 and 3.14 for the use of in-house labour does show a preference (by those questioned) for this form of procurement for RM work over PPM.

For PPM: RSLs used Partnering Agreements the most followed by Selective Tendering and a Preferred Contractors Lists (note: it could be argued that Preferred Contractors are an embryonic form of Partnering); ALMOs used Selective Tendering the most followed by Partnering Agreements and Competitive Bids (note: this could indicate a greater proportion of large scale refurbishment work is being undertaken); and LAs used Partnering and In-house procurement (to the same extent) followed by Selective Tendering and Competitive Bidding. For RM work; RSLs used the Preferred Contractor list followed closely by Partnering; ALMOs used Partnering followed by In-house procurement the most; and LAs used In-house procurement followed by Partnering the most. Sealed bids, PFI, Negotiation and Other were the least used forms of procurement for both types of work and across all three types of landlord. This is despite the government's encouragement of the use of PFI. According to the interviews, the size of the organisations and a protracted and expensive process were cited as the main reasons why PFI was not used more in social housing maintenance.

Respondents were able to select more than one form of procurement method in answering this question but there was no pattern to the combinations chosen. A combination of procurement was used to allow for flexibility and best value. Twenty nine out of 92 (who answered this question) use a single form of procurement and of those 29, 18 chose only to use Partnering. These 29 organisations were represented by all three types of landlord and all size of organisations.

The government and the Housing Corporation (who at the time of the survey was the landlords' regulator) were encouraging the use of Partnering for maintenance work and this form or procurement appears to have penetrated the sector.

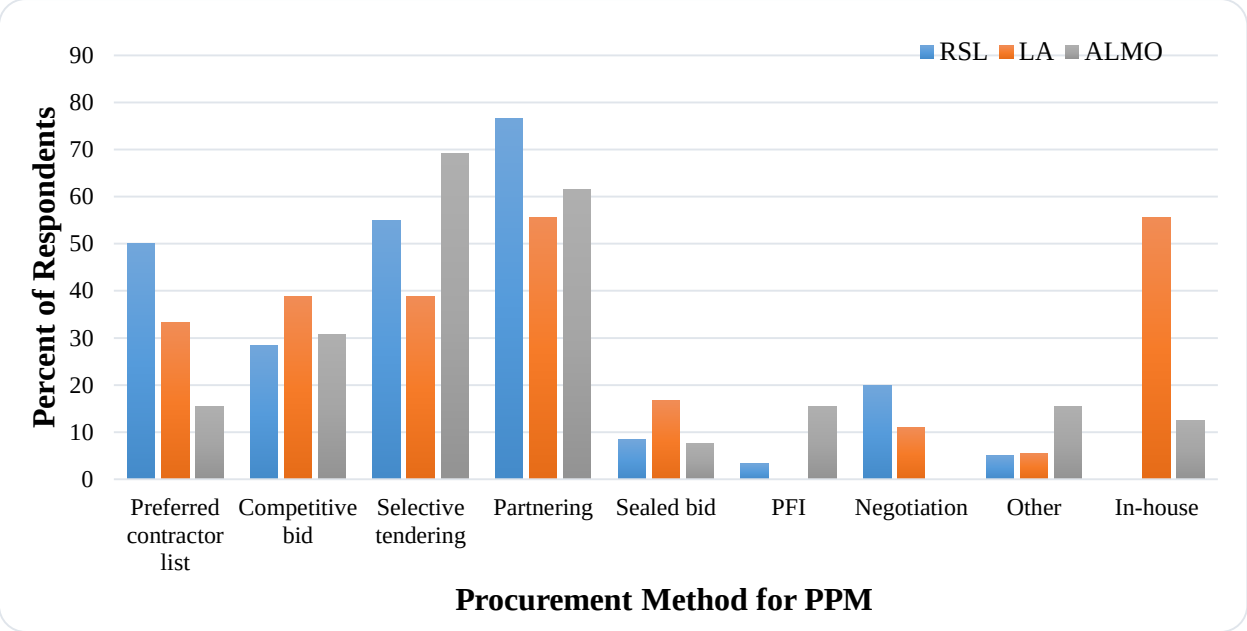



**Figure 5.13 Procurement of PPM Work**

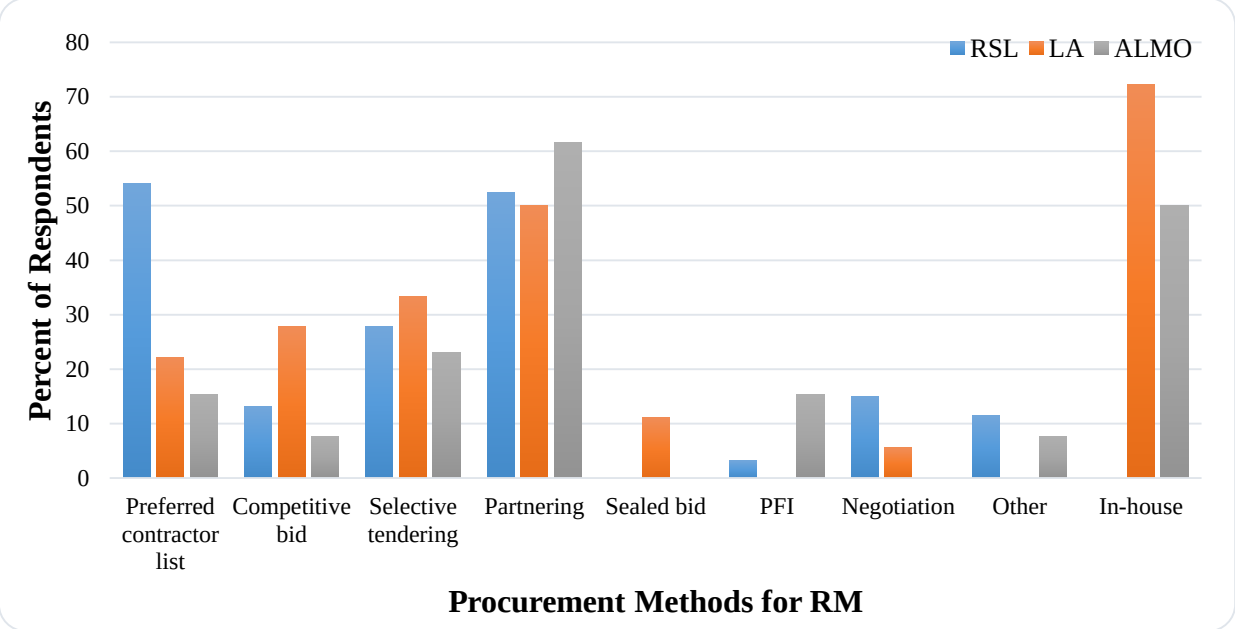



**Figure 5.14 Procurement of RM Work**

5.3.3.9 Major Sources of Maintenance Complaint and Problems Facing Organisations In Terms of Maintenance

Figure 5.15 provides a breakdown of respondents by the sources of maintenance complaint and shows that there was a similar pattern of distribution across all three types of landlord in terms of the types of maintenance complaint they received. The most complaints received were for Repair/Replace, then plumbing, heat loss / gain and sound penetration.

As the responding organisations had a variety of dwelling types and ages within their property portfolios it was not possible to compare the types of maintenance complaints to the dwelling types or ages. However there was a large proportion of properties aged between 1945 and 1980 within the social landlord housing stock where the above mentioned problems would be common. The number of converted flats used for social letting would also explain why there is a common problem with noise penetration.

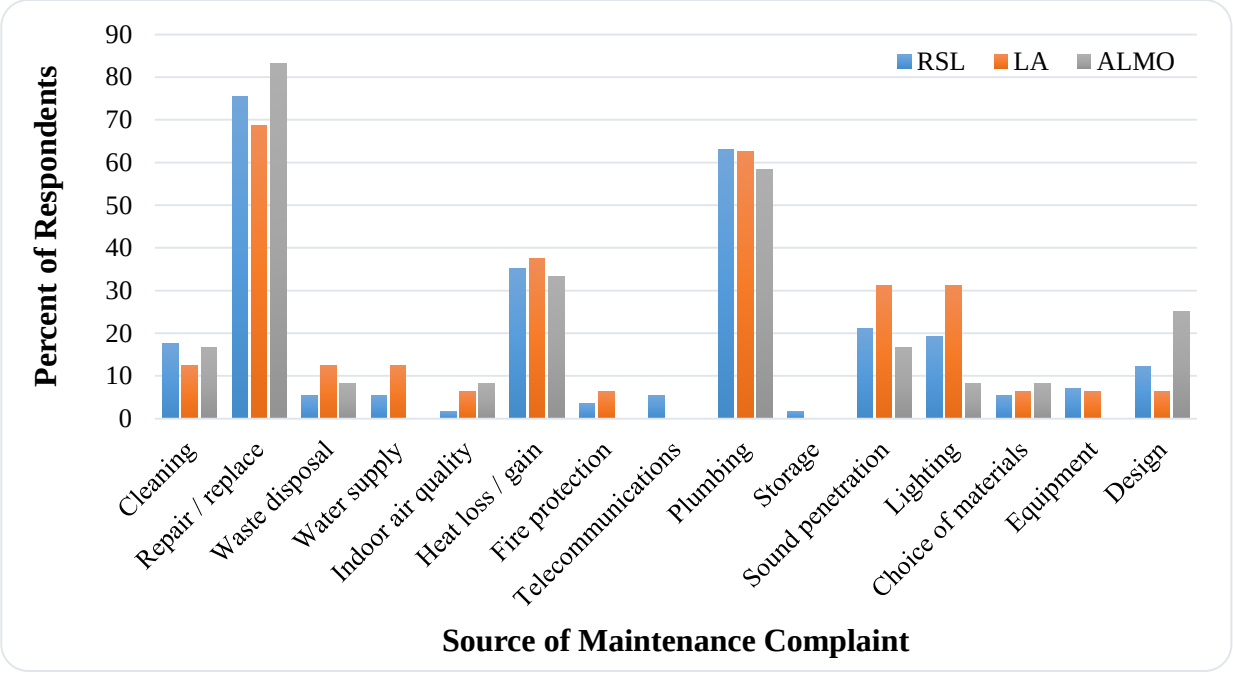



**Figure 5.15 Source of Maintenance Complaint**

'Lack of money' was by far the biggest problem being faced by all three types of landlord in terms of executing their maintenance strategy (as shown in Figure 5.16). The next biggest issue was 'building design' then 'service inefficiencies', 'too many calls' and 'poor contractor performance'. Only RSLs and LAs had issues with 'poor construction quality'. This was a reflection on the quality and age of properties managed by ALMOs who had acquired them from LAs who traditionally had the oldest properties with the highest proportion of repairs backlog. With regards to the building design issues this emphasises one of the drawbacks to the traditional way of designing and developing new buildings which does not incorporate the early input from the maintenance department.

Organisations were permitted to choose more than one criterion resulting in combined scores of over 100% for each landlord.

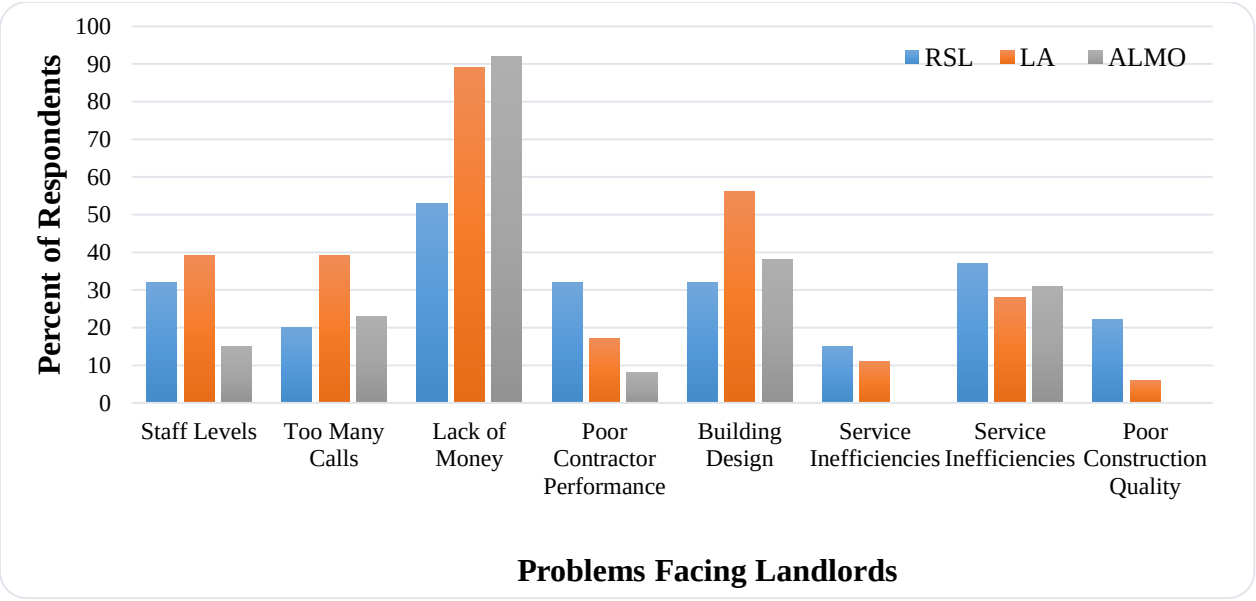



**Figure 5.16 Current Problems Facing Landlords in Terms of Maintenance**

5.3.3.10 EcoHome Principles and Maintenance Schemes

Overall 39% of landlords (43% of RSLs, 33% of ALMOs and 29% of LAs) considered the principles of EcoHome when developing their maintenance schemes. However, very few used the EcoHome XB toolkit, preferring instead to develop their own tools and their own interpretation of the principles of sustainability to match their specific needs. (In total 85 out of the 97 landlords surveyed responded to this question).

Generally speaking those organisations who considered the principles of EcoHome in their maintenance schemes also thought them important in the development of maintenance strategies. Organisations may not have been collecting EcoHome data in a format that could be used to carry out XB assessments but they were using the principles to help inform their maintenance decisions. In the analysis of answers to this open-ended question, it appeared that the EcoHome Principles were being used in the main to help improve the thermal comfort of the property via the heating systems, controls and insulation, use of materials which would reduce the impact on the environment, and also to help support a robust Environmental Policy, reduce waste and implement water saving measures. Finally, respondents were asked why they thought the EcoHome principles were Important to the maintenance strategy. There were 29 responses to this question which were divided into 4 categories; solutions/primary replacements, strategy, assessments and targets as shown in Table 5.5.

**Table 5.5 Reasons for Using EcoHome Principles**

| Category | Examples of Responses |
|---|---|
| **Solutions/ Primary Replacements** | This category received the most responses with 11 organisations stating that EcoHome principles were used within their maintenance strategy to aid decision making regarding maintenance solutions or primary replacement for example "Consideration to be given to renewal of drying areas in flats" and "Encourage the use of materials with a low impact on the environment". |
| **Strategy** | Eight responses stated that EcoHome were embodied in their organisation's strategy "We have adopted a strategy of implementing eco-friendly materials and methods in the implementation of our investment programmes including innovative energy technologies". |
| **Assessments** | Ten organisations use EcoHome to form maintenance solutions "Only sustainable materials used, embodied energy cost in materials considered" and 4 organisations are using it to assess the sustainability of their stock and maintenance works required ".. assess our stock using EcoHome XB". |
| **Targets** | Five organisations used EcoHome to set targets to work towards "There are aspects of EcoHome which we try and emulate with our Asset Management Strategy. We have various targets of trying to reduce waste, energy saving measures, water saving ..". |

It was not possible to categorise 2 of the responses which reflected how they were used rather than why.

Finally, two organisations were using the EcoHome principles as an opportunity to work with new build designers to establish standard components and innovation to improve lifecycle costs and thermal comfort. Many maintenance problems arise because maintenance issues and the people expert in this field are not included in the design process, which has a detrimental impact on the level and cost of future maintenance. Early involvement of maintenance managers in the design process will therefore have social, environmental and economic impacts on the 'in-use' portion of a buildings life cycle.

In summary it would appear that respondent's maintenance practices follow the traditional maintenance model.

- Policy clearly reflected the needs of the DHS and there was some evidence that at a strategic level the environmental principles were influencing decisions. There was only limited evidence of environmental principles being reflected in operational procedures used to identify maintenance need and prioritise maintenance actions.
- The SCS was the primary toolkit used to assess maintenance need.

- Life cycle modeling and the use of management information on historic performance were used to inform decision making but there was no evidence to suggest that it was fully integrated into the decision making process.
- Maintenance actions were prioritised according to need and then smoothed to reflect available budgets.
- PPM was the preferred maintenance strategy for the majority of organisations.

There was also evidence that the use of other performance measures (e.g. SAP ratings, KPIs) were being used to provide a broader view of maintenance need.

### 5.3.4 Quality of Social Housing Stock

All social housing landlords in England were required to achieve the DHS by the end of 2010 and to set annual targets to help achieve this.

#### 5.3.4.1 Percentage of Dwellings Achieving the DHS

Figure 5.17 provides a breakdown of respondent by the percentage of dwellings achieving the DHS. In 2006 the responding RSLs had a higher percentage of dwellings achieving DHS than the LAs and ALMOs; they were also more likely to have a high proportion of stock already Decent Home compliant with the majority of RSL respondents achieving 81 – 100% compliancy. LA housing was also skewed towards the upper half of the graph whereas ALMOs were spread throughout. This was reflected in the DCLG 2006b which confirmed that 1.1 million (29%) social sector dwellings were non-decent consisting of 676,000 LA dwellings and 465,000 RSL dwellings.

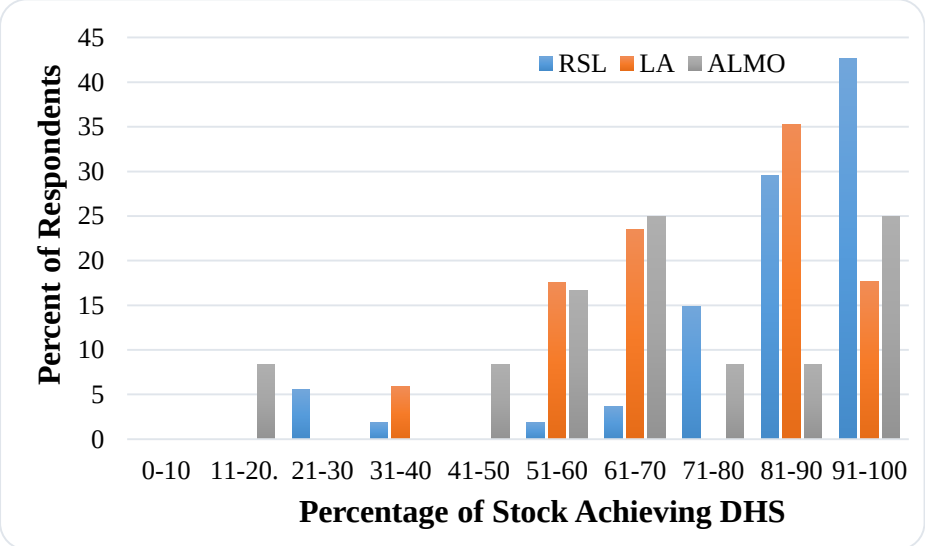



**Figure 5.17 Dwellings Achieving DHS**

5.3.4.2 Failing Criteria under the DHS

Figures 5.18 provides the average data for dwellings failing the DHS according to DHS criteria and type of landlord. Most RSL dwellings were failing due to Modernisation, whilst most LA and ALMO.

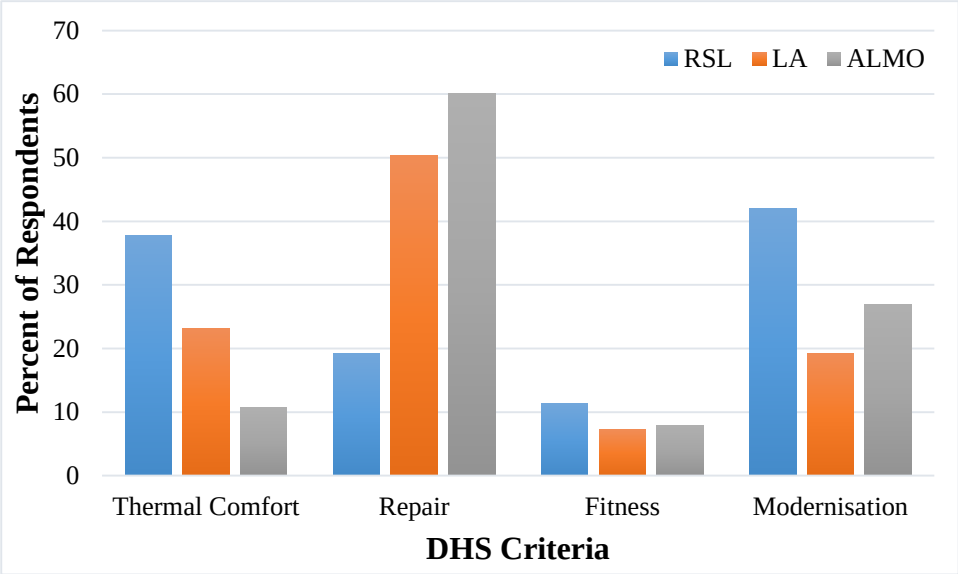



**Figure 5.18 Dwellings Failing the DHS by Criterion**

There appears to be little similarity between the three types of landlord and the criteria which dwellings were failing DHS by the most, except that all three had the least dwellings failing due to the Fitness criterion. According to the DCLG 2006b the Thermal Comfort criterion was the most common reason for social sector dwellings failing the DHS. Therefore figures within this study appear more skewed towards repair than in the English House Condition Survey (DCLG, 2006b). Dwellings may fail DHS due to more than one criterion therefore landlords were permitted to select as many criteria as necessary.

On the whole landlords did not respond well to this question and those that did, did not answer accurately. This could be due to a lack of clarity within the question, however it may also be that the information needed was not readily available which in itself could be an indication that the information was not measured and recorded or perhaps the respondent did not have direct access to this information (it was apparent on a number of occasions that the questionnaire was completed by a number of people across departments), it may also reflect the change in criterion from Fitness to HHSRS. Landlords were required to report annually on the percentage of properties failing DHS with their plan and target for the following year to ensure that all properties were decent by the end of 2010.

Of course in April 2006 (6 months prior to the distribution of the questionnaire) the Fitness criterion was replaced by the Housing Health and Safety Rating System (HHSRS) and whilst the

DCLG 2006b measured the level of non-decency due to HHSRS failures the respondents to this questionnaire may not have been able to. It was therefore not possible to determine if the reported failures due to the Fitness criterion actually contained data relating to the HHSRS as this would have depended on when the HHSRS was incorporated into the SCS and when the most recent SCS was completed. If the HHSRS data had not been incorporated into respondents overall decency results, landlords may find their DHS achievement rate decreased as was seen in the English House Condition Survey 2006, this would not necessarily indicate a deterioration of housing stock.

5.3.4.3 Impact DHS had on Social Sector Maintenance Strategy and the Reasons Why

All responding ALMOs and 95% of RSLs and LAs believed the DHS had impacted their maintenance strategy.

Those RSLs whose maintenance strategy had not been affected by the DHS were relatively small landlords (owning and managing between 0 and 1000 dwellings with an annual maintenance spend of less than £1 million) and had a portfolio consisting of mainly purpose built low rise flats. Each had a different maintenance strategy; one was predominantly RM focused, one predominantly PPM focused and one employed both strategies. One RSL had 100% DHS achievement rate which may be why they no longer felt the standard impacted their maintenance strategy. The maintenance strategy of the other RSLs may already have incorporated the requirements of the DHS as it was regarded by some as a standard with relatively low requirements.

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Those organisations whose maintenance strategy had been impacted by the DHS were asked to explain their reasoning (Table 5.6). As would be expected the overriding factor was that it was a mandatory government target, however implantation of the DHS resulted in other consequences for maintenance managers, the most prevalent being that the standard dominated financial and maintenance prioritisation decisions.

**Table 5.6 Reasons Why the DHS Has Impacted Maintenance Strategies**

| Category | Examples of Responses |
|---|---|
| **Priorities** | "The Decent Home Programme has provided the opportunity to replace many elements of work to prevent further deterioration of housing stock". |
| **Resources** | "(DHS) takes first slice of budget". |
| **Change in Procurement** | "This has enabled us to develop a long-term partnering strategy instead of annual tendering practices which offer better value. We have been able to plan work over many years thus reducing costs and contractor inefficiencies that exist when carrying out restrictive annual maintenance programmes that are constrained by annual budgets" |
| **Strategic,** | " Our business plan identifies how we deal with non-decent homes and preventative measures to be taken in the future" |
| **Measuring Decency** | "Standards are not fully 'SMART' – difficult to measure, some are very intransigent" |
| **Quality** | "Thus, we believe, has not only reduced replacement costs and is reducing future maintenance costs but has also provided the opportunity to review all of our technical specifications, materials and manufactured items used etc. so that we plan and use parts that provide added benefit to the environment". |
| **Changed Strategy** | "Future PPM requirements to include DHS requirements" |
| **Tenants** | Tenants "Budgeting for DHS impacts on satisfying the tenants' wishes for other types of improvements through financial constraints". |
| **Targets** | "… ensure long-term sustainability of stock, reduce household bills, reduce annual maintenance and better design of work undertaken etc. Decent Homes has enabled us to develop a 30 year Asset Management Plan and will re-focus how investment is carried out in the future" |

This question received 76 responses (individual responses were on occasion split amongst a number of different categories resulting in 80 answers) which were broken down into 10 categories; the largest category was 'Statements' (25) in which respondents simply confirmed that the DHS had impacted their maintenance strategy because they were obliged to achieve the governments' target and were therefore adhering to it. The remaining respondents provided more detail and these responses were broken down into the remaining 9 categories of; Priorities (15), Resources (Operational) (8), Change in Procurement (7), Strategic (5), Measuring Decency (5), Quality (5), Changed Strategy (no details of how) (4), Tenants (4), Targets (2),

The responses to this question also highlighted positive and negative attitudes towards the DHS. On a positive note landlords felt the DHS had raised the standard of work; lowered RM costs and helped to establish future plans and priorities. On the negative side, landlords felt that the DHS

reprioritised work away from a needs basis; did not match maintenance plans and did not match tenant expectation.

5.3.4.4 DHS and the Sustainability of Dwellings

Figure 5.19 provides a breakdown of respondents by whether or not they believe the DHS had improved the sustainability of their existing stock. Sixty-three percent believed that it had, 13% believed that it hadn't and 23% were undecided. Amongst these respondents, ALMOs exhibited the most positive attitudes towards the DHS (in terms of its impact on sustainability) with all respondents agreeing that it had resulted in improvements to the sustainability of their stock. RSLs (41% disagreed) and LAs (50% disagreed) were less convinced of the positive impacts that the DHS had on the sustainability of their stock.

Improved thermal comfort, improved lettability and increased customer satisfaction were cited as the main reasons why respondents felt the DHS had a positive impact on the sustainability of their stock. But even where respondents held a positive viewpoint the limiting factors of the standard were recognised as it did not address the wider community issues, requirements were far below building regulation (2000) standards and had narrowly drawn parameters.

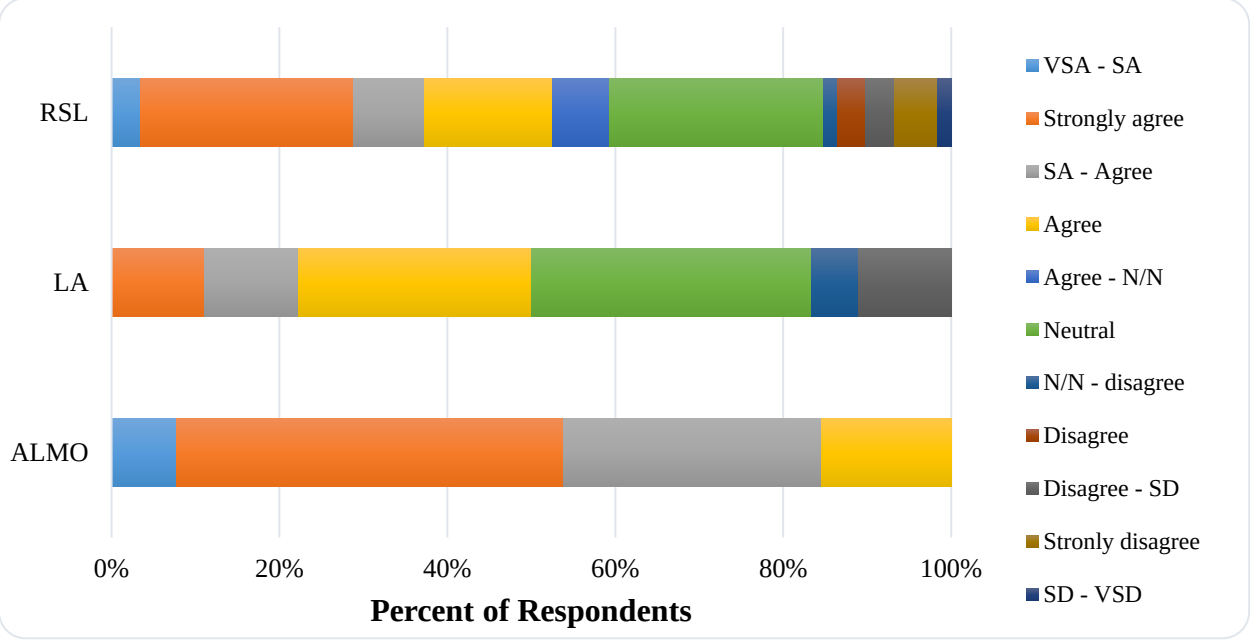


**Figure 5.19 DHS Will Improve Sustainability?**

Twenty-three percent of respondents had a neutral opinion regarding the impact of the DHS on the sustainability of their stock, and did so because;

- Of the limited range and requirements of the DHS and the lack of direct link to sustainability. The standard consists of 4 criteria; repair, modernisation, HHSRS and thermal comfort, all limited to the individual building envelope, its contents and its immediate external environment with requirements that trigger action which are well below current practice.
- It does not satisfy the economic, environmental and social aspects of sustainability of the housing stock and its occupants.
- It impacts the mechanics of maintenance work, in some cases leading to early replacement of elements which is wasteful both in terms of limited landlord resources and material resources.

The remaining 13% did not believe the DHS would improve the sustainability of their existing stock and reiterated many comments made above; its limited nature, its low standard; how it only addresses the condition of the property and not the wider community; its potentially detrimental impact on the mechanics of maintenance work; by encouraging quantity rather than quality programmes of work; but this group also added that it was having a detrimental impact on landlord resources as well as the life cycle assessments of buildings and their elements and encouraged the use of unsustainable materials.

There were 73 responses to this question which were broken down into 10 categories, one of which included answers considered not applicable because statements were made rather than reasons given. The other 9 categories (Table 5.7), in order of group size, starting with the largest group were; No direct link (12), Standards (11), Desirability (10), Asset Management Strategy (10), Partial (9), Minimal (5), Funding (5), Unnecessary (5), Procurement (1).

In general landlords were starting to talk about environmental, economic and social sustainability and how it changes the way maintenance is carried out, both positively and negatively.

**Table 5.7 Reasons Why DHS Will/Will Not Improve Sustainability**

| Category | Example of Responses |
|---|---|
| **No Direct Link** | "Sustainability is more than the condition of the home, it relates to other conditions on estates. More work needs to be done on security and environmental issues." "the standard is low and does not set challenging targets relating to sustainability". |
| **Standard** | "DHS specifically targets achievements and maintaining high quality homes, components and thermal performance in our properties". "Improved facilities and thermal improvements will improve stock and living conditions for tenants ..". "… improvement in thermal performance of properties improves sustainability. "… many materials being used in the Decent Home refurbishment would not be considered sustainable, e.g. UPVC windows" |
| **Desirability** | "Focused investment in maintenance – improved quality has also led to increased demand." "Just because a property has a new kitchen or more insulation does not mean it is desirable if in poor surroundings". |
| **Asset Management Strategy** | "Pressure to upgrade as cheaply as possible … does not encourage sustainability." "DHS ends in 2010 but maintenance requirements will go on for ever" "DHS has enabled a more planned approach to delivering investment to address stock failure and programme work in a more effective way that provides best value" |
| **Partial** | "It only deals with individual properties – more needed for community works" "Works to implement could greatly improve sustainability, however a lot depends on tenant use". "For this council attainment of the DHS requires major investment in kitchens and bathrooms – little impact on sustainability". "Too black and white, detracts attention from the overall picture for a scheme". |
| **Minimal** | "It sets a standard albeit minimal", "DHS is not a high enough standard to properly address sustainability. Funds for stock regeneration have had to be re-deployed in order to achieve DHS". |
| **Funding** | "The strategy has led to an increased investment/improvement in the housing stock". "It can't be viewed as a finished project, will require continued investment to ensure no future slippage – difficulties in securing investment." |
| **Unnecessary** | "I believe we already had a strategy in-place – it was not necessary for the government to impose a 'solution'" with the statement that the DHS will improve sustainability." |
| **Procurement** | Engaging "with the local businesses and invest in the local economy". |

5.3.4.5 Incremental Upgrades and Maintenance Programmes

Seventy-seven percent of LAs, 76% of RSLs and 53% of ALMOs confirmed they incorporated incremental upgrades within their maintenance programmes, which on the whole were concerned with upgrades to insulation and heating or bathrooms and kitchens.

When asked if these upgrades went beyond those identified in the DHS all landlords who stated that they incrementally improved also stated that those improvements were in excess of the DHS, therefore in the majority of cases the quality of upgrades were a continuation of the work being carried out under the DHS programme. This concurs with the statement made earlier that the

DHS was dominating financial and maintenance decisions (it of course makes sense to capitalise on works of a mandatory nature due to DHS and make improvements to what were considered low standards). Incremental upgrades which were not a direct continuation of DHS programmes tended to focus on the social aspect of sustainability, in particular in improving security (at an individual house level or at an entire estate level) and working towards reducing the level of anti-social behaviour. Respondents were asked to provide examples of how they included incremental upgrades within their maintenance programme. Fifty-five provided answers which were categorised 'Not Applicable' (17 responses), 'Environmental' (19), 'Social' (13), 'Economic' (4) and 'Opportunistic' (2) which were not considered relevant (Table 5.8)

Responses categorised as 'Not Applicable' or 'Opportunistic' were not included in the analysis. In analysing the responses to this question it was important to remember that just because a landlord stated that they were going beyond what they would normally do, does not imply they were acting sustainably. These responses simply imply that landlords who were making incremental upgrades were doing so to improve what they considered to be the quality of the dwelling.

The categories indicated that the social, environmental and economic aspects of sustainability were being considered by landlords, although not yet holistically.

**Table 5.8 Types of Incremental Upgrade**

| Category | Example of Responses |
|---|---|
| Environmental | "Repairs carried out at a higher/improved specification e.g. insulated render" |
| Social | "Disabled arrangements and communications systems" |
| Economic | "General rule of replacement rather than repair and improvement rather than maintain" |

To summarise, the DHS had impacted (both strategic and operational) the way in which social landlords respond to the maintenance needs of their tenants. The DHS affected the way in which priorities were established and resources committed. The DHS had also allowed a more long term approach to be adopted to maintenance planning (setting targets and measuring progress) and the procurement of maintenance works (partnering). However, the DHS was not seen as a panacea for the problems of social housing. It was seen by a significant minority to be

minimalistic, and not linked to the wider sustainability agenda. It focussed on the condition of individual properties rather than on the performance of the house as a home, and, its lack of engagement with the wider social and community issues have caused many to question what would happen post 2010 when the DHS programme expires.

### 5.3.5. Sustainability Strategy

5.3.5.1 Organisational Sustainability Strategy

Figure 5.20 provides a breakdown of respondents by whether or not there was an organisational sustainability policy in place. Whilst 51% of RSLs, 50% of LAs and 46% of ALMOs did have a sustainability strategy in place, a large percent didn't. What is also clear from Figure 5.20 is that a significant minority of those completing the questionnaire didn't know whether their organisation had a sustainability strategy in place or not.

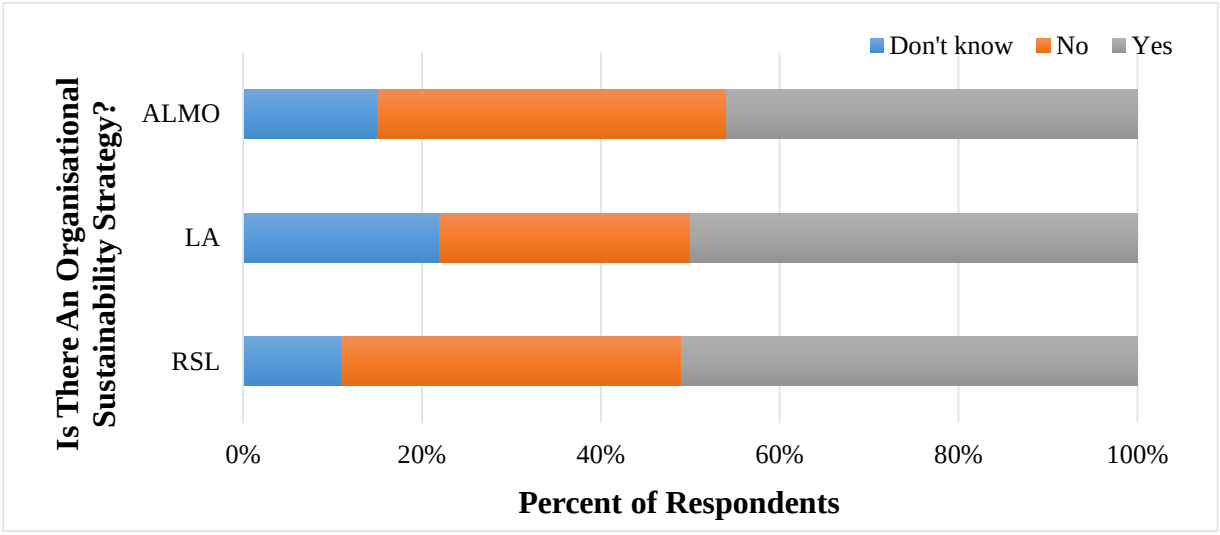


**Figure 5.20 Organisational Sustainability Strategy**

Respondents were asked to provide examples of the aspects of sustainability covered by their organisation's sustainability policy, the answers to which demonstrated that landlords understood the need to address social, environmental and economic aspects of sustainability within their policy. The 26 answers provided were broken down into 'Environment' (10 responses), 'Integrated' (9), 'Social' (3), 'Not Relevant' (3) and 'Economic' (1) as shown in Table 5.9.

**Table 5.9 Areas Covered by the Organisational Sustainability Strategy**

| Category | Example of Responses |
|---|---|
| **Environmental** | A broad range of environmental issues were covered by this group including "… minimising waste, waste recycling measures, water conservation measures, minimising travel". In a small number of cases economic aspects were also included in their answers such as, "Green Charter – all materials and procurement", and one response also included the social aspect of sustainability such as, "Materials, services and communities". |
| **Social** | This group was driven by communities, demographics and responding to change |
| **Economic** | Economics appears to be the least considered "Investment, continued improvement, stock appraisals, asset management strategy." |
| **Integrated** | sustainability policy considered the environmental, social and economic aspects of sustainability in an integrated manner, "Financial stability, sustainable communities, minimising environmental impact, preserving and enhancing ecological value ..." |

5.3.5.2 Sustainability and Maintenance Strategy

Figure 5.21 provides a breakdown of respondents by how much they believed sustainability had impacted their maintenance strategy. A 9 point Likert type scale was used where a 'moderate impact' formed the central choice (however a number of respondents chose to select midpoints between impact categories). It was clear that sustainability had only a slight to moderate impact on the organisations' maintenance strategy (only 32% of respondents indicated a moderately-significant or significant impact). Cross tabulation shows a statistically strong association between size of impact sustainability had on maintenance strategy and those who had a sustainability strategy in place with a Chi-square value of 39.323 which equates to an association greater than 99% (with 12 degrees of freedom)

Overall, the largest percentage of landlords (28.6%) who answered this question believed sustainability had a moderate effect on their maintenance strategy.

Whilst ALMOs suggested that sustainability had the greatest impact on their maintenance strategy (mode value was significant effect), RSLs suggested it had the least (on average the RSLs believed sustainability had a 'slight-moderate' and 'moderate' impact on their maintenance strategy which is in agreement with their views on the impact DHS has on sustainability).

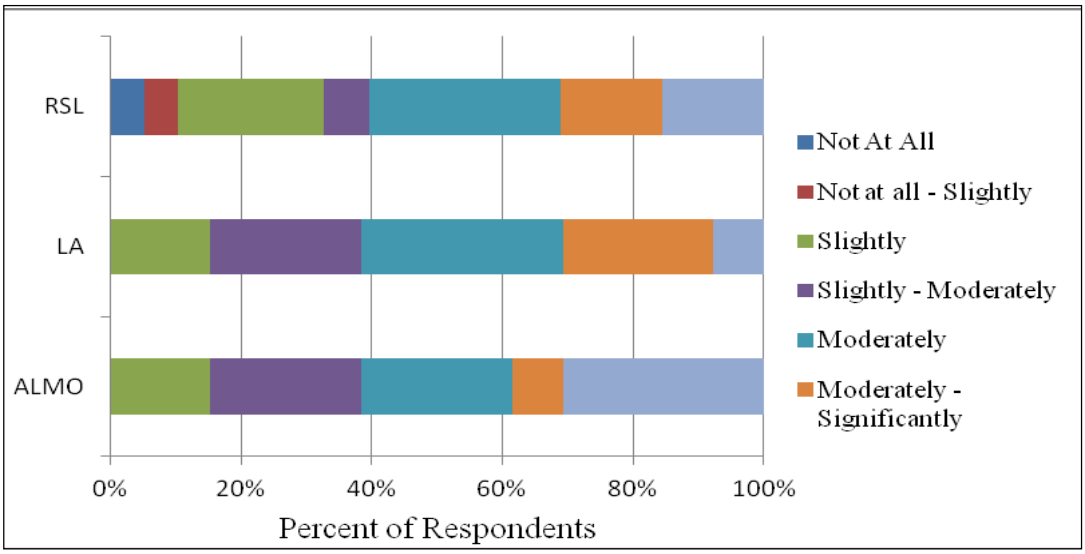


**Figure 5.21 Effect of Sustainability on Maintenance Strategy**

5.3.5.3 Relevance of Sustainability Debate to Social Housing Maintenance Managers

Figure 5.22 provides the breakdown of respondents by how relevant they believe the sustainability debate was to their work.

Overall, 71% of the respondents believed the sustainability debate to be of significance (had moderately significant or greater impact) to the work they did (mode score for each landlord type was 'significant'). Only one respondent did not believe that the sustainability debate had any relevance. This was a LA landlord with 5,001-10,000 properties in its portfolio which consisted mainly of older houses. They were PPM biased and had a high DHS achievement rate of 89.3%. EcoHome principles were considered during the development of maintenance schemes and were important to the maintenance strategy. However they did not have an organisational sustainability policy in place, believed their maintenance strategy could be improved in terms of sustainability and considered the sustainability strategies of their contractors. It would appear that this respondent believed that the sustainability debate was irrelevant at the operational level as it appeared to have an importance at the strategic level.

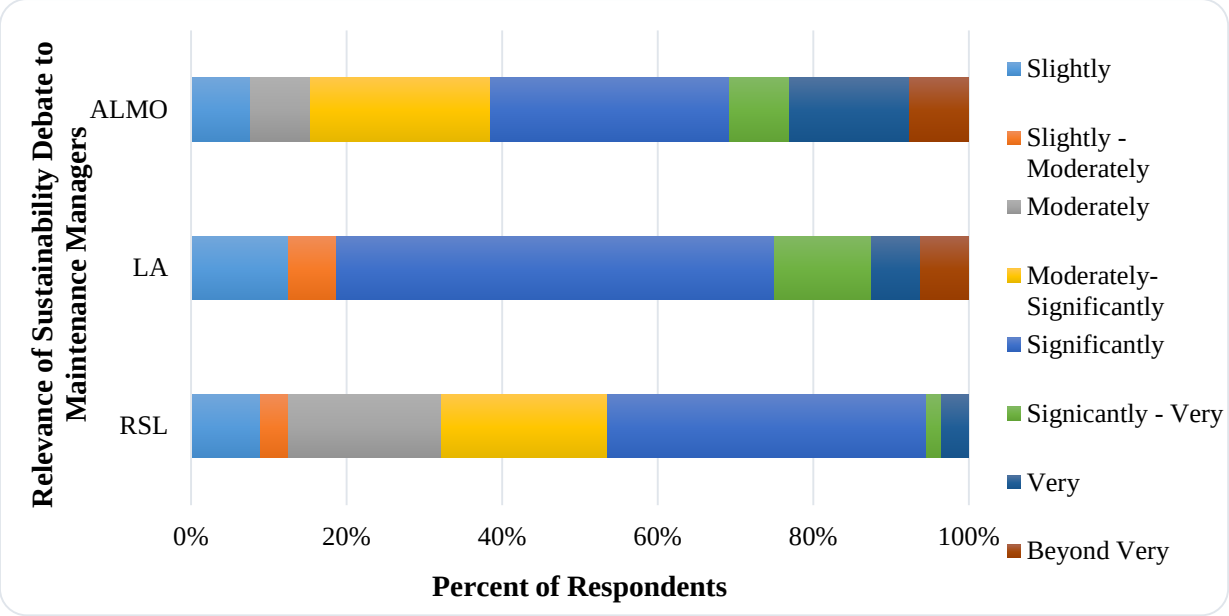


**Figure 5.22 Relevance of Sustainability Debate**

5.3.5.4 Measuring the Sustainability of Housing Stock

Fifty percent of ALMOs, 37% of RSLs and 33% of LAs confirmed they measured the sustainability of their existing housing stock. This concurs with the responses provided to, tools used to inform maintenance decisions and the continued reliance upon measuring the condition of a dwelling to determine its maintenance need. In many cases a narrow view of sustainability was taken and measures limited to single building elements.

Respondents who measured the sustainability of their stock were asked to provide details of the measures used (Table 5.10). Twenty nine responses were received which were broken down into the following categories, in order of size; SCS/Asset (10 responses), Recognised Toolkits (8), Economic (6) and Scenarios/Community Level (3) and 2 responses were not categorised.

**Table 5.10 Methods for Measuring Sustainability of Housing Stock**

| Category | Example of Responses |
|---|---|
| **SCS/Asset** | Specific aspects of sustainability have been integrated into the asset management strategy in order to produce a matrix of measures which can be incorporated into the SCS which will ultimately provide a sustainability performance rating system. |
| **Recognised Toolkits** | The only truly sustainable toolkit was EcoHome XB which was being used by 2 of the 8 landlords within this category. Five of the 8 were using SAP which only measures energy performance of the dwelling and only a small aspect of sustainability. Of the 5 using SAP, only one was using it in-conjunction with customer data (satisfaction, turn around) to broaden the scope of the measurement to include some social aspects of sustainability. The one remaining respondent was an EcoHome assessor and used aspects of BREEAM but did not provide further details. |
| **Economic** | Six respondents based their sustainability rating solely on economic indicators, either in isolation or integrated but all included demand, costs and turnover "Based on combined measurement of demand, void turnover, length of tenancy, repair/refurbishment costs". |
| **Scenarios** | A small number using "option appraisal" exercises including pathfinder |

5.3.5.5 Does the Sustainability Measurement Impact Your Maintenance Strategy?

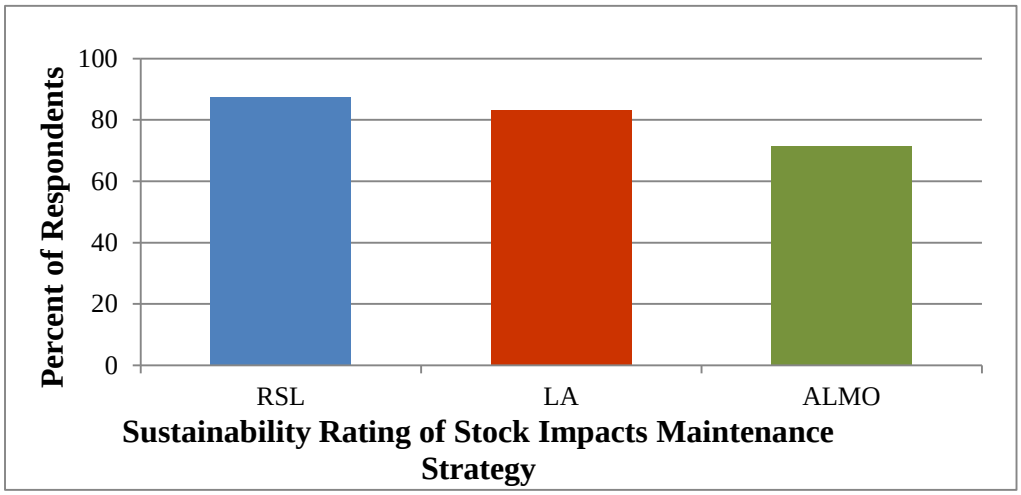


**Figure 5.23 Sustainability Rating Impacts Maintenance Strategy**

Landlords who measured the sustainability of their housing stock were asked if this measurement impacted their maintenance strategy. Figure 5.23 shows the breakdown of the answers given. There is a similar spread across all three types of landlords in as much as, those who measured the sustainability of their stock stated that it impacted their maintenance strategies. However, it was also clear that a number of organisations were collecting sustainability data and not using it

to inform their maintenance decisions (ALMOs 29%, LAs 18% and RSLs 13%). It was unclear as to why this may be the case and would be addressed during the interview stage.

5.3.5.6 Improving Organisational Maintenance Strategy in Terms of Sustainability

All ALMOs and the majority of RSLs (79%) and LAs (83%) believed their maintenance strategy could be improved in terms of sustainability. Other respondents included landlords who rated their current maintenance practices unsustainably and believed maintenance practices could not be improved in terms of sustainability. Respondents who did not believe the sustainability of existing housing could be improved through the maintenance practices of their organisation or through maintenance works may feel such improvements require more substantial intervention such as refurbishment. The opposite was also true however, as organisations who considered their practices to be sustainable also recognised that improvements could still be made to their current practices. This was a good indication that work was still necessary to improve the sustainability of the existing housing stock and that most of these organisations believed they could have a positive impact but were still to fully embrace the principles of sustainability.

Respondents who believed their organisational maintenance strategy could be improved in terms of sustainability were asked to provide examples of where improvements could be made. Fifty-five responses were received which were broken down into the following 6 categories (Table 5.11); Environment (17), Strategic (11), Economic (10), Social (5), Measure (4) and Better Understanding (3). One group of 5 could not be categorised.

**Table 5.11 Sustainability Improvements to Maintenance Strategy**

| Category | Example of Responses |
|---|---|
| **Environment** | A broad range of environmental features were considered which could be sub-divided into; materials used, waste and recycling, thermal comfort and transport. Some responses included economic aspects of sustainability "Spread the net wider on materials and services when procuring contracts", whilst others included social aspects such as "Maximising fuel efficiency within dwellings ". |
| **Strategic** | "A more comprehensive approach" and "A robust sustainability policy which complements our DHS" must be incorporated to ensure maintenance strategies improved in terms of sustainability. This may indicate a more integrated approach than the other groups. |
| **Economic** | Such as, better prioritisation of work including a better ratio of PPM to RM repairs. These responses demonstrated the difficulties social landlords had reconciling the additional costs incurred by more sustainable practices with the financial constraints they face in terms of rents and value for money. One response also included the social aspects of sustainability "Better analysis of social and economic trends, maintenance expenditure and void patterns .." |
| **Social** | More resident consultation needed, "wider community issues", "Using local labour and putting through apprentices help with lack of trades". |
| **Measure** | Measuring the sustainability of stock and working to standards will help improve the sustainability of the maintenance strategy. Only 1 out of 4 respondents referred to EcoHome principles as a method of measuring. |
| **Better Understanding** | Maintenance strategies could be improved but landlords require greater knowledge or a better understanding of sustainability issues before they further comments regarding improved maintenance strategy |

5.3.5.7 Sustainability of Current Practices

Figure 5.24 provides a breakdown of respondents by how sustainable they rate their current practices. Eighty nine of the 95 landlords surveyed answered this question and 64 considered their practices to be sustainable, to varying degrees. RSLs provided the highest (very sustainable) and lowest rating of their practices (V unsustainable) indicating the level of disparity between members the same type of landlord.

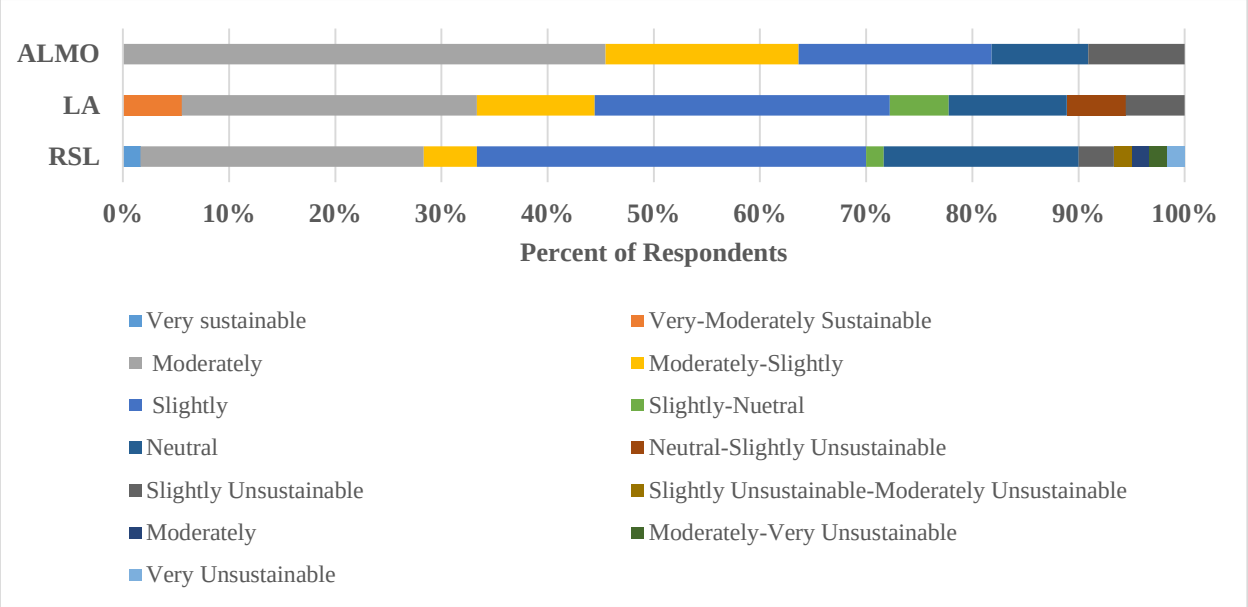


**Figure 5.24 How Sustainable Are Your Current Practices – All Landlords**

5.3.5.8 Sustainable technologies INCORPORATED in your refurbishment projects?

The survey asked respondents to confirm which sustainable technologies had been included in refurbishment projects and Figure 5.25 provides a breakdown of the textural answers provided. The most popular sustainable technologies were those which increase the energy efficiency of the property such as high efficiency boilers, insulation, draught exclusion and double glazing 42%. The DHS stipulates minimum insulation thickness and SAP rating to trigger works to be carried out to improve the thermal comfort of properties and major works have been undertaken to reduce fuel poverty. Therefore landlords could have taken this opportunity to make improvements to thermal comfort to satisfy their warmzone requirements whilst also meeting their DHS requirements but ensuring that mandatory works were capitalised on.

Readily available and tested micro generation low and zero carbon (LZC) technologies were the second most popular sustainable technology incorporated in refurbishment work with 21%; including photovoltaic (PV), wind turbines, ground source heat pumps (GSHP), solar thermal, combined heat and power (CHP). Many of these installations were demonstration projects to determine actual costs incurred and energy generation so as to increase knowledge and reduce risk in future LZC installations.

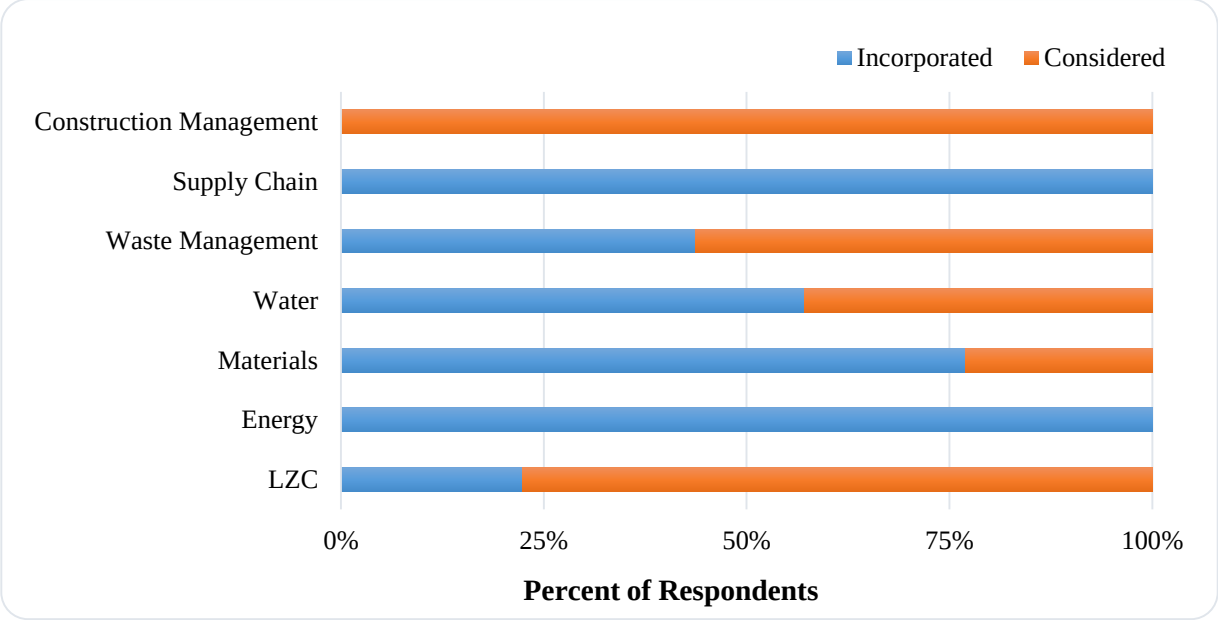


**Figure 5.25 Sustainable Technologies Incorporated**

Use and sourcing of materials was the second most popular sustainable technology with 20%. Specific items mentioned were; timber from sustainable sources, renewable materials, locally sourced materials and low emission paints. The use of plastics instead of timber was raised as a sustainable and unsustainable use of materials. Sustainable because it reduced maintenance requirements but unsustainable because of its origin, chemical composition and disposal issues. This highlighted a popular debate and the difficulties involved in accurately determining a materials life cycle analysis.

With 8%, water was the fourth most popular sustainable type of technology incorporated as part of refurbishment works and included sanitary ware to reduce potable water consumption, rainwater harvesting, grey water recycling and reed beds for sewage treatment.

Waste management came next with 7% and included implementing waste management and recycling measures and waste reduction measures.

Finally with 3% the supply chain was mentioned highlighting the importance of local labour and the implementation of a good supply chain. The inclusion of a supply chain in a sustainable maintenance strategy was voted 12$^{th}$ most important out of 31.

On the whole these results show a good understanding of the issues surrounding the built environment and include environmental, economic and social aspects of sustainability.

5.3.5.9 Sustainable Technologies CONSIDERED in Refurbishment Projects

The survey asked respondents to confirm which sustainable technologies had been considered for inclusion in refurbishment projects and Figure 5.25 provides a breakdown of the textural answers provided. Seventy three percent had considered proven and readily available low and zero carbon technologies in their refurbishment projects. The technologies stated were PV, solar thermal, wind turbines, GSHP, biomass boilers, micro CHP and green roofs. Nine percent stated waste management in the form of recycling materials and waste reduction; 6% had considered water in the form of grey water recycling and reduced consumption; 6 % stated construction methods such as MMC and Pod construction; and 6% stated material use such as the use of eco paints and GRP windows.

This question did not make it clear whether or not the technology was first considered and then later installed or not. Only 11% of those who answered this question were considering technologies other than LZC and these covered water, waste, materials and energy either as a stand-alone item or in combination.

5.3.5.10 Tenant Engagement

Eighty four percent of RSLs, 82% of LAs and 77% of ALMOs confirmed they engaged with tenants on issues of sustainability.

5.3.5.11 Sustainability Strategies / Policies of Contractors

Respondents were asked whether or not they considered the sustainability strategies of their contractors. This question was answered by 90 out of the 95 respondents, 45 of which stated they did consider the sustainability strategies of their contractors and 45 said they did not. Of the 45 who said they didn't, 80% agreed (in varying degrees) that a supply chain should be established as part of a sustainable maintenance strategy. This could indicate that the strategic desires of the organisation haven't yet manifested themselves at an operational level or that these are the operational desires which haven't yet been fulfilled.

**Table 5.12 Consideration of Contractors Sustainability Strategies**

| Category | Example of Responses |
|---|---|
| **Procurement Stage** | Used to evaluate the sustainability strategies and policies of new contractors, "When selecting new contractors it is our intention to consider their position on sustainability along with all other factors for example, waste management, recycling and use of local resources" and "As part of the overall evaluation process of bids/tenders. Generally we use a 70% quality and 30% price basis for our evaluation and Sustainability issues account for around 5-10% of the quality element". |
| **Partnering / Framework Agreement** | Continuously evaluated the sustainability strategies and policies of their existing contractors. "They are all required to keep management systems that are audited annually for their environment and waste policies." |
| **Review Contractor Policies** | Reviewed their contractors sustainability policies and strategies but did not state at which stage of the process this was carried out, what impact it had (if any) on procurement or if the contractors were audited in accordance with their policies. |
| **Quality System / KPI** | Used some form of quality system or KPI to review the policies and strategies of contractors. "As part of quality assessments. However we are working with Envirowise and IEMA to help all our contractors achieve BS8555." |
| **Landlord Policies** | Contractors required to incorporate landlords' policies or ensure that contractors' policies were in accordance with the landlords "The new major works contract 2006 – 2011 requires that the appointed constructor adheres to certain sustainability criteria." |

Those respondents who confirmed that the sustainability strategies / policies of their contractors were considered were asked to provide examples of how they did this. Thirty eight examples were provided which were broken down into the following 6 categories (Table 5.12); Procurement Stage (13), Partnering / Framework Agreement (8), Review Contractor Policies (7), Quality System / KPI (5), Landlord Policies (4) and 1 respondent considers their contractors sustainability strategies / policies and has "Just completed initial review and we are soon to complete impact assessment to ensure greater compliance".

5.3.5.12 Sustainable Maintenance Strategies

Table 5.13 provides a breakdown of criteria respondents felt should be included in a sustainable maintenance strategy. The criteria were ordered in accordance with the respondent priority rating. The mean priority ranking (a 7 point scale was used where 1 = very strongly agree, 4 = neither agree nor disagree, 7 = very strongly disagree).

A number of red herrings were included in the sustainable maintenance strategy statements; install high NOx emitting boilers; install materials with a high ODP and GWP; use primary

aggregates; use uncertified timber, to gauge the depth of understanding of the respondents. In the overall analysis the majority (3 out of 4) of the red herrings appear in the bottom quartile with 'use primary aggregates' and 'use uncertified timber' ranked at the bottom of the table. The 'installation of high NOx boilers' was ranked 21st (third quartile) and could indicate a lack of thorough understanding of the respondents regarding this issue.

The top 10 issues RSL respondents believed should be incorporated into a sustainable maintenance strategy included; home user guide; planned maintenance system used; materials with a low impact on the environment are used; household security is considered during product procurement; responsive maintenance system used; renewable technologies considered as replacements for existing components; supply chain; protect existing ecological features during maintenance works; use low toxicity paints / varnishes; and source labour locally.

The top 10 issues LA respondents believed should be incorporated into a sustainable maintenance strategy included; use low toxicity paints / varnishes; adopt best practice policy in respect of air and water pollution; use planned maintenance system; provide home user guides; consider household security during product procurement; use materials with a low impact on the environment; mMonitor and reduce construction waste; source labour locally; and in joint 9th place were; protect existing ecological features during maintenance work, consider renewable technologies as replacements for existing components and put waste reduction procedures in place during ordering process.

The top 10 issues ALMO respondents believed should be incorporated into a sustainable maintenance strategy included: use low toxicity paints / varnishes; source labour locally; joint 3rd were; use materials with a low environmental impact, establish and monitor supply chain and reduce construction waste; joint 6th place where use planned and responsive maintenance systems; then adopt best practice policy in respect of air and water pollution; incorporate improvements into the maintenance programme to upgrade the building's overall performance and protect existing ecological features during maintenance works.

Thus, whilst there may be a slightly different emphasis between the three groups of landlords there were a set of core issues (planned maintenance; materials with a low environmental impact; existing ecological features protected; and locally sourced labour) that were pertinent to all.

**Table 5.13 Desirable Contents of a Sustainable Maintenance Strategy**

| Criteria | RSL Rank/Mean | LA Rank/Mean | ALMO Rank/Mean |
|---|---|---|---|
| Home user guides are provided | 1st / 2.93 | 4th / 2.71 | 13th / 3.50 |
| Planned maintenance system used | 2nd / 3.08 | 3rd / 2.56 | 7th / 3.15 |
| Materials with a low impact on the Environment are used | 3rd / 3.32 | 6th / 2.94 | 4th / 3.00 |
| Household security is considered in product procurement | 4th / 3.43 | 5th / 2.76 | 13th / 3.50 |
| Responsive maintenance system used | 5th / 3.49 | 20th / 4.12 | 7th / 3.15 |
| Renewable technologies considered as replacements for existing components | 6th / 3.53 | 10th / 3.24 | 23rd / 4.15 |
| Improvements are incorporated into the maintenance programme to upgrade building performance | 7th / 3.57 | 8th / 3.14 | 3rd / 2.94 |
| Existing ecological features are protected during work | 8th / 3.58 | 10th / 3.24 | 10th / 3.33 |
| Low toxicity paints / varnishes etc. used | 9th / 3.61 | 1st / 2.44 | 1st / 2.69 |
| Labour is sourced locally | 9th / 3.61 | 9th / 3.18 | 2nd / 2.77 |
| Supply chain established | 11th / 3.69 | 16th / 3.83 | 4th / 3.00 |
| Best practice policy adopted for air and water pollution | 12th / 3.74 | 2nd / 2.53 | 9th / 3.25 |
| Energy consumption monitored and targets set to reduce use during occupation | 13th / 3.76 | 14th / 3.47 | 19th / 3.92 |
| Recycled / reclaimed materials are used | 14th / 3.90 | 15th / 3.56 | 12th / 3.46 |
| High NOx emitting boilers installed | 15th / 3.98 | 28th / 5.29 | 24th / 4.30 |
| Monitor and reduce construction waste | 16th / 4.00 | 7th / 3.11 | 4th / 3.00 |
| Monitor and set targets to reduce water use in occupation | 17th / 4.03 | 20th / 4.12 | 17th / 3.67 |
| Waste reduction procedures in place during procurement | 18th / 4.13 | 10th / 3.24 | 15th / 3.54 |
| CCS aims and objectives are applied to maintenance | 19th / 4.14 | 13th / 3.44 | 11th / 3.42 |
| Quality system in place | 20th / 4.16 | 17th / 3.94 | 21st / 4 |
| Improve site ecology considered during maintenance plan | 21st / 4.39 | 22nd / 4.24 | 22nd / 4.08 |
| Plant is sourced locally | 22nd / 4.47 | 17th / 3.94 | 16th / 3.58 |
| Energy consumption monitored and targets set to reduce use during maintenance work | 23rd / 4.58 | 17th / 3.94 | 26th / 4.75 |
| Material is sourced locally | 24th / 4.73 | 23rd / 4.38 | 19th / 3.92 |
| Monitor and set targets to reduce water consumption during maintenance work | 25th / 4.95 | 27th / 5.06 | 25th / 4.42 |
| Energy from renewable sources used during maintenance | 26th / 4.98 | 26th / 4.82 | 27th / 4.85 |
| 'E' technology used | 27th / 5.09 | 25th / 4.60 | 30th / 5.27 |
| Install materials with high ODP and GWP | 28th / 5.10 | 29th / 5.40 | 18th / 3.78 |
| Monitor and report transport use to calculate $CO_2$ | 29th / 5.36 | 24th / 4.59 | 28th / 4.92 |
| Primary aggregates are used | 30th / 5.44 | 30th / 5.69 | 29th / 5.08 |
| Uncertified timber used | 31st / 7.38 | 31st / 7.69 | 31st / 6.18 |

In addition to the pre-determined list of criteria shown in Table 5.13, respondents were given the opportunity to identify their own additional criteria. Seventeen respondents provided additional criteria which were broken down into 6 categories (table 5.14); Environmental (40%); Economic (18%); Asset Maintenance Strategy (18%); Social (12%); Combination of all of the above (6%) and those who were not sure (6%) but who believed improvements were still possible.

**Table 5.14 Additional Criteria for a Sustainable Maintenance Strategy**

| Category | Examples of Responses |
|---|---|
| **Environmental** | Estate level improvements; Reduced packaging waste; and the use of Low/No maintenance components |
| **Social** | The role that tenants play in caring more for their homes and of measures to better engage them and "… get them on your side …" |
| **Economic** | Securing greater funding for renewable energy through grants and incentives and reducing the cost burden associated with a high turnover of tenants. |
| **Asset Management Strategy** | Constant review of standard replacement products and comparison with other material solutions; Partnered approach to include tenants / contractors / local government; Setting specific asset management KPIs; and raising awareness of those delivering and responsible for maintenance services |

5.3.5.13 Barriers to More Sustainable Practices

Figure 5.26 provides a breakdown of respondents by what they considered to be internal barriers to more sustainable practices and demonstrates that cost was the biggest deterrent. Cost included the initial cost of sustainable technologies and long payback periods, many landlords struggled to reconcile the distribution of benefit to tenants rather than themselves following their financial commitment. As there were no satisfactory mechanisms for measuring social or environmental benefits, these too were omitted from the payback analysis. Lack of resources (which could also include lack of money) and culture were also major barriers to more sustainable practices. Culture was recognised as a difficult barrier to overcome as it required a change in people's behaviour in the workplace and attitude towards sustainability.

There was a similar pattern of distribution amongst all three types of landlord (although ALMOs didn't consider there was a lack of leadership) indicating that they encounter the same problems and fundamentally the same financial restraints.

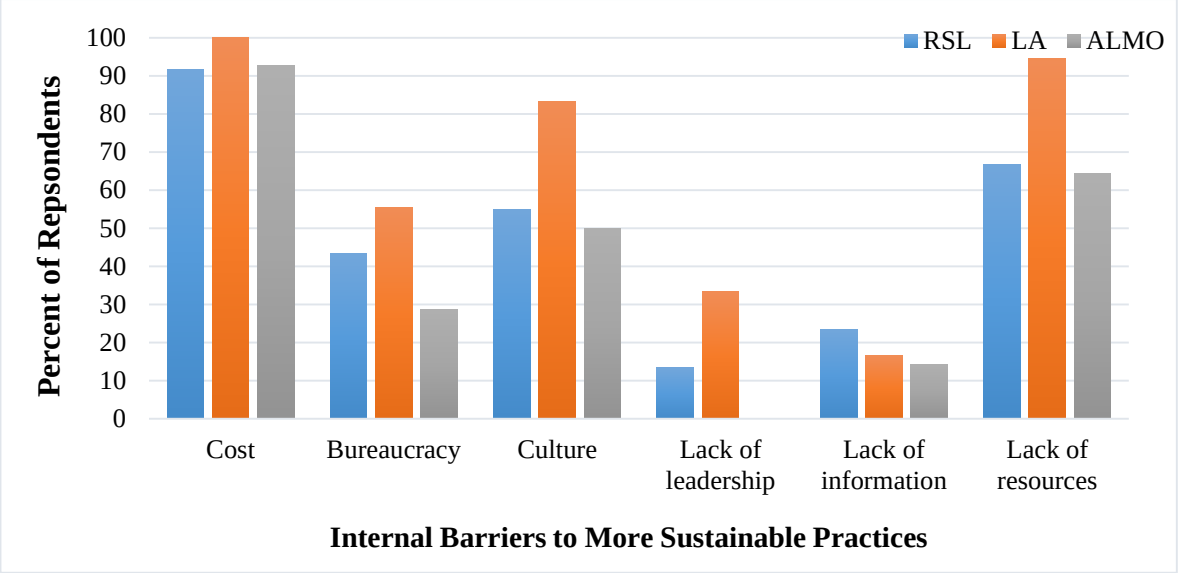


**Figure 5.26 Internal Barriers to the Organisation**

Figure 5.27 provides a breakdown of external barriers to more sustainable practices and shows that the lack of any real incentive closely followed by a 'Lack of joined up legislation' were the main external barriers. This could be because landlords were not measured against sustainable objectives by their governing bodies and as a result were focused on reaching the targets they were measured against. The third biggest external barrier according to LAs was 'legislation' and 'lack of government leadership' by RSLs and ALMOs. There was a similar pattern of distribution amongst all three types of landlord indicating that they encounter the same problems.

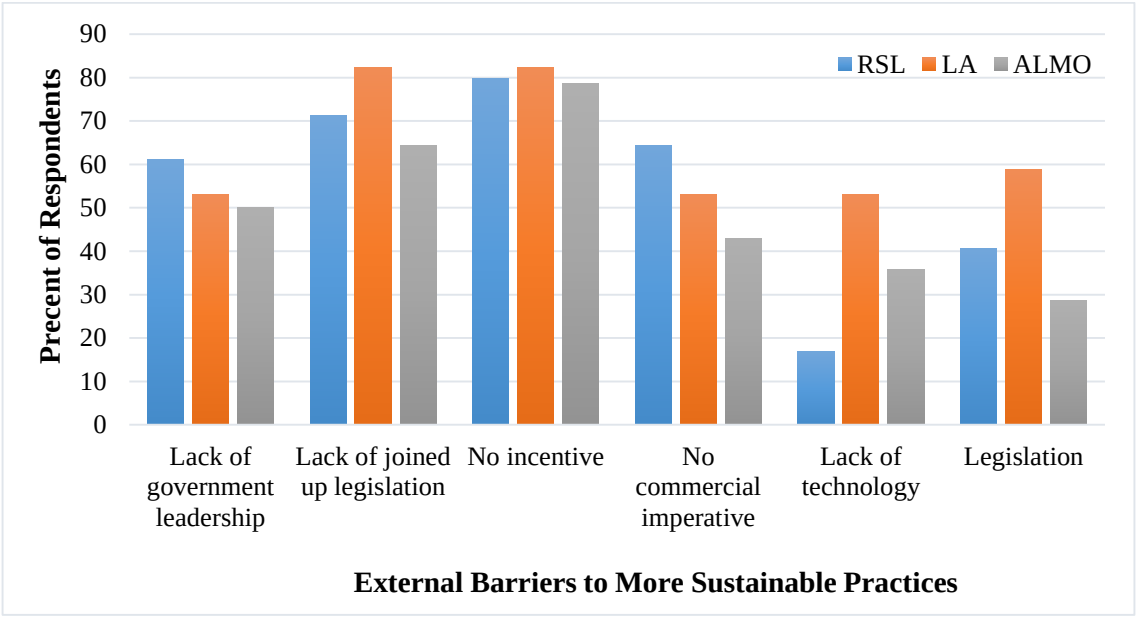


**Figure 5.27 External Barriers to the Organisation**

5.3.5.14 Cost of More Sustainable Solutions

In anticipation that cost would be identified as a major barrier to a greater uptake of sustainable technologies, respondents were asked how much additional cost they could justify when procuring sustainable solutions. Figure 5.28 provides a breakdown of the answers provided, RSLs and ALMOs could generally justify an additional 3-5% whilst LAs could justify an additional 6-10%.

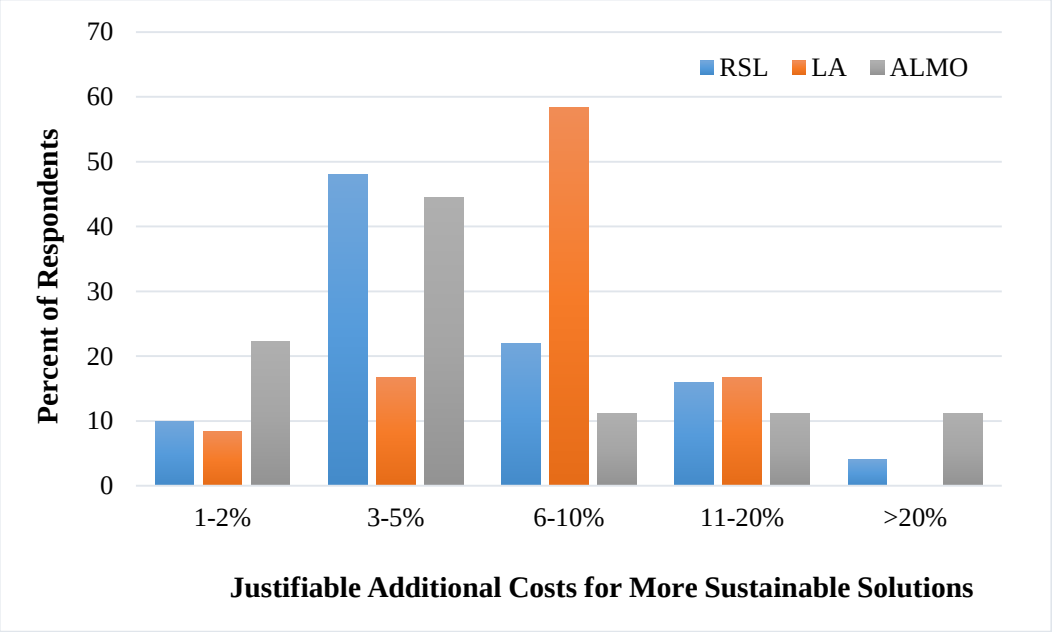


**Figure 5.28 Justifiable Additional Cost of More Sustainable Solutions**

Respondents were also invited to give the reasons behind their choices as shown in Table 5.15. The respondents who believed a greater additional spend could be justified tended to exhibit a more long term, strategic view. What seems clear is that in order for higher costs to be justified better whole life models are required which are supported by a clear evidence base of the performance of the technology in use.

The final question of the questionnaire asked respondents if they had any other comments. Table 5.16 shows the 19 responses received which were broken down into the following 4 categories (in order of size, with the largest first); Economics (4), Knowledge / Skills (4), Environment (3) and Lack of Imperative (2) and 4 responses have been classed as miscellaneous as these were in response to the completion of the questionnaire rather than on the issues raised.

**Table 5.15 Reasons Why Additional Spend Can Be Justified**

| Additional Spend | Reason |
|---|---|
| **None (1)** | Budgets are so tight that no additional costs could be justified |
| **3-5% (5)** | Limited by rent capping and the need to satisfy statutory requirements |
| **6-10% (2)** | Whilst initial costs may be greater these could be offset when WLC principles are introduced. Needs to be driven by governance. |
| **11-20% (4)** | If a longer term view is taken of payback period and maintenance costs |
| **>20% (2)** | Greener/sustainable products invite new technology at far higher costs per se |
| **Varies (5)** | "Dependent upon the views of our client when assessed against a basket of client priorities. Depends on the outcomes which would need to be evidenced. It will vary significantly due to life cycle costs of the solution" |

5.3.5.15 Any Other Comments

**Table 5.16 Other Comments**

| Category | Example of Responses |
|---|---|
| **Economics** | "With rent controls being applied by the government and the lack of grant funding for 'major works' we can only manage a repairs/maintenance system from funds through rents received. We already commit 50% of our income in this way and are unable to put in additional resources unless we borrow against our debt free properties". |
| **Knowledge / Skills** | Included the difficulties smaller organisations had trying to get information on energy/saving products, whilst others highlighted the problem of disinterested key staff who lack the "inclination and drive to deliver new innovation to existing programme regardless of how much management time is invested. |
| **Environment** | "We must design homes that embrace the benefits of fuel saving technologies", **"**DHS distracts attention from environmental issues as expectations are low" and "Ecohome XB is really quite new. It is something we are going to look at but haven't as yet had the opportunity. For a small organisation like us maintaining and evaluating items like $CO_2$ outputs during a contract is probably not achievable without significant resource." |
| **Lack of Imperative** | "Sustainability issues have not yet moved up the maintenance agenda, either nationally or locally, there is no imperative to consider these issues. Maybe the Government could consider this after the DHS has been met beyond 2010." |

## 5.4 Summary

This chapter provided a review of the results from the pilot study and large scale questionnaire survey.

From the large scale questionnaire it was clear that, the sustainability agenda had started to impact the way housing maintenance managers perceived the performance of their social housing but that the current approach did not fully address the social, environmental and economic aspects of sustainability. So, whilst sustainability was considered by the vast majority of respondents to be an important issue for maintenance departments, it hadn't yet had a major impact on the social housing maintenance process.

# Chapter 6

# Interview Results

## 6.1 Introduction to the Interview Results Chapter

Sections 6.2 to 6.6 of this chapter present the interview results and discussions whilst section 6.7 presents the chapter summary.

The interviews aimed to address the key research questions:

1. What is the range of criteria that social housing maintenance managers need to address when assessing the sustainability of their existing housing?
2. How can these criteria be integrated into a decision making model that is robust and defendable?

The methods for data collection and analysis of the interviews have been discussed in chapter 4 and will not be reviewed here.

## 6.2 General View of Social Housing and Maintenance

There are three types of social housing landlord, LAs, HAs and ALMOs, all committed to providing "… housing of an adequate standard which is provided to rent (or on a shared ownership basis) at below market cost for households in need of Local Authority or Registered Social Landlords operating on a basis of accepted and regulated standards of good practice in relation to physical conditions, management, allocation, equal opportunities and accountability to tenants and other stakeholders" (ODPM, n.d). Yet the nature of these landlords was varied and offered a diverse range of services to their tenants. At one end of the spectrum was the HA whose attitude towards social housing was very simplistic;

> *"….we built them, we let them and we maintain them and that's housing management in a nutshell. As far as the tenants are concerned, we have an agreement with them, if you can pay your rent, we won't cause you any grief … and if you want a transfer then we'll do our best to help you, if you need some adaptation, to be honest we'll do our best to help you with that. It's a very simple contract."*

And at the other end of the spectrum was the LA / ALMOs that believed it was their responsibility to help achieve sustainable communities via cross agency working;

> *"… we need to make sure that we don't think that just doing up homes and making them decent is going to solve all a communities issues. … its quite complicated in terms of sustainability, it requires full engagement of all partners involved in the community, police, health, local shop tenants for example, services, all those people and the tenants themselves involved; What are the issue? What are the problems? What do we need to do? How are we going to make sure that this estate, for example has a future? Can it be sustained? Can we build a plan for it? What's the contribution of that agency? Where is the funding coming from? Where is the funding needed? For me it's vital that we don't just think about it, in isolation."*

Cross agency working could be achieved via the Local Area Agreement (LAA), which some interviewees had been involved in but like everything else, needed strong management to ensure the overall objective was not lost. Without a strong champion the good intentions of the LAA may not be achieved.

> *"We tried to do, LAA where we worked with transportation services, the police, social services and people have gone away to do their bit and then we've found out that one person is putting in a wall and another person is putting in a fence at the same property …"*

These landlords understand that their actions impact the wider society, beyond people housed in their properties.

> *"… if you've got long term commitment and they know they're going to get £8-10 million worth of work every year for the next couple of years off you they can afford to have directly employed staff rather than subcontracted staff and one of the contractors said that they had already taken on 100 people on that basis. So they would take on people for trainees as apprenticeships because someone is going to be around for 2 or 3 years because they've got that longer commitment …."*

### 6.2.1 Cost

The results of the interviews showed that an organisations attitude to cost and sustainability was largely dependent upon its financial position and the age/condition of its stock, although there were exceptions. There appeared to be two extreme cases, those organisations that had a healthy financial starting position (excess funds available for their current work load), combined with relatively new/decent stock and those who had insufficient funds available to prevent repair backlogs occurring and were unable to meet the DHS target.

> *"Have millions in the bank at the moment and currently make approximately £300/400K a year. At the end of the day our priority is not price at the moment, so environmental, particularly on procurement side will have a bigger impact, and customer service also*

*becomes a factor as well. … We are starting off from a very low cost basis, all the properties had been modernised, a lot had been modernised prior to the transfer in '97 and then we had a massive grant, approximately £2 to £3 million to modernise all the remainder. So … we don't do a lot of planned maintenance at the moment, because we just don't need to because properties haven't aged that much. … cost [as a barrier to more sustainable practices] not a big one anymore, than when I responded, it was more important then but the Chief Executive has said 'sod the cost let's just go for it'."*

*"…. because sustainability in its purest terms can be quite expensive and the rate of return over the following years is not that great and if you're a small housing association controlled by your rents, you can't increase your income, there are no grants to housing associations to do any sustainable work or to do improvements. So you're financing it all from within and that tends to limit where you concentrate….. So we concentrate on the bare minimum, we know what people are talking about, we can understand what they are talking about but we can't afford it and I don't know many RSLs that can afford the agenda.."*

Of course having excess funds did not mean organisations concentrated more on sustainable solutions; this was more dependent upon the principles of the organisation in question

*"From an economic point of view (we are) in a good position, we are financially viable so we have no problem in meeting things like the DHS criteria and meeting our PPM objectives for the future……. although climate change is not on the agenda..."*

And as one HA demonstrates, your central principle can be sustainability whilst having limited funds and older stock, so long as it's being driven from within.

There were also two schools of thought regarding sustainable solutions and perceived cost. There were those organisations who believed that more sustainable solutions were inherently more expensive and those who believed more sustainable solutions could save money. Those organisations who believed more sustainable practices were cost effective included those whose attitudes towards sustainability were not based on a healthy balance sheet but on the attitudes of those driving their maintenance department.

*"…. yes adopting more sustainable solutions will cost our organisation more money at the moment because of the current cost. The way that I think of being more sustainable are these windmills etc., generally are expensive so of course it will cost us more money but there are other solutions, Agenda 21 and so on that are sustainable solutions but not sustainable solutions to maintaining the housing and improving the sustainability of housing…… And my estimate we would require 25% more budget each year, guestimate that would be, … we've already had to make reductions to our programme so if we're doing, very approximately, 50% of the works our survey identified then, if we doubled our finances we'd probably still only do what our survey says and that doesn't include [sustainable solutions].."*

*"I think it can cost some money but it's about changing people's attitudes and it's about changing the way we do things in terms of our recycling policy for example, or the way*

*that we might be able to look at different ways of making an estate sustainable rather than ploughing huge sums of money into it."*

Similar attitudes towards life cycle costing were recorded; there were those who believed it couldn't be accommodated within social housing maintenance; the perception was that more sustainable products and materials had a higher initial cost and future savings couldn't be accounted for in the initial purchasing decision. Those landlords who were unable to balance initial CAPITAL cost against REVENUE benefits or benefits received by the tenant, and finally there were landlords who felt it was in direct conflict with the governments requirements for an annual percentage in savings (efficiency gains).

*"Am I going to look at life cycle cost [of a product] when I've got to find the money now and then if I've borrowed it I've got to pay that back, irrespective of what the life cycle thing is going to give me, is it going to give me sufficient cash to be able to pay back the lender, 'cos I haven't got any money 'cos my rents are controlled."*

*"… there is an extra over cost to being sustainable at the moment, sustainable materials tend to be a bit more expensive at the moment, arguably they tend to last longer, however that's never put into the equation, we don't look at things on a long term basis, we don't look at the whole life cycle cost analysis"*

*"… the limiting factor is going to be the cash aspect … we could fit some rainwater harvesting, we could fit some wind mills and PVs, GSHP etc. not a problem, but we can't because its capital and the benefit is revenue. And its rent capped so we can't, we can't charge more, so we're in a bit of a bind."*

The advocates of whole life costing were independent upon their financial position, such organisations believed the benefits of whole life cost outweighed those of traditional cost decisions and were able to recognise non-financial.

*"…. energy efficiency in terms of new boilers and putting new controls in, it's an expense but the return is, well its more efficient for the tenant but it helps the SAP rating and climate change..."*

*"… in terms of the housing stock its mainly the maintenance of the stock and whole life costings of the stock, so what we don't do as an organisation, is we don't buy the cheapest product on the market which then gives us a headache over the years because we're constantly getting call outs to do repairs. So what we consistently do in the business is we WLC products … we have been through a tendering process on boilers and you can get a very cheap boiler but the likelihood is that they will constantly breakdown, customer dissatisfaction from that, and in the end it actually costs more and it can affect the reputation of the organisation as well during that process. So what we do is we try to find the balance with the best quality products that then reduce future maintenance costs."*

Those same organisations who believed in the non-financial benefits of WLC maintenance solutions were able to convey this message to their board or council to gain agreement for their

proposals whereas those organisations who only looked at financial benefits were unable to do so.

> *"Well if I'm going to outlay £2 million say, my board will say to me A) why are you doing it and if I say we have to, well then they say ok so you do it don't you, but if I say it's nice to do, well its nice but £2 million is a lot of money, ok well what's the return for us and if I say well A) we're going to get, over 20 years we might get that £2 million back but if I say we won't get any return, they'd look at me and think I'd been on acid or something so that won't happen. So, there needs to be some sort of economic benefit"*

Even enthusiasts of WLC recognised its problems, mainly the lack of accurate life cycle information. (Whilst the principles had been developed in theory, practical problems still occurred. The building maintenance cost information service data (BMI, 1992) and the PSA cost-in-use, elemental table (PSA, 1991) still failed to gain universal acceptance and recent projects to overcome the problems of producing useful, reliable and consistent WLC data had so far not come to fruition for the maintenance industry, El-Haram et al., 2002)

> *"We've got a couple of people in the organisation who convey mixed messages about materials. We, since 1993 have been putting PVC windows in as a standard item. … Some people within the organisation are telling other people that you can't obtain EcoHome Excellent if you've got PVC windows in, and as you know you lose 1 point from material and you can gain that by putting a washing line in. So we're going back a step now. We're trying to source good timber windows, but of course most of the good timber windows come from Germany, Sweden, Denmark, so what you save on the impact of using petroleum products in the plastic you're shipping stuff all round the world, you have to treat them, you have to paint them..."*

> *"One of the things we tend to do in social housing is that we put something in that appears to have a long life but we don't actually, I don't know if there's been 10 or 15 year study on what actually happens to these boilers, do they actually last, does it actually cost us more in the long term to run the building?"*

The lack of reliable life cycle cost information prevented other maintenance practices from being explored which could have beneficial impacts on the sustainability of existing housing in comparison to current maintenance practices such as 'Just-In-Time' (JIT). JIT maintenance is essentially preventative maintenance carried out just before a component or system fails with the belief that the maximum life from each building component and system will be achieved, but this approach is rarely used in the built environment. JIT maintenance requires accurate performance information, most commonly in the form of life cycle cost which is not currently available.

> *"lifecycle data is really poor out there I think … they're very broad estimates… with all this technology there might now be more time to actually start chipping materials and to actually get some real data produced. The Japanese do a lot of these intelligent buildings,*

*there's no reason given where we are with microprocessors we can't now start to put some of that into our buildings to give us real performance data."*

The government's affordable warmth agenda was indirectly pushing the issue of WLC;

*".. there are now all these efficient boilers, the benefit is to the resident really with cheaper running costs not necessarily to us, but the policy for our affordable warmth is to provide the most efficient building we can so we're doing that."*

The general perception was that technology would result in more sustainable buildings, rather than behaviour and as such sustainable solutions (technologies) were expensive, great emphasis was placed on pay back periods and the difficulties of retrofitting such technologies. However, installing new technology was still considered the easier option to behaviour change activities (tenants as well as landlords) and received less focus at the time.

### 6.2.2 Cost and Budgets

The literature review highlighted problems with the current maintenance prioritisation methods which were "not adequate to allocate limited resources for items in urgent need", one of the reasons being that the cut off line between the current programme and the backlog generally falls within a priority category. Therefore it is difficult to determine which items belong in the current programme and which in the backlog. (Shen et al, 1998).

This issue was raised with a small number of landlords during the interview process which intimated that prioritisation of works to that degree was, in the scheme of things, not a significant problem for them and their solution would be to

*"Ask for more money or slip the work……. when you have an imbalance you've got two choices, you can either do less work or you can find more resources and the only two ways of doing less work is you either do less work in each home."*

*"I can get around shortage of finance, I can get around not enough money to do the improvement programme by using innovation by making programmes slightly longer"*

*"… not seen as an urgent repair it might be pushed onto a different department to deal with. For instance we have a great turnover of void properties where we have tenants coming and going and sometimes when people leave the void property is in such state that it costs too much money to get it to a standard to re-let again, that would be passed onto another department for them to deal with and the budget found"*

A more significant problem was that budget allocations remain static whilst external demands fluctuate; this fluctuation invariably has a negative cost implication on the landlord.

*"the interesting one here is digital switch over, I think its 2012 when the analogue system is turned off, ... so if we don't want our residents looking at blank screens we need to upgrade our systems, so again we've got a budget figure for doing that."*

*" ... I think part of the problem with maintenance is other people, the disrepair thing is about other people driving your budget, if you have your pot of money and you have £5m you know that's all you've got and that's capped, when your £5m is done you have to start giving priority to things you think are important but the customer is someone else who can jump in with a disrepair claim, so it's that sort of thing that's difficult to juggle."*

*" ... the latest one that we are getting excited about now is every time we go up to a gutter, under the new health and safety regulations we need bloody scaffold. Well we've had to put a scaffold in the budget this year ... you can't increase your income so here someone has just lobbed an expense in for you"*

Of course the argument with the disrepair issue is that if works were adequately prioritised in the first place tenants would not be able to lay claim to disrepair and so this can be an avoidable expense.

The literature review also highlighted that basing maintenance budgets on SCS data was unreliable (Chapman, 1999 section 2.4.4). Were there more sustainable alternatives? This research proposes a multi criteria in-use performance based maintenance model but alternatives were suggested; primarily performance based but based upon the energy performance of a building.

*"... instead of looking at a building through its age/cost, if you could rate a building on its energy use/performance and then use that as an investment tool; ... our investment criteria is, cost of work against ability to let. In other words if cost of maintaining is high and it's difficult to let then we would have to consider doing something about it. If you could include in that ... its performance as an energy user, the building as an energy user then use that as part of your criteria for investment then I think we might be getting somewhere in terms of where we direct our money."*

Ultimately, constraining rents to ensure below market rents were available, constrained Landlords' maintenance budgets. Landlords disagreed on many aspects of housing maintenance but they all agreed they never had enough money to carry out maintenance works to meet tenant aspirations and regulators targets.

*"There is a price to sustainability and rent fixing doesn't necessarily allow you to achieve that, there are people who would be quite happy to pay a little bit extra for a service which is more environmentally friendly, more sustainable, but we are stuck with the rents that we've got."*

Other research concluded that tenant behaviour impacts maintenance cost and that ".. a housing manager who discounts tenant information in the development of a maintenance budget will not apply resource to full effect" (Olubodun, 2001), which one can conclude is critical with limited budgets. Olubodun concluded there are 6 independent variables which were significant factors in the determination of maintenance requirements for housing stock (section 2.4.5) and tenant behaviour was also known to influence the life span of certain components and elements but such data wasn't routinely captured and utilised by landlords for the purpose of developing maintenance schemes. Possible reasons could be the cost of data capture and analysis and the frequency of tenancy, however it was not possible to draw specific conclusions on this from the current research.

> *"It's alright central government saying a kitchen will last 10 years or 20 years or 30 years but you've got tenants in there that will banjo that kitchen in 3 months so there are certain issues in there that they don't take into consideration …"*

Despite the good intentions of the DHS and in some cases the great effort of landlords, access to as much as 30% of total stock was denied by tenants. There were numerous reasons, the older tenant may like their aging kitchen/bathroom and do not wish to have it replaced, there were issues regarding the perceived quality of the landlords' works, tenants may not want the disruption and those resident in the property may not actually be the tenancy holder. Regardless of the motives, having access denied can greatly impact the planning and budgeting of PPM works.

### 6.2.3 Maintenance Decision Aiding Toolkits

The questionnaire survey results demonstrated that the SCS was still the primary housing maintenance decision making tool for all types of social landlord. Furthermore, 92% of respondents rated it as the most important for their decision making. However, it also showed that performance based toolkits such as HHSRS, SAP 2001 and SAP 2005 were not only widely used but rated as the second most important source of decision making information.

The interviews were used to establish why these toolkits were being used and how they were integrated into the maintenance strategy. Table 6.1 provides a summary of the answers given (column 2 represents the number of respondents). The central body of information collected was formed by the SCS, HHSRS and SAP (either 2001 or 2005), primarily because social landlords were required to do so by their regulators as part of their annual reporting mechanism, but also

because they believe this to be the most efficient way which data can be collected to satisfy the requirements of their maintenance strategy. The two main drivers behind such maintenance strategies, regardless of the type of landlord, were to provide the most energy efficient homes possible and to achieve the DHS 2010 target.

> *"We're required to produce stock information for our regulators, SAP, DH analysis are the key ones we provide to the housing corporation annually so … its information that we collect to inform our investment strategy and so our scenario is we want to produce the most energy efficient dwellings that we can and we can only do that based on the information that you collect. DH analysis is crucial and again it's a government requirement, we're required to produce this information and produce a strategy that will deliver DH by 2010 …"*

**Table 6.1 Data Collection Toolkits Used**

| Toolkit | No. | Quote |
|---|---|---|
| EcoHome XB | 1 | *"EcoHome XB is really about where we want to be in 3-5 years' time in terms of our stock investment, thinking ahead it needs to be wider … we need to be thinking about how we can invest better really."* |
| EMAS | 1 | *".. every decision that the council make, all its reports and all the individual decisions we make, a thought is given to the environmental performance .."* |
| HHSRS | 27 | *"… we've done a full HHSRS survey, it's doubled the cost of the survey mind you, it's about another half hour on the survey time. And it gives you a set of results that unless you have the book at the side of you, it means absolutely nothing. J69 (item within the HHSRS) and you think, what does J69 mean?"*<br>*"I think the change from 'Fitness' through to a more vigorous H&S risk assessment basis is helpful in that respect because it covers some of the major risks …"* |
| SAP | 27 | *"… we need to do the SAP because it's one of our Best Value Performance Indicators we need to measure the SAP improvement on an annual basis "* |
| SCS | 27 | *"the SCS as it says gives us an indication of the condition of a property at a point in time and that allows us to identify work needed and allows us to profile, cost that work, profile it over a number of years to develop the improvements to that individual property. It's a key piece of data which has to be collected in my view from out in the field by trained surveyors with experience and it's something that you can't really do as a desk top exercise, also in terms of the SC of a property you can do energy assessment if you like or look for things like asbestos and also look at the immediate surrounding environment to that property as well and see if the immediate surrounding environment requires any work so under the sustainability band, sustainable neighbours agenda if you like."* |

There were well known issues relating to the use of the SCS data to determine planned maintenance programmes and budgets. This point was raised during the interviews as interviewees were asked to discuss what they felt were the positive and negative aspects of using stock condition surveys. Table 6.2 provides a summary of the answers provided, the negative points have been categorised as, cloning, incorrect data, subjectivity, SCS design and poor

reputation and the positive point was that it provides key data. The issues raised by the interviewees echoed those of Chapman, 1999 and demonstrated that little progress had been made to fully overcome them.

**Table 6.2 Positive and Negative Aspects of the SCS**

| SCS | Issue | Quote |
|---|---|---|
| Negative | Cloning | *"The previous SCS data was very poor, was only based upon 10% of our stock, although we have quite a similar stock we are finding that we need at least 50% to get anything like, we are finding out that flats we thought were modernised aren't.* |
| | Incorrect Data | *"it doesn't pick up day-to-day repairs, it's only as good as the information we put into it."* |
| | Subjectivity | *"… people get confused about what is poor and what's fair and what's ok, even within one organisation"* |
| | SCS design | *"…the SCS was not really successful because, although we collected lots of information thinking there was a lot of information we did need, a lot of information we didn't need and a lot of faulty errors in that as a result …"* |
| | Poor Reputation | *"I don't think the SCS is particularly inaccurate but it's just, the truth is there's only a few people who believe it … we can't convince anybody else to believe it, … therefore the SCS is wrong rather than their view of things."* |
| Positive | Key Data | *"It's the biggest thing we do, is maintain our housing stock and we've got to have the most informed information that we possibly can to be able to ensure that we can tell our boards and our regulators that we're investing in the right stock at the right time. I don't know of another model that will tell you that …"* |

Landlords were asked what they were doing individually to overcome the most frequently cited issues of subjectivity, cloning and data capture. Subjectivity was being tackled by taking responsibility for it in-house, reducing the number of surveyors involved and providing comprehensive training, whilst some believed outsourcing was the solution.

> *"… we do a rolling programme and we employ our own staff. We've found, nothing against consultants, consultants staff come and go and you've got a training need, whereas with your own staff, you can train them but we also have an audit systems administrator who does a desk top review of all the surveys, they do look at any human errors if you like. We also seek feedback on a daily basis from our maintenance surveyors, from our housing people, from our contractors and they feed back into it. Although it may be a slight duplication it does point things out"*

Cloning issues were being resolved by taking the decision not to clone any data (where possible), of course the size of the stock profile would influence this decision but the DHS agenda made this a possibility.

*"… we made a decision, to carry out a 100% survey, bearing in mind that we were talking about a DH survey which was limited in its extent but we felt that if we were going to get information then it's impossible to really have an idea of decency, particularly as we weren't going to be able to achieve it. It's a bit different if we were saying 'ok we know what we've got to do, we've got to blitz the whole thing' but because we knew we couldn't achieve it, we then had to pick and choose and how can you pick and choose unless you know exactly which ones are alright"*

The problems associated with the accuracy of the SCS data were being resolved by the implementation of integrated housing management database systems and robust internal procedures for its use. Information and communication technology has greatly improved in recent years making the collection, storage, interrogation and update of stock condition data easier and quicker to use but it was also recognised that the accuracy of this information is only as good as the information entered.

*"The flaw with our SCS is it doesn't pick up day-to-day repairs, it's only as good as the information we put into it. … we use IBS as a housing system and we can now identify replacements by what we call source codes. What we do quarterly, we run a report on source codes and it tells us where we've installed the odd boiler, where the void kitchen has been put in, so we can update the SCS that way, it's not ideal …"*

The only positive comments regarding the use of the SCS was that it was the one, clear, recognised toolkit for assessing the condition of housing stock which was imperative for the formulation of maintenance programmes and budgets.

In 2000 the government committed itself to a target where all social housing would be decent by 2010. At that time a decent home was defined as one that was 'wind and weather tight, warm and has modern facilities' and consisted of Fitness, Disrepair, Modern Facilities and Thermal Comfort Criteria (discussed in more detail in the introduction). All landlords were required by their regulators to annually report the number of properties failing the DHS.

On the 6th April 2006 the HHSRS replaced the fitness standard as the statutory element of the DHS. The HHSRS did not set out minimum standards but used a risk assessment approach to avoid (or minimise) potential hazards. Whilst the use of the HHSRS was not mandatory until April 2006, the contents of the document were known since the release of version 1 in 2000 and version 2 in 2003. So by introducing a change to the way properties were measured against the DHS part way through the target period, government did not expect landlords to suffer from significant increases in non-decency. It was felt that the most common hazard under HHSRS would be excess cold and much of the work already carried out as part of the Decent Home, Fuel

Poverty and Energy Efficiency agendas would be tackling this. Landlords were also expected to be aware of the other hazards from which their stock was suffering even though they may not have been formally surveyed before.

With this in mind the interviewees were asked for their opinion regarding the HHSRS and how its implementation had affected them. Table 6.3 provides examples of the answers given which have been categorised as 'Negative Impact', Neutral / Minimal Impact' and 'Positive Impact'.

**Table 6.3 Impact of HHSRS on Maintenance Planning**

| Negative impact | Neutral / Minimal | Positive |
|---|---|---|
| *"… the HHSRS is very complicated, it may well take a long duration to apply it in the survey process. You can generally do a survey in about 45 minutes to a domestic property, both internal and external, subject to getting access. The HHSRS alone may take that … so it's not been a welcome piece of legislation."* | *"Potentially overcrowding is a big … if you fail on it and there's nothing you can do about it you just fail on it and you accept that ….To me it is more of a responsive repair type issue and being aware of it than being a major works long term issue, .. but most of them are immediate failures that happen and need to be tackled, it's about getting our responsive repair staff and contractors up to speed. Financial implications, I don't think are that great, where it might impact is on the fire issues and that's almost a double whammy because the new regulatory format replaced the old fire precautions act…"* | *I think it's better actually, we're probably in a position where we've always looked at risk anyway in terms of our stock so we've always tried to encourage people and we have our own H&S advisor who works for our property services, so we've tried to look at H&S, … so the culture has been there and I think by having this as something people have to do and have support from a management point of view and the impact, internally of the properties I don't think it's been huge, because a lot of what's been raised we would have done anyway, the biggest area for us is probably externally, footpaths and things like that, trips. So I think it will be good, I'm not quite sure the impact financially* |

There were only two clearly negative comments from RSL and ALMO landlords whose main concerns were that the replacement was a far more complicated system than the fitness standard and that it had doubled the survey duration, and therefore increased costs. Neither landlord however stated that the number of properties which were non-decent increased as a result of the HHSRS survey.

### 6.2.4 Procurement of Maintenance Work

The questionnaire survey confirmed that Partnering, Selective Tendering and In-house contracts were the preferred methods of procurement for both PPM and RM work, Table 6.4 shows that the interviewees followed a similar pattern with Partnering and Selective Tendering but this group used Preferred Contractor more than in-house services. The majority of landlords were using a combination of procurement methods for the completion of both PPM and RM works to provide flexibility, satisfy LA contract requirements and drive value.

Out of the 27 organisations interviewed, 24 were questioned about their procurement practices, the majority (54%) of which used a combination of methods including Partnering, the next significant group (21%) only used Partnering, then a combination of methodologies excluding Partnering and finally one organisation used Competitive Bidding only. As shown in Table 6.4, 21 out of the 24 landlords questioned used Partnering either in isolation or in combination, the drivers behind a partnership based procurement strategy were the Egan principle, efficiency gains stipulated by the Housing Corporation and the skills shortage. Most organisations using Partnering believed it had delivered efficiency in the management of maintenance works as well as direct economic savings.

> *"We've found that the partnership procurement process has been a way of cutting through the bureaucracy of the structure of the council in effect, speeding up the delivery time ... There's been significant savings in the time and significant unravelling of bureaucracy is what the partnership we think has brought us, plus and I don't fall in line with this myself but, there are efficiency savings to be made within the partnership procurement route in terms of economies of scale, in terms of supply chain management and in terms of being able to extend, a flexible approach to extend estates within their remit which might not have been part of their original agreement so therefore traditionally we would have had to put out a separate tender which would have been further work, further time, further money, with partnership you just broaden it."*

Whereas a minority felt they have been 'arm twisted' into using partnering by the efficiency gains of the spending review and did not believe economic savings would be made by this type of procurement and felt the organisation would be exposed to too much risk.

> *"If I can save money I will go for it tomorrow but if that puts the business at too much risk, it's very much risk moving from the contractor to the client and open book is cost plus, the contractors have no risk in it, I carry all the risk, so I've got to be able to see literally cash savings."*

The results of the questionnaire survey showed that Sealed bids, PFI, Negotiation and Other were the least used forms of procurement for both types of work and across all three types of

landlord. This was despite the government's encouragement of the use of PFI. According to those interviewed, the size of the organisations and a protracted and expensive process were the main reasons why PFI was not used more in social housing maintenance.

**Table 6.4 Procurement Methods for Maintenance Works**

| Procurement | No. of Respondents | | Quotation |
|---|---|---|---|
| | PPM | RM | |
| Preferred Contractor | 6 | 5 | *"… need a supply chain that is built up on preferred supplier arrangement and preferred contractor list because of fluctuating demands … if you've got your preferred contractor arrangement, you've got a relationship already, that you can draw on."* |
| Competitive Bid | 6 | 6 | *"… because we have to, in terms of our contract requirements, or the LA contract requirements, our standing orders are still about procurement which is fair and reasonable …"* |
| Selective Tendering | 13 | 10 | *"… selective tendering from our preferred contractors list. The way we do our tenders is the lowest and 2nd lowest from the last time they tendered and a selection of 3 from the list, … if we have someone working for us successfully, they'll get another go at tendering for us"* |
| Partnering | 21 | 17 | *" … when we enter into long term strategic partnerships it is quite a significant part of the tender evaluation of those contractors as to how they will work with us to deal with some of the key government priorities. And we do have specific KPI's … so we do an annual monitor of their management systems, we do an annual monitor of their waste management."* |
| Sealed Bid | 1 | 1 | *"… because we have to, in terms of the LA contract requirements .."* |
| PFI | 1 | 2 | *"My view is that PFI is very protracted, it's taken several years to get to finalisation, only recently the PFI 2 contract … [took] approximately 5 years; the PFI took an enormous amount of time, engaging an enormous amount of resources to actually get it out to get the signature."* |
| Negotiation | 4 | 2 | *"… if we've got a 3 year contract and the contractors working well, we'll negotiate, why retender? Why go through the cost of tendering if everything is working well for everybody?"* |
| DLO | 4 | 4 | *"our own DLO deliver the day-to-day repair service to 10,000 units and to a couple of HAs locally or housing type trust type set ups."* |
| Improvements to Procurement | E-tendering could be used and bidding on-line. As a LA they must be seen to test the market and be open and transparent which means tendering<br>More joint procurement / partnering clubs could be trialled | | |

### 6.2.5 Housing Quality - The Decent Home Standard

The DHS was the main driver behind maintenance plans and the focus of all spending, eclipsing all other maintenance issues.

> *"…. trying to do a bit here and a bit there but never doing enough and never really able to have the resources to do the things on every component of sustainability that we need to do, we might improve the houses and we do a reasonably good job at that but if we can't*

*improve the environment the sustainability equation becomes weakened perhaps, so I think as an organisation, we can see what we want to do, we have a reasonably clear vision of what's needed but we've insufficient resources to deliver it, so we have to … look at the real priorities and I suppose our real priorities with our insufficient funds is to make sure our homes are warm, safe and dry."*

All the interviewees who were asked what was driving their current maintenance planning said the DHS but in addition were, repairs outside of the DHS, installation of Carbon Monoxide detection, secure front doors and door entry systems, fuel poverty (via the DHS), secure by design estate improvement, sustainability, H&S and non-DHS promises made at transfer. In terms of estate improvement a difficulty mentioned by a number of landlords was that their regulators appeared to assume that their property profile consisted of estates when in reality the profile consisted of pepper potted housing or partial ownership of estates which made implementing estate improvements difficult.

The DHS has done much to raise the profile of maintenance at board level and has provided additional funding to certain types of landlord for the improved quality of their stock, but according to this group of landlords there were more negative points to the standard than positive points.

Negative

- It's a basic / minimum standard,
- It does not go beyond 'the front door' of a property and does not address communal areas or community issues,
- The timescale over which the DHS has been implemented means that components and building elements are expected to reach the end of their life cycles at the same point resulting in large replacement schemes at some point in the future but funding for that is currently uncertain (i.e. all boilers will need replacing in 15 years),
- The implementation of the HHSRS has resulted in maintenance requirements which were not issues under the original format of the DHS but which can have significant cost implications and do not attract funding.
- It focused on improving minimum SAP ratings but made no suggestion of what level a realistic SAP rating should be dependent upon the building archetype.
- It doesn't address the single largest problem with social housing, in that there isn't enough of it

- It doesn't provide for environmental improvements
- The original formula for ALMO allocations was grossly inadequate (approx. £5,500/dwelling, actual costs for some were more like £11,000)
- There was still a shortfall between the aspirations of the landlord and tenant and the requirements of the DHS,
- Tenant expectations have been raised beyond which landlords can maintain

A smaller number of landlords thought that the DHS was beneficial because, it's provided

- Landlords with a good PR opportunity
- Focus and a framework to which all landlords could work
- Funding
- An opportunity to address tenant's biggest issues (kitchens, bathroom, windows) and provided them with a better standard of product than previously
- An opportunity to ensure 100% of the housing stock was evaluated and brought up to standard

The governments document 'A Decent Home: Definition and guidance for implementation' (2006) stated that the DHS should be used as an opportunity for landlords to carry out other works that fall outside the standard which help achieve 'other local priorities such as improving the quality of the local area through environmental work to the estates, physical improvements to help design out crime or provision of disabled persons' adaptations'. To take this into account some landlords developed and were working towards achieving their own Decent Homes Plus Standard but with the 2010 target to be met other landlords struggled with limited funds and sought to satisfy the DHS minimum only.

Beyond the scope of the DHS were housing priorities which landlords felt the pressure of but were unable to comply with, included, a lack of family sized accommodation (one of the impacts of the right-to-buy schemes was that in some areas almost 50% of family accommodation had been lost), there was insufficient social housing (one landlord had 190 units empty and a waiting list of over 7,000), estate improvement and appropriately located properties.

### 6.3 The Sustainability Agenda and Housing Maintenance

Sustainability was not seen as a joined up environmental, social and economic agenda but as separate and isolated agendas. The meaning of sustainability was unclear and undefined within single organisations as well as across the sector reducing its meaning and impact.

#### 6.3.1 Cost and Sustainable Technologies

The focus for improved sustainability was very much technology driven and a major limiting factor to the number and types of technology these social landlords were able to install was initial outlay and poor payback periods. It was suggested that by providing technology manufacturers with a more guaranteed market for their products via various incentive schemes to help purchasers with the initial cost, then eventually the cost of such products would reduce to a more affordable level eliminating the need for incentives, but greater government support would be required than was available at the time of the interviews.

> *"… if we started fitting solar panels, one of the calculations I saw was that it would probably take us 75 years to actually pay back that investment, but if that was part of legislation, those products would come down significantly in price and I think maybe if there was more support for new products, you know grant assistance or some sort of tax rebate scheme, that would help organisations like ourselves to actually trial new products that have an environmental impact."*

The initial cost and poor payback periods were not the only reasons why social housing landlords were hesitant when it came to installing such technologies; the uncertain benefits of them was also an issue. One obvious solution to this dilemma was to run pilot schemes and determine first-hand the true benefits in terms of ease of use, ease of installation and generation (heat, electricity, hot water, clean water etc.) capabilities. But the initial outlay to fund a pilot scheme when returns were not guaranteed was still seen as too great a risk to these organisations.

Demolition rates in the UK were very low, only 0.8% of housing was being replaced each year (DCLG, 2006a) and, given increased demand, by 2050 approximately 70% of the housing stock will comprise that already built today. Thus if the housing stock is to address the social, environmental and economic aspects of sustainability, the housing industry will have to work largely with today's stock. But social housing landlords were finding it increasing difficult to keep up with and implement the requirements of new legislation without additional financial support never mind trying to address the wider issues of sustainability which was not mandatory.

The Code for Sustainable Homes and the target for zero carbon homes all focus the industry on improving the environmental impact of new building but there was no equivalents for existing building and yet this was the most challenging and costly sector and it was operating with limited funds.

> *"The government can try to implement the zero carbon housing within new housing within 16 years but that is such a small proportion of housing in the county, what we've got to do is do something in the social housing [but] how can social housing do anything beyond what they are doing already."*

> *"some of the environmental sustainability it's going to be easier doing that from a new build scenario when we can put in, be it the greywater or the CHP that sort of thing, trying to plant those on to existing buildings is very difficult, very expensive and we also have the issue of leaseholders having to contribute to it which given the high proportion we've got is often something very difficult to get sign up of. Whereas if we build new, allowing leaseholders to buy into those at a later stage, we can probably bring in more of those sustainable features and look at some of the things required by the new sustainable code."*

Whilst it was true that social housing landlords did not receive additional funds to improve the overall sustainability of their stock, it was also true that they could apply for grants to support the implementation of sustainable technologies as well as those available from energy providers to improve the energy efficiency of stock. The response to such grants was mixed, those run by energy providers received the most positive feedback whilst the government sponsored grants were seen as time consuming, demanded information that was difficult to come by, did not target the least inefficient housing and did not employ joined up thinking.

> *"I'd just applied for a 'green skies' grant for some solar thermal … and after filling in a massive questionnaire I had to get it in … that day because the grant was ran out. They held onto it for several months, came back with loads of questions and in the end they turned it down. They turned it down because we weren't replacing the chlorifier, the cylinder. We didn't need to because we were solar twin which used the existing cylinder, it's just putting an element in the cylinder. Through EEC (Energy Efficiency Commitment) we're strategic partners with Scottish Power ManWeb and we have been for 5 years now and even accessing what should be standard grant is so difficult and the amount of grant we get is tiny. Probably £30,000 - £40,000 per year for our complete range of activities."*

> *"… there is a lot of publicity given out by government and various agencies that grant is freely available and is easy to access and it just isn't in practice and I think that's a big frustration for a lot of housing associations or RSLs and I think that once people have made an attempt at getting some money and got frustrated they perhaps go away and think 'well sod that I'm not going to make the effort' and to be honest that has been persuasive for us, we have got limited grant, I think it's something like, we've got a £5 million maintenance budget a year and we're getting something like £10-£15,000 per year which is nothing really and it makes you wonder that by the time someone has gone off to several meetings, filled hundreds of forms out, is it actually worth them doing that."*

### 6.3.2 Sustainable Technologies Considered for Installation

**Table 6.5 Sustainable Technologies Considered for Installation**

| Reason | Sustainable Technologies Considered |
|---|---|
| Cost | *"… wind turbines, the only place I can put them is on top of my tower blocks and I can't afford them, too high a capital cost"*<br>*"…we had 3 blocks of flats with a flat roof and we know that within 5 years, that roof will need replacing. So we did a feasibility study of putting a light weight pitched roof on with solar panels, unfortunately the economics didn't stack up."*<br>*"PV panels … I think the price has to come down substantially because the payback period isn't worth it"*<br>*"We've looked at greywater systems, it's too expensive to retrofit … retrofit costs at least twice as much as new build for those sorts of systems."* |
| Grant | *[Wind turbine not installed] "… we didn't get the grant."*<br>*"I can get funding for the biomass boilers but what I can't do is afford to pipe it through the building."* |
| Planning / Reliable Information | *"… wind, that's a planning issue to start with, we also are given to understand that some of the turbines don't actually perform as well as manufacturers claim.."* |
| Installation | *(Wind Turbines) "…There were actually some construction problems with attaching it, … and we've ditched it."*<br>*"… Traditional buildings with solar panels on the roof wouldn't look right but it would with EcoHomes."*<br>*"… the CHP for example, you have to have something like 40 units to make it viable, we don't have many schemes that have that amount in one area"*<br>*"… we have looked at an experiment of actually putting in hoppers which allow a green hopper and an ordinary waste hopper, it's this retrofit that makes it difficult for us on some of our blocks to do."* |
| Fuel | *"With biomass, we're not yet convinced that there is a good supply of biomass within a local area to be sure of a regular supply."* |
| Research | *"We are investigating the use of water saving taps … can we carry out that replacement with the better, more environmentally friendly tap for the same cost and will it be perceived as equal to the tenant."*<br>*"… looking at replacement roof coverings, … I've got 3 and 4 storey flats, that have traditional roof coverings, so if we get a strong wind and they blow off I've got to get £500,000 worth of scaffolding to replace a tile, looking at alternatives to that so looking at profiled roof coverings that will last a lot longer, aren't necessarily, production wise that good for the environment but from a sustainable point of view (life cycle) are useful."*<br>*"Looking at recyclability, particularly when we're looking at empty properties and repairing properties."*<br>*Alternative materials such as bamboo and sourcing sustainable timber* |
| Trial | *"We have looked at some new stuff which is a gel that you put into radiators and it gives it an 11 second charge which lasts for 15 minutes, so every 15 minutes you give it 11 seconds of electricity and then it generates heat, but you can't do that on economy 7, … so we're trialling a couple of those now. What the manufacturers say and how it actually works is a different thing."* |
| Sustainability Credentials | *Timber vs. plastic which is more sustainable over the life cycle of a window*<br>*"PV cells I don't believe are environmentally friendly in construction for the amount of energy they produce, at this time."* |

The questionnaire survey asked respondents which sustainable technologies had been considered for inclusion in refurbishment projects with 73% having considered proven and readily available low and zero carbon technologies (section 5.3.5.9). It was not clear from the questionnaire whether or not the technology was first considered and then later installed or not, this was clarified during the interview process. This group of landlords considered LZC technologies (12) Materials (4), Water (4), Procurement (2), then, Alternative Components, Energy Efficiency, Recycling and Waste (1 each) but for various reasons decided against installation. The reasons given against installation are summarised in Table 6.5 and have been categorized as Cost, Grant, Planning, Installation, Fuel, Research, Trial and Sustainability Credentials.

The overriding factors against the installation of sustainable technologies has already been stated as high initial costs, poor payback periods and high retrofit installation costs, which were accentuated due to difficulties with attaining grants. The issues with grants was twofold, firstly the bureaucratic process of attaining them and secondly their limit of application.

The questionnaire survey asked respondents which sustainable technologies had been included in refurbishment projects, the most popular were those which increased the energy efficiency of the property, 2$^{nd}$ most popular were micro generation low and zero carbon technologies that were readily available and tested, use and sourcing of materials was the third most popular, water was fourth, waste management came next and finally the supply chain.

As expected the interview responses were similar to those of the questionnaire survey, the interviews were used to assess what technologies were being installed, why they had been chosen and the positive and negative aspects associated with them.

### 6.3.3 Installed Sustainable Technologies

The reasons given for installing some of the sustainable technologies mentioned included knowledge base from institutes such as the BRE and EST as well as staff experience and qualifications, initial costs and triggers such as changing regulations and affordable warmth policies. Within the remit of planned and responsive maintenance, landlords were limited in respect of the types of sustainable technology they could install, as the technology must be readily available and tested or they must be in a position to trial that technology to ensure value for money and to safeguard their tenants.

*"... you look through the whole gambit of what is manageable or achievable within the area of work that you do and I suppose within planned maintenance, there's only so much you can do. We're not going to be putting in huge wind turbines ... because you can't incorporate it in the day-to-day stuff and I think you've just got to pick, not what's easy but what you can incorporate without going out on a limb ..."*

*"Condensing boilers were triggered because of a change in regulations... Everything else is around the home comfort, investment strategy, customer feedback and things like that and really try to picture the world if you like in 3 to 5 years and what will be our targets"*

*"Initial costs are certainly critical to us. One of the issues we have, nothing that we do in improving properties is cost reflective. We don't get any return for that initial expense so even though we are spending money on insulation as a landlord we can't charge a higher rent to cover the cost of the insulation, the tenant benefits from our investment, arguably it's all part of the same circle but there isn't the driver for that."*

As shown in Table 6.6, (column 2 represents the number of respondents) the interviewees provided their experiences of installing LZC and energy efficient technologies, which appear to be fairly well balanced in terms of positive and negative. Experiences of installing and using LZC technologies appear to suggest that there was little consistency within the industry in terms of products and installation as the same type of product can provide landlords with opposing experiences for ease and cost of installation and savings on tenant bills.

**Table 6.6 Sustainable Technologies Installed During Refurbishment**

| Category | No. | Quote |
|---|---|---|
| Energy Efficiency Good<br><br>Bad | 12 | Insulation, efficient heating systems, double glazing<br>"*So even if we don't do anything with the heating, we've actually worked out that we will half the running costs just by putting in insulation, putting new windows in, insulate, oak cladding and new doors."*<br>*"... changing boilers because they're 15 years old and they're SEDUK C or D and we're putting SEDBUK A's in, those boilers had to be manufactured, the old ones have to be got rid of. So there is an economical cost there or an environmental cost there."*<br>*"I think the biggest con in the last 30 years has been double glazing. Double glazing does nothing except reduce noise…. But what we've done now is seal up our houses and turned them into sealed little boxes, we've lost ventilation. ... and realising we've made a mistake we're putting mechanical ventilation in so we're putting in fans that are driven by electric to do something that was naturally done 10 years ago."* |
| Green Roof | 1 | *"... we've done one green roof project"* |
| LZC<br>Good | 7 | CHP, GSHP, PV, Solar Thermal<br>"*I think the solar water panels that we've done have shown a good saving for our tenants I think we've saved something between 50 and 60% off their heating bills "*<br>*"PV has not been too bad ... something like 20 – 30% saving ..."*<br>*"The CHP technically worked well but it hasn't turned out to be as cost effective, in terms of the running costs, the maintenance costs are particularly high"*<br>*"... solar hot water we've had a number of problems with that. Installing solar hot* |

| | | |
|---|---|---|
| Bad | | *water in existing properties isn't as straight forward as you're led to believe …"*<br>*"GSHPs … that was not that good, for the cost, I think it was partly due to some issues in the installations ... They're working fine now … it's quite an expensive thing and the payback time is quite daunting."* |
| Materials | 5 | *"… if you went down the RICS now they would say you have to paint every 5 years, well we've recognised that paints have got better so we've stretched our targets to get better value out of them …"*<br>*"… electrical re-wiring we are now putting in non-PVC wiring but it wasn't necessarily to get rid of PVC it was because we were using low smoke emitting wiring…"*<br>*"[tenants] still want timber windows … we have a cycle of painting, we've actually just gone from a 4 year cycle to a 5 year cycle because we're using a product that will last longer, so sustainability in the sense that we've looked at increasing those cycles of painting, so economically it's better for us and better for the environment, but yes there is an argument for using UPVc, certainly, low maintenance, in some terms its more secure, its more energy efficient, less drafts … I can see arguments for and against."* |
| Procurement | 7 | *"… we're not a supplier, we specify, it's becoming clear to me that perhaps we need to be smarter in our specification in telling our contractors exactly what we expect them to do in terms of recycling the materials.."*<br>*"We're working with them as partnership, we're looking at supply chain management which is part of that efficiency and sustainability issue, we're looking at … things like 'e' auctions but one of the considerations you've got to make when looking at supply chain management is that you can actually have a massive effect on your local economy if you don't do it right, so people say 'go straight to the manufacturer', but what about the merchant? The merchant can play an important role in your local economy, you've also got to look at the footprint that you're creating, the travel miles. So that needs to be part of the strategy."*<br>*"[We] are a member of Fusion 21 which is a local procurement and collaborative working initiative …"* |
| Rating | 1 | *"… we have reviewed all our specifications against the EcoHome XB standard… and during the course of the DH programme we're going to look at what we can do to bring the building elements of our homes up to the EcoHomes XB standard."* |
| Recycle | 1 | *"… the council will recycle wherever we can."* |
| Re-use | 1 | *"… as part of the DH programme [we] started looking at these perfectly good cast iron baths that we were going to throw out into a skip, and we've done some makeovers which have been very successful. And the funny thing was when we replaced some of these baths we started to get complaints and the complaints we were getting was that some of our larger residents couldn't get into the baths because the BS have narrowed the baths so we were better off leaving the older baths in there. We have to be careful and balance it with H&S issues because the older baths don't have the (dimples on the bottom) to help with standing, especially with people going for the showers as well..."* |
| Waste | 2 | *"… have a composter [at the office]."*<br>*"… encouraging waste action plans…"* |
| Water | 5 | *"… we've looked at showers, taps and toilets that give the impression that they are doing the same job but use half of the water and we will continue to look for and we tell our tenants to look for washing machines with an A rating for electricity but also water consumption."* |

Within the negative experiences of energy efficient technology, the sustainability 'price' of changing legislation was questioned following the replacement of boilers prior to their expired life expectancy to satisfy new requirements.

The use of plastics instead of timber was raised as a sustainable and unsustainable use of materials; sustainable because of reduced maintenance requirements, but unsustainable because of its origin, chemical composition and disposal issues. This highlights a popular debate that was underway and emphasises the difficulties involved in accurately determining a materials life cycle analysis.

### 6.3.4 Sustainability and Maintenance Approach

Incorporating sustainability as a central issue to social housing maintenance does not stop with a new model and set of toolkits for measuring the performance of a building in-use, it requires complete buy-in from the organisation and a new way of working. Sustainability issues are cross departmental issues and require a holistic approach to management, much different to the traditional management structure which encouraged silo working.

> *"It's a bit fragmented some of the people who are in management positions just haven't thought about it and have just worked traditionally and it's about having a co-ordinated approach which we've just started to do."*

LAs and ALMOs tended to look beyond their internal management approach to deal more holistically with sustainability issues and were more likely to consider multi agency approaches, than HAs.

> *(On this estate there was a) "... huge amount of crime, anti-social behaviour, we've worked with the schools, with the police, we've done road shows down there we've put additional resources such as housing officers and such like into the area. The school is now highly rated, crime has come down, we've issued a couple of ASBOs between us and the police and the courts and we've got some very strong tenant representatives down there and the tenant representatives I believe now feel fully supported."*

LAs and ALMOs placed greater emphasis on wider social sustainability than offered by HAs and were trying to balance their unique and complicated local area housing needs through their housing policies. Whilst HAs understood the social composition of their local area, many seemed less willing to try and tackle such issues through their work unless it was on the back of a government agenda they were pursuing such as energy efficiency.

*"What we've done, again back to the energy providers, in terms of the criteria for the DHS is to partner with British Gas on the 'Here to Help Programme' which is a very socially responsible initiative that looks at a number of charity partners being involved and benefit health checks and a whole range of options that gives our residents access to support, Gingerbread and Scope, RNIB, there are a number of partners in there. We've had some amazing success with that, so supplementing the energy efficiency work that we were doing probably anyway, we've managed to lever in some support for it and helped residents and tenants access some of these charity partners and we've got some really good results with…"*

### 6.3.5 Attitudes Towards EcoHome XB

In the questionnaire results, 39% of the landlords surveyed considered the principles of EcoHome when developing their maintenance schemes. However, very few used the EcoHome XB toolkit, preferring instead to develop their own interpretation of the principles to match their specific needs. What was found during the interviews was that landlords concentrated data collection to that which they are reviewed on, therefore stock condition survey and SAP information, anything else is surplus to requirements and costly. This appeared to be especially the case with the implementation of EcoHome XB which had been specifically designed for use by social housing landlords. The general feeling amongst the landlords interviewed was that EcoHome XB was too time consuming, costly, required additional data collection which couldn't be utilised elsewhere and was just too overwhelming to apply to existing stock.

*" … no I'm not interested, I've had enough with NHER, BREEAM. My boss came back from York where it was talked about by the National Federation of ALMOs, he bought it, … said 'its dead easy' I looked at it, 57 pages of instructions, it includes the SAP rating within it, I haven't got the time, the resource, to start another set of figures that is not legislative, it's nice and I'd like to have it but its bottom of the pile for priority and you would have thought when the last one didn't take off they might have got the idea. I've spoken to my peers…… and everywhere else and they're going 'oh yeah I've got plenty of time to do that' no, we will not be taking it on in the near future."*

There were a number of landlords who hadn't heard of the scheme.

*"I don't know what it is. Maybe I've been shown the route to it but I've never followed it because I've got other things to look at."*

And a number of landlords who believed it would become a legislative requirement at some point and were therefore keen to continue / start using the toolkit as a means of staying one step ahead of their peers.

*"….. there needs to be a push from government …I think it's going to come because it's been supported by the Housing Corporation, BRE are there, it doesn't take a genius to realise actually whether it's a years' time or 2 years' time, there'll be a push that*

*everybody needs to be using it so we thought we would try and get ahead of the game and actually it fitted in quite nicely with our stock investment strategy because we're thinking ahead."*

In order for EcoHome XB to be taken more seriously and implemented more extensively it would have to be made mandatory but for what benefit? As this landlord states, what is the point of knowing where your properties sit in terms of the wider sustainability agenda if you are unable to do anything to improve the situation because of limited funding?

*"…Ok it comes up as a pass, what's the point? The main thing is that we know that there is only so many things you can do to an existing building, for a limited budget and the thing is insulate the cavities, to put as much insulation in as possible, to double glaze if you can and to provide pleasant services that we would normally, but beyond that the cost of renewables the cost of extra insulation in terms of wall panels and that sort of thing is prohibitive. So therefore there is little point in finding out where you are to do nothing."*

### 6.3.6 PPM vs. RM

Twenty landlords out of the 27 interviewed were asked if they believed one form of maintenance delivery was more sustainable than the other, 13 believed PPM to be the more sustainable out of the two, 5 believed PPM and RM were equally sustainable and 2 believed RM practices were more sustainable.

Those landlords who considered PPM the more sustainable maintenance option did so because it was easier to include the principles of sustainability into the planned programme as more money was spent (on individual programmes) and therefore more consideration could be given, and because PPM was more economical and a better use of resources. There was disagreement as to whether PPM was more sustainable in terms of tenant satisfaction. Some landlords believed PPM would improve tenant satisfaction whereas others, who saw themselves as a reactive service provider believed it was their RM works upon which tenants judged them and that PPM works were invisible to tenants. These organisations felt further restricted and unable to meet their tenants' aspirations because the Audit Commission's targets in relation to the timely completion of maintenance works did not correspond with tenant's requirements. Table 6.7 provides a selection of quotations by the landlords expressing their opinion regarding the sustainability of PPM and RM works (column 2 represents the number of respondents).

**Table 6.7 PPM vs. RM in Terms of More Sustainable Method of Maintaining**

| Category | No. | Quote |
|---|---|---|
| PPM More Sustainable | 13 | *"PPM and RM are essentially the same thing – same work is carried out just at different times. Easier to make PPM more sustainable because of its planned nature. It's important that the same standards are applied to both"*<br><br>*"PPM is considered better working practices than RM…. Key policies drive maintenance which is moving away from demand base to needs base…"*<br><br>*"…in terms of long term viability and sustainability of a building it's got to be PPM because you are replacing and planning for and replacement and/or improvement to elements of the building and that's going to contribute to thermal insulation and all the rest of it and replace your elements with up-to-date materials and that sort of thing and you're improving the long term viability of it. RM is not long term viability although [it] is much more of a social service than it is anything else, in a sense as it makes people feel connected."*<br><br>*"In terms of efficiency it has to be [PPM] the better option for any RSL due to customer satisfaction."* |
| PPM and RM Equal | 5 | *"… people's aspirations and their expectations rise continuously. So the more we maintain it and improve it to a higher standard, the more they want to keep it there and so the kitchen draw that would jamb a few years ago they would have put up with, today they won't and we've got to go fix it. So when people say 'you put a new kitchen in and your RM contract is going to save money' the answer is no, because people's aspirations and expectations of that draw working or that worktop being in good order or that tap dripping, they expect it fixed because it's their lovely new kitchen and they want it keeping that way."* |
| RM More Sustainable | 2 | *"The tenant's views sometimes conflict with things like the Audit Commission targets because if they ring up they want their repair done, the Audit Commission targets drive us to say, if you ring up we will decide if that's a programme job and you won't get it for four weeks. So, PPM is more efficient and it's a better use of resources but it doesn't necessarily suit what the service users want."* |

### 6.3.7 The Importance of the Sustainability Agenda to Social Housing Maintenance

One problem with the sustainability agenda is the lack of definition of what sustainability is. It is a word that is used so frequently to describe so much that to many it has lost all meaning. Even within the same organisation there is little agreement as to what sustainability means and its importance.

The results of the questionnaire survey showed that 71% of the landlords surveyed believed that the sustainability debate had some significance (had moderately significant or greater impact) to the work they did. The landlords interviewed were asked to provide the reasons behind their original answer to this question. The responses were broken down into 7 categories; business

opportunity, community, control, economic, environment, government led and intrinsic and are detailed in Table 6.8 (column 2 represents the number of respondents).

**Table 6.8 The Importance of the Sustainability Agenda to Social Housing**

| Category | No. | Quote |
|---|---|---|
| Business Opportunity | 1 | *".. if we can pioneer it [here], which is a small area and because we are so compact, basically one estate, we can actually demonstrate the effectiveness of it, we can then use that as a business opportunity and do consultancy work for other companies."* |
| Community | 6 | *"... priority is to get the community spirit back and secondly is to stop us wasting money. If we can get people to be more socially interactive without being anti-social, if we can get rid of the anti-socialness then the economic kickbacks from that is massive so it's a case of getting, supporting people out of their current situation."* |
| Control | 1 | The 'get it right first time' principle as a means of cutting waste and considering the types of materials being used.*"... it's all about the controls in construction and getting people to take pride in that work and do it right in the first place. That then makes it sustainable."* |
| Economic | 2 | Sustainability debate had significantly impacted his work "*Now my role is to be efficient and deliver, so if I'm not hooked up to the sustainability agenda it's not going to work, in a few years' time we run out of money basically or we're going to, it's all about putting the right product in to get the right answer at the end of it."* Sustainability debate had moderately impacted his work "*the driver more than anything from the company's point of view is about making efficiency gains, efficiency savings, increasing productivity and sometimes you will find that we will sacrifice sustainability for productivity, ... So again it would be wrong to say that our maintenance policies are being driven by sustainability issues but it is important and if we can achieve it then we do achieve it but it tends to be a secondary issue."* |
| Environment | 2 | Sustainability debate is important "*because it affects the environment, you're wasting resources if you don't consider that. ... Its linked with the environment we live in and the environment we live in is going to be affected by climate change ..."* |
| Government Led | 2 | *"Well there's more and more coming from government and more and more the government is looking at LAs to take the lead in ... we can't expect them to take action if we're not taking action ourselves."* |
| Intrinsic | 3 | *"... it's also the environment we live in now, it's such a hot topic politically and morally and ethically and everything else like that, that if you're working in most organisations you need to be addressing this and it's not just a social housing thing, it's what we do at home and what any private sector organisation is doing and everyone should be doing their bit really. It's not just driven by the HC, they're just tapping into the public mood and the public expectation."* |

### 6.3.8 Sustainability and its Impact on the Maintenance Strategy

The questionnaire survey results showed that the sustainability debate had only a slight to moderate impact on the organisations maintenance strategy. The interviews were used to establish how the sustainability agenda had impacted the maintenance strategy, the results of which have been broken down into 9 categories; Customer Satisfaction, Energy, Funding,

Maintenance Practice, Neighbourhood Profile, Policy, Procurement, Materials and Products and Tenant Engagement, as shown in Table 6.9 (column 2 represents the number of respondents). Like the DHS, the impact the sustainability agenda will depend on the age of the housing stock. Those with mainly new stock will be impacted the least.

> *"… because most of our properties are relatively new, we've not had to do major refurbishment, so they've been built at a time when, I know the building regulations have changed, particularly in energy efficiency fairly recently, but yes they were built at a time when they took on board all or some of those environmental issues …"*

Only one interviewee mentioned customer satisfaction and tenant participation (as a means of providing dialogue between landlord and tenant) as reasons for the sustainability agenda having impacted their maintenance strategy. As will be shown later, this group of landlords had indicated that they considered the social aspect of sustainability to be second most important ($2^{nd}$ only to economic sustainability) to the work they do maintaining social housing yet it appeared to have made little impact on maintenance strategies. This was not representative of the general feeling regarding the importance maintenance managers and CEOs place on the social agenda as it was central to their work, it was perhaps indicative that organisations strategic drivers were out of sync with operations.

Most of the interviewees believed the sustainability agenda had impacted their maintenance strategies via the materials and products they chose to work with. Greater emphasis had been placed on purchasing sustainably sourced materials, materials and products which had less impact on the environment and the standardisation of specifications and labour for RM and PPM works, a well-established Egan Principle.

Energy, both efficiency and sourcing of, and maintenance practice, increasing the level of PPM compared to RM, synchronising RM and PPM works and improving the efficiency of RM working practices appeared to be the next most considered set of drivers for sustainability implementation.

**Table 6.9 Impact Sustainability has had on Maintenance Strategy**

| Category | No. | Quote |
|---|---|---|
| Customer Satisfaction | 1 | *"we're starting to realise that sustainability is quite key because if you keep the residents happy, keep them in their place, they don't change tenancy, that saves you money, it all links together really. And ultimately we are here for customer satisfaction."* |
| Energy | 4 | *"... it's encouraged us to consider alternative technologies for heating... We're looking at work that makes the properties better to live in, ... but looking at things like better specifications, better heating, making sure that we've got an affordable warmth strategy and that we do whatever is necessary to meet that strategy."* |
| Funding | 1 | *"we've done very little work around sustainability in terms of council stock in that we haven't had any funding really under the sustainability banner, all the funding has gone on the DH agenda. So ... the lion's share of the funding has gone on the DH, making homes decent and nothing else outside on the estate…"* |
| Maintenance Practice | 4 | *"In the past they have been given a van, go do a job, come back and get materials ... so we're now putting stock on the vehicles, we now have them fitted with trackers to go straight to the job from home in the morning, not coming into depot, all of which has a big impact on the environment as we are seeing a reduction in fuel usage and we're seeing a reduction in mileage …So it was driven by the economics of productivity but the spinoff will be consuming less fuel, contributing less to the carbon footprint as a result."* |
| Neighbourhood Profile | 1 | *"My sustainable criteria are the social ones ..., we've got to be very sensitive to the categorisation of our stock on two levels really ... an investment into an area can improve an area that is declining, can improve or slow the decline down, but lack of investment can actually precipitate some of the negative factors."* |
| Policy | 2 | *"Where we've got existing toilets we're putting in flush bags ... so we've been doing small things like that but it's not very organised, it's not as entrenched in our policy as it should be and the intention is to move on where there are relatively inexpensive sustainable measures that we can do, is to do those straight away and then try and get the funding or change the way that we do things to get the more expensive things implemented."*<br>*"...strategies in place for environmental issues and it's just the small things from, recycle things within the office, looking at the paper we use and recycling that or recycling tins and things like that. ..."* |
| Procurement | 2 | *"Whenever we tender we give marks to the environmental care that the contractor takes so that is part of our tendering procedure now"* |
| Products and Materials | 9 | *"We're moving away from anything that had a battery in it and going hard wired. We've looked at the materials that we're using so timber obviously we like to get it from a sustainable source..."*<br>*"... when we use a product it needs to be recyclable ... and the products that are coming out need to be recycled ..."* |
| Tenant Engagement | 1 | *"... we're talking to them about energy conservation, about defrosting fridges, about turning the thermostat down one degree..."* |

Policy which included incremental improvements in cyclical works and incorporated environmental policies together with procurement of services and materials appeared to be the next most considered with neighbourhood profiling and funding having the least impact on the

implantation of the sustainability agenda.

### 6.3.9 Sustainability Rating of Landlords Organisations

In the questionnaire survey landlords were asked to rate the sustainability of their current practices. The majority believed their current practices to be sustainable (to varying degrees), how this rating had been established was discussed during the interviews.

None of those interviewed actively measured their practices against any form of sustainability indicator or agenda, but 4 felt their practices were moderately sustainable because they knew their practices needed to implement the sustainability agenda and they were doing what they could with the resources they had.

> *"I think it was a gut feeling. I think we try and in our small way to incorporate, just little things within projects, … you're doing a gutter replacement and you'll put some water butts there, rather than discharging to the ground… trying to encourage our contractors or trying to tweak our specifications, there's maybe not much you can do but what you can do that has an environmental impact, you'll try and build it in and for the most part there's very little cost implication. .. I do feel we can do more … we've had an environmental strategy for 3 or 4 years or whatever and I think we've tried to build on things year on year."*

3 slightly sustainable *"Probably because there is room to improve I think. There's a will there but..."*

And 1 neutral to slightly unsustainable

> *"Well on the basis that if, from an energy point of view there isn't much more we can do for a relatively cheap price. If we are going into increasing insulation of walls, you know making walls thicker or renewables like PV or heat pumps or whatever that's another huge cost. In terms of the programme responsive debate … I think our stock is 70% planned and 30% responsive but I consider that neutral. If I were able to go 90% programmed and 10% responsive that would be progress but it's not and it's probably not able to do so because people's expectations of our service but also because of the condition of our properties. I'm not able to invest in them enough to bring that down, so that's why it's sort of neutral."*

### 6.3.10 Improving Organisational Maintenance Strategy in Terms of Sustainability

**Table 6.10 Improvements Required to Organisational Maintenance Practices**

| Category | No. | Quote |
|---|---|---|
| Champion | 1 | *" for an association this size and our growth plans at the moment, environmental issues can take a back seat to running the business. So we do have a Board champion, but that board champion probably needs to be a more forceful."* |
| Increase Level of PPM | 1 | *"Looking at all 3 contractors with ourselves to share innovation, we're looking at targets and reducing RM and making that more of a planned approach"* |
| Knowledge / Buy-in of Staff | 1 | *"We've looked at things like having allotments on the estate, we just don't know how to go about these things. So what we're doing, is employing experts but we're also copywriting, we are employing them on the basis that we can copy write their knowledge effectively and we can sell their knowledge and they can work with us going forward. We've had all the staff trained…We try to get everybody on board."* |
| Leadership | 1 | *"I think it needs to be done at an organisational basis because I think a lot of these … high level policies are manufactured with little regard of the practicalities of implementing the policy"* |
| More Data | 1 | *"I think we need data. You can't say they're sustainable unless you know where your starting point is and we just don't have that. So we need to be more sophisticated about the way in which we collect data on the performance of our properties.."* |
| Production Selection | 2 | *"… there must be a standard product that you can source that is greener than other products but I don't see any concerted effort being made, people just go down to Travis Perkins or wherever and just get the materials. So there needs to be a database, a readily available database of equivalent green materials and people need to start thinking about embodied energy …"* |
| Resources | 1 | *"we very much believe that security of resources, so that we've got a long term maintenance plan and asset management strategy will give greater certainty of turnover and work for our contractors and that will allow us to try new things and test new innovations and get much better value for money and also I think some of the things, we could spend more time on, is looking at the wider sustainability of both the way we manage our investment, the effect it has on the community and trialling new things, trying solar panels, better insulation products doing a lot more work on some of the governments key agendas, but while we are chasing the next budget, it just takes your focus away from some of those innovations and we are very much interested and wanting to get behind some of the governments thinking on the carbon footprint and meshing all those initiatives together with our investment strategy."* |
| Stakeholder buy-in | 1 | *"… do this by working in partnership with the residents and the contractors, we can't do it alone, we've got to work with other people to improve. We can provide the funding to do it, we can provide the expertise from an office point of view, from an organisational point of view but that's no good unless you've got the right people working for you and you've got the residents on board too."* |
| Supply Chain Management | 2 | *"We're working with them as partnership, all three of them sitting at the table at the same time and we're looking at supply chain management which is part of that efficiency and sustainability issue, we're looking at… pursuing things like 'e' auctions."* |
| Toolkits | 1 | *"I think there probably are tools that we need, I think there's probably a model that would be useful for housing associations to have, I think the reason I say we need to improve is that I know deep down we're not quite there yet … it's not a central focus of what we're doing"* |

The questionnaire survey results showed that all ALMOs and the majority of RSLs (79%) and LAs (83%) believed their organisational maintenance strategy could be improved in terms of sustainability and this was regardless of how they rated the sustainability of their current practices. The interviews determined how their practices could be improved in this sense.

The results, in Table 6.10 (column 2 represents the number of respondents) indicate little agreement and have been categorised as requiring a champion, increasing the level of PPM works, increased knowledge, leadership, more data, a change in product selection, security of resources, stakeholder by-in, supply chain management and new toolkits/working model.

### 6.3.11 Balancing the Triple Bottom Line of Sustainability

Of the 27 social landlords interviewed, 21 were asked how they would balance the triple bottom line of sustainability in the context of maintaining social housing stock. The initial analysis determined that economics (0.43) was considered the most important, social (0.37) second most important and finally environmental (0.2) aspects of sustainability.

This question proved difficult to answer; because of the complexity of the subject, in some cases there was a (conceded) lack of understanding, but also because (a result of its complexity) solutions generally required a cross department approach, and a definition of what sustainability means to the maintenance of social housing is lacking, although a popular response was "its places where people want to live and are happy to live in."

Almost half of those who were able to answer this question rated the economic aspects of sustainability the most important factor because; "we're dealing with public money", "… I need to improve the properties and to have a planned maintenance programme for the future, if we don't maintain our properties, demand will decline and we won't get people in our properties, we won't get our rents and it's a vicious circle and downward spiral … I need money to maintain the properties"

Those who believed environmental or social aspects were of greater importance did so because; they were in a strong financial position and were able to reprioritise their resources, the financial benefits of improved social sustainability were recognised, they were located in socially deprived areas which forced greater social prioritisation, promises made during the LSVT, and because "it

would be foolish to bring homes up to any sort of reasonable standard if nobody wants to live in the neighbourhood in which they are placed".

Environmental aspects of sustainability were considered the least important by the group as a whole, "there aren't enough financial drivers at the moment to take that [environment] into account", however it was acknowledged that greater consideration was being given to this topic due to pressure from councillors and (in a number of cases) residents.

The government targets and limited resources restricted what typical social landlords were able to do in terms of sustainability.

### 6.3.12 Sustainable Maintenance Hierarchy

The same landlords were asked what criteria they thought should be included in the maintenance process to ensure improved sustainability is delivered within the existing social housing stock.

From the interviews it emerged that the responses given were dependent upon two courses of action 'maintenance practice' (the maintenance process) Figure 6.1 and the 'house going forward' (maintenance work carried out on the property) Figure 6.2. These were purely the responses of those maintaining social housing and whilst it is acknowledged that what landlords believe is important in terms of the sustainability agenda may be different to the opinions of tenants, the tenant perspective has not yet been sought.

Figures 6.1 and 6.2 are illustrations of the combined criteria this group of social landlords believed should be included in the maintenance process to ensure improved sustainability is delivered within the existing social housing stock, a far wider set of criteria than was being considered by maintenance managers and the DHS.

Whilst Figures 6.1 and 6.2 illustrate the combined opinion of the three types of landlord their data was originally reviewed separately to compare between the RSL and ALMO/LA groups. Common features amongst the RSL and LA/ALMO hierarchies under environmental aspects of sustainability were waste, energy, materials, water and pollution, all widely accepted issues currently incorporated in government legislation and best practice. Safety was the only common feature between the RSL and LA/ALMO hierarchies under social aspects of sustainability. There

appeared to be a better understanding of economic and environmental issues for which there was a plethora of supportive literature, however there was less understanding of what role housing maintenance can play in the social arena. There was little similarity between the RSLs and ALMO/LA (only agreed upon WLC) groups as to what was important in terms of economic sustainability which is most likely a reflection of their differing approaches (ALMO/LA are more community minded whereas RSLs appear to take a more business-like approach). There was a common belief that regardless of the type of landlord they all have the same problems that of meeting stringent UK Government targets whilst providing safe, warm and dry houses that people want to live in under budgetary constraints.

Figures 6.1 and 6.2 present an assembly of criteria social housing landlords would wish to consider as part of their maintenance planning but to what extent can they be modified into meaningful KPIs? Do landlords actually have sufficient control to make such KPIs practicable? It is thought not. Of course not every landlord would wish to measure their housing stock against every criterion mentioned, a selection would be chosen which best represents their unique requirements and reflects their interpretation of the sustainability agenda.

Those involved with maintaining Local Authority owned and managed housing appeared to have a more mature understanding of the issues surrounding sustainability. Their attention focused on the benefits of wider participation, going beyond that of a provider of social housing, encompassing other agencies such as the NHS and the police. This group appeared to take more of a community perspective than did the RSL group, which takes a more pragmatic, business-like approach.

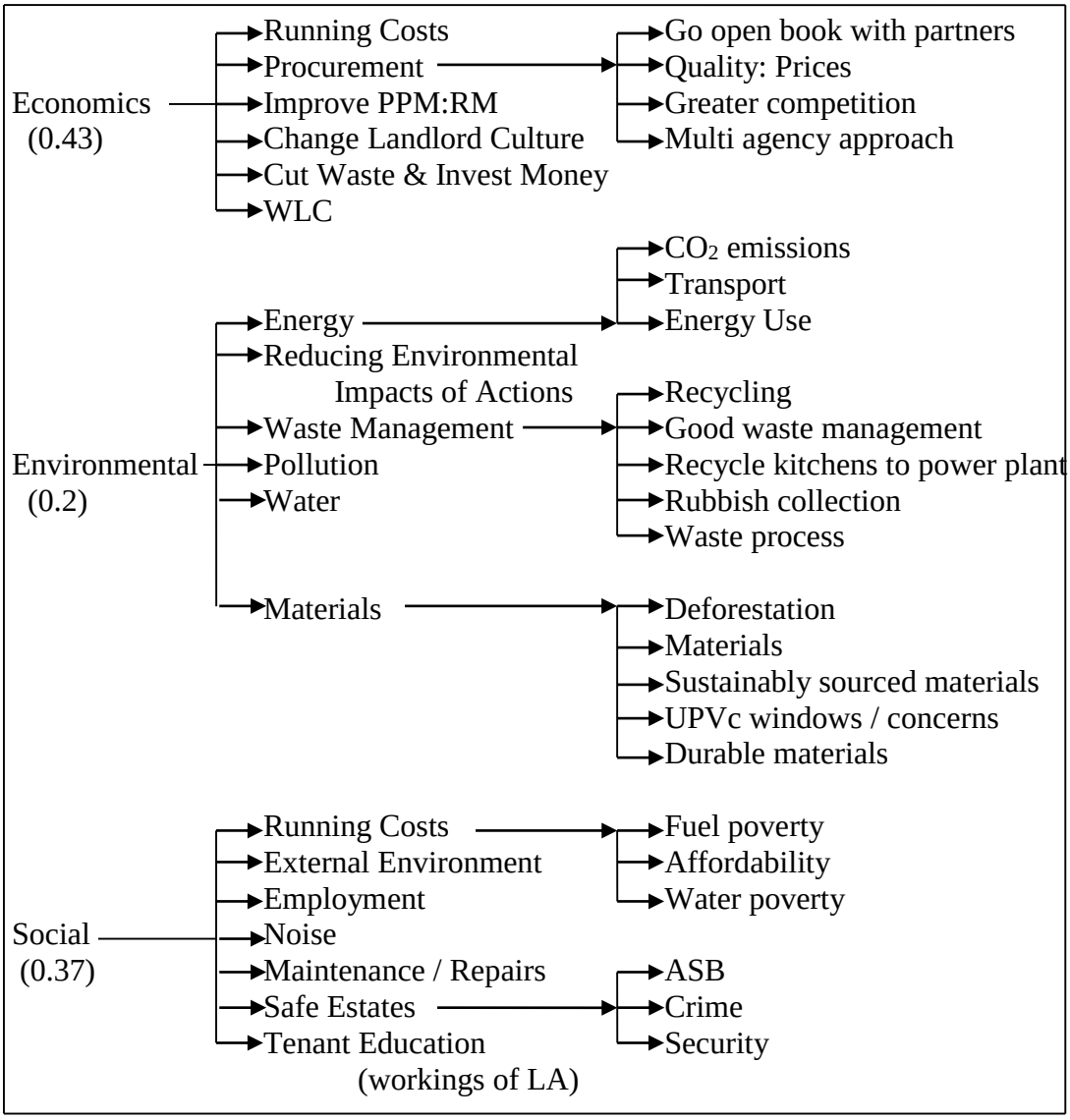


**Figure 6.1 Sustainable Maintenance Hierarchy – Maintenance Practice**

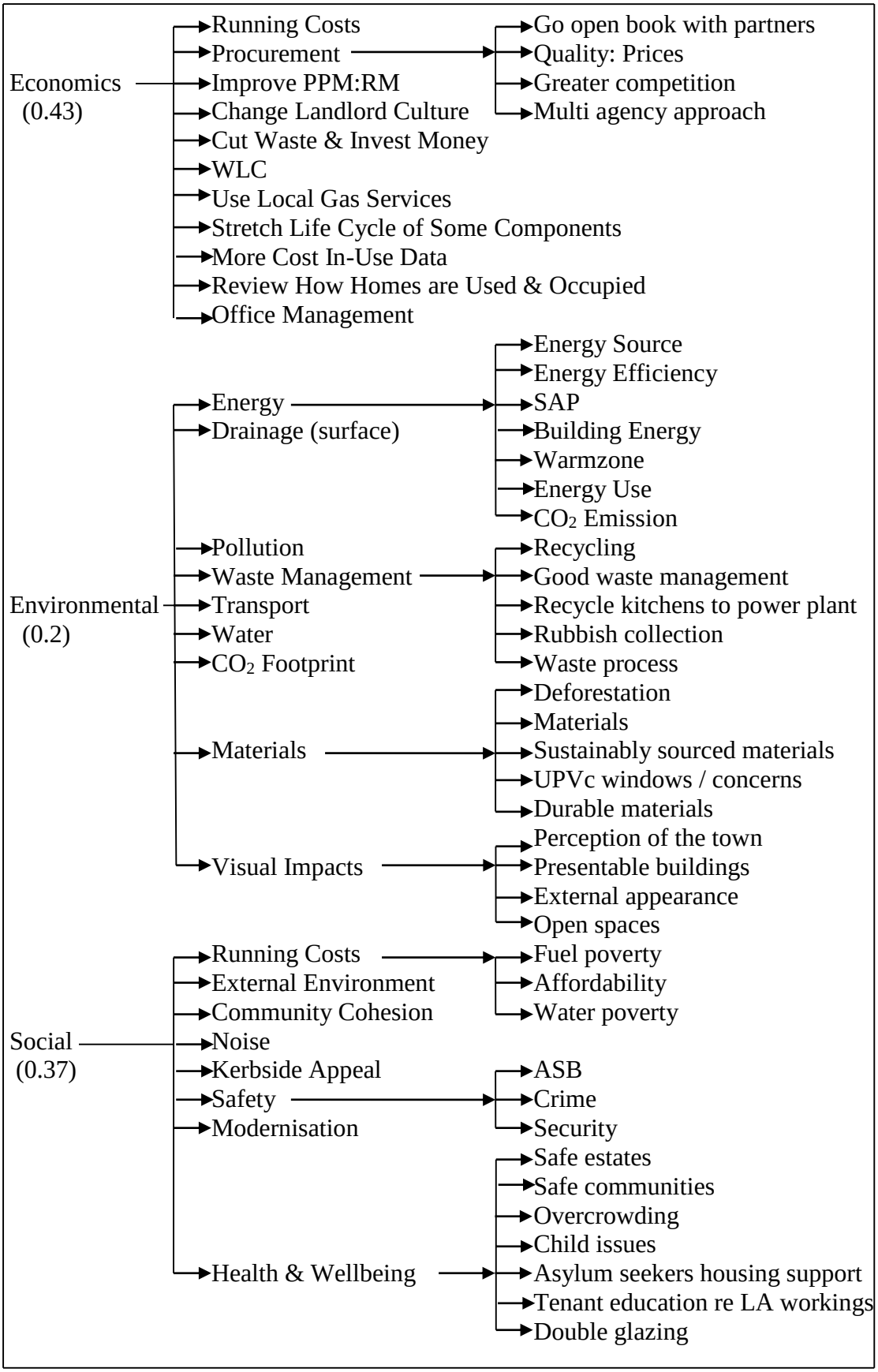


**Figure 6.2 Sustainable Maintenance Hierarchy – House Going Forward**

### 6.3.13 Environmental Schemes

To determine the positive and negative aspects of implementing environmental schemes the landlords were asked to share their good or bad experiences of such schemes. Schemes considered to be environmental were wide ranging and included, installation of energy efficient light bulbs, tree planting, retrofitting sustainable technologies and whole estate rejuvenation. Table 6.11 provides a summary of the good and bad environmental projects.

The good examples included the very simple, yet highly successful scheme where water hypos were installed during property visits which also provided an opportunity for discussion with the tenant regarding lifestyle issues which impacted sustainability issues. The results of which were used to update maintenance plans and specifications, to the much more complex, cross agency rejuvenation of entire estates.

The bad examples included unsuccessful tree planting schemes which resulted in increased vandalism, poor performing sustainable technologies and failed estate rejuvenation for which significant funding had been received from the 'Social Regeneration Budget', and resulted in what appeared to be an attractive built environment but which failed socially. It can be seen that the similar types of scheme are being implemented but with opposing success rates, there would appear to be some complex social issues at play which determine the success, or not of a scheme.

**Table 6.11. Environmental Schemes Implemented**

| **Environmental Schemes Implemented** | |
|---|---|
| Good | [Estate] *"… huge amount of crime, anti-social behaviour, we've worked with the schools, with the police, we've done road shows down there we've put additional resources such as housing officers and such like into the area. The school is now highly rated, crime has come down, we've issued a couple of ASBO between us and the police and the courts and we've got some very strong tenant representatives down there and the tenant representatives I believe now feel fully supported.."*<br><br>*"Each house has got the 1kW turbine wind generator… Residents, I don't think they realise they are there, they just work in the background, saving people money. Not as much as we'd like."*<br><br>*"… we call them a water hog system, in toilets, the briquettes that go in and save the water, it has worked really well. So what we did, is when we're putting these things in, it gave us the opportunity to talk to households about energy awareness and fuel poverty and all the other things, how to save energy. … and it enabled us to get inside the properties and helped us understand how people lived their lives."*<br><br>*"We've had a bit of success with, motion sensors. We have a very large scheme … which is nearly 200 retirement flats with large communal areas, atriums, walkways, shops, all sorts of things and we had a problem with... It was so over specified on lighting, … it was costing us a fortune to light the village over night, when everyone is asleep and as a consequence lights were burning out faster than they should have done so we took the decision a couple of years ago to put motion sensors in. Basically, I think it's called microwave technology that it will come on when you walk into a room and at certain hours it will go down to a lower lux level. . the lights aren't on as much, in the evening the lights go on when someone goes into an area and then after 5 minutes they will drop down to the lower level. So its two fold, it saves electric, it also saves on the replacement costs of the fluorescent fittings."* |
| Bad | *"We did a tree planting scheme and we found that people hated it. … We had a grant of £10,000 given to us to do this. We have ripped out all the hedges, not realising that the hedges were natural drainage and helping to remove all the water and now what we are finding is that we are flooding all the time, so we thought we'll plant a few trees, get a bit of that back. We polled 930 flats (that's all of our tenancies) and about 50% were in favour and about 50% weren't but once we'd actually planted them we did find out that not only the amount of vandalism to the trees and saplings was unbelievable … we received … letters objecting to it."*<br>*"We tried to do, LAA (local area agreements) where we worked with transportation services, the police, social services and people have gone away to do their bit and then we've found out that one person is putting in a wall and another person is putting in a fence at the same property, its crucial at the beginning that someone is made champion and they make the decisions or they hand out the work. … people have done work and then we've gone back and done something different and at the end of the day this is public money and we don't want it wasted."*<br><br>*"… we've just done a scheme … where we used the [ ] CHP units and they are not reliable. I think [ ] have taken them off the market."* |

### 6.3.14 Sustainable Working Practices

Egan and Latham principles were being encouraged via the efficiency gains resulting from the spending review as well as the principles of sustainability. Popular aspects of this were partnering and standardisation. While it is relatively straight forward to standardise materials,

plant and equipment within the maintenance supply chain and to reap the well-publicised benefits, synchronising specifications between development and maintenance can be more problematical depending upon the level of control the landlord has over the development.

> *"From a maintenance point of view I've often said to our development team, I want this particular kitchen or this particular boiler so that my maintenance team, when they go in they've got all the stock and they don't have to get special and we'll pay the extra, if it costs an extra £200 per boiler, we'll pay the extra but they just won't. They say it's the contractors, and I can understand it. If they've got a whole site, you imagine a 106 site where we might have 20% of the stock, they've got contractors to do the whole site and if he suddenly has to start changing materials for even only 20%, it makes life difficult, so contractors just really want to knock out a building as quick as possible, sell it and get their money."*

The emphasis on annual efficiency gains could also detract from real sustainable gains as some organisations had already realised the Egan and Latham principles before the spending review was publicised so looking to make further efficiency savings from their operations was considered a waste of valuable time and money.

> *"If you've got a badly run business then the Egan report is fantastic and you can achieve it. If you're already a lean, mean, fighting machine of a business then there isn't any fat there to play with and although we potentially try to be innovative in how we can get round and save this 2% every year, that is unsustainable, you cannot."*

A further detriment of the efficiency agenda was that by focusing and monitoring landlords on annual savings it prevented long term savings being realised. In many cases implementing more sustainable practices meant savings wouldn't be recognised until some point in the future and over a more sustained life cycle, issues which were beyond the scope of annual efficiency reports. This could actually have the converse effect to that ultimately desired, in that the sustainability agenda can be overlooked.

> *"…the efficiency savings tend to focus on percentage savings per year rather than looking at, couldn't an efficiency saving be one that's realised at some point in the more distant future, such as, putting in higher specification kitchen units into a property, the tendency has been in social housing to put below specification equipment in because of financial constraints and it doesn't stand up to the wear and it doesn't last as long. Whereas [with our] specification we've taken a view that we've only got this one opportunity to do it, so if we look at the best specification we'll gain the benefit because we'll have fewer future maintenance, but, we can't demonstrate any savings because we're spending a bit more on kitchen units. We could project the savings at some point in the future but that does not fit in with the timetable of the efficiency savings agenda, so if there was a little bit more flexibility on allowing people to demonstrate better value for money and count that as the equivalent as an efficiency saving because it would be at some point in the future that might help, because at the moment people are so focused on how we can save 2.5% this and then next year and then the year after and your focus is on that rather than what's the best thing you can do now to achieve a better result and a long return result."*

### 6.3.15 Barriers to More Sustainable Maintenance Practices – Internal Barriers

The results of the questionnaire survey showed that cost was the biggest internal barrier, and that lack of resources (which can again include lack of money) and culture were also major barriers to more sustainable practices. The interviews were used to establish why landlords believed such internal barriers existed and if possible, suggest ways in which they could be broken down.

As expected the interviews closely replicated the questionnaire survey and Table 6.12 provides examples of the answers given. Cost remained the biggest barrier to this group of interviewees because of limited funds available for maintenance, rising costs of labour and materials and high initial cost of sustainable technologies and materials with long payback periods. Bureaucracy, lack of resources and culture were also seen as major internal barriers. Issues associated with culture stem from the traditional maintenance management structure which encouraged silo working and staff behaviour, which can be a very difficult obstacle to overcome. Culture also relates to tenants who have established habits over a long period of time and are used to occupying their dwellings in a certain way and these habits can also be difficult to break. Lack of resources relates to time (staff), information and insufficient funds available to deliver a maintenance programme that satisfies changing tenant expectations and bureaucracy, the environment these organisations work in is well known to be bureaucratic both internally and externally but it is the amount of time (resources) tied up in bureaucracy that is detrimental to more sustainable maintenance practices.

For those landlords who were developing their own properties there was another issue. From Facilities Management studies the impact design stage consultation with maintenance managers can have on the future maintenance requirements and therefore cost of a building can be significant. However within the social housing arena putting these principles into practice can be difficult and the future benefits lost because, increased initial costs cannot be accommodated within the build cost or it is not possible to synchronise development and maintenance specifications.

> *"I think, while we do get on very well with our development team, at the end of the day they do have this limit on what they can spend and therefore they might say, 'yes I'd like to do it but the scheme isn't viable and we can't do it' and that's just so stupid, that means I then have to spend more money later to do the conversion or do it quicker than I would normally replace that particular item, so it doesn't seem to make sense to me, the two seem to clash against each other"*

**Table 6.12 Internal Barriers to More Sustainable Maintenance Practices**

| **Internal Barriers** | |
|---|---|
| Bureaucracy | *"I think to a certain extent to get decisions made by local councils can be quite challenging… we operate in a political environment and we have to adjust our plans to suite that sometimes."*<br>*"… bureaucracy takes up a lot of time and that time could be better spent actually looking at what we do and improving [what we do]."*<br>*"I think sometimes it's been more of a hassle trying to get sustainability into projects than it has been to get things done quickly and there has been this driver so you sacrifice it for the sake of speed."* |
| Cost | *"… one example of the costing issue is labour rates and materials rates have gone up astronomically since we set off on the DH journey due to the fact that, in my view, labour is in demand, insufficient plumbers, insufficient electricians has forced up salaries etc. … Changes in building regulations has impacted on decency, electrical regulations, Part P of the regulations have affected the fact that we needed to address issues that we might not have addressed previously, there's a big impact on the budget there."*<br>*"… there is an extra over cost to being sustainable at the moment, sustainable materials tend to be a bit more expensive, arguably they tend to last longer, however that's never put into the equation, we don't look at things on a long term basis, we don't look at the whole life cycle cost analysis."*<br>*"Cost obviously the amount of monies available to us is limited although that's driven by, on housing side a lot of it is driven by revenue … we aren't too bad because we're in positive subsidy … there's also the rent capping element as well where HAs have their rents capped, … so the cost, the rising in cost from an inflated building industry, cost of demand, does effect what we can do …"*<br>*"… because the payback time and cost/benefit of most of these wind turbines and heat and power and everything else are not good then they're not going to be considered as part of our day-to-day things."* |
| Culture | *"Within the organisation and within the tenants as well. It's getting people on board, … maybe we do need to have policies and procedures in place and people will only conform to policies and procedures they won't perform on idealism or whatever so I think we have to write all the environmental issues into our policies and procedures …"*<br>*"Well the culture bit is the education part, both residents and staff."*<br>*"… people work in silos, there was very little sort of understanding of the big picture, there was very little making sensible business decisions …"*<br>*"Culture is simply that some people still don't believe that Global Warming is a reality and they are in denial …"* |
| Lack of information | *"… I'm struggling for a system to help me illustrate to people what the benefits are, certainly sustainable energy products."* |
| Lack of resources | *"… of course tenants expectations have risen as well, … they want to feel safe and secure commuting about the estate they don't want to feel threatened so they want CCTV, they want improved lighting, they want somewhere to park their car and they all cost money and under the lack of resources that's a big challenge."*<br>*"… lack of resources, either relating to staff to be able to do the actual extra over work. Sometimes when you're doing something innovative, you've got to do it and do your normal work."*<br>*"Its money, its information and it's probably about staffing as well …"*<br>*"… lack of resources is exactly the same as cost in my opinion."* |

### 6.3.16 External Barriers

The questionnaire survey showed that lack of any real incentive closely followed by a lack of joined up thinking were the main external barriers to more sustainable practices. The interviews were used to establish why landlords believed these external barriers existed and if possible, suggest ways in which they could be broken down. Unsurprisingly the results of the interviews replicated those of the questionnaires and Table 6.13 provides examples of the reasons why (column 2 represents the number of respondents).

Social housing Regulators did not provide incentives for social landlords to either improve their performance generally or to incorporate the sustainability agenda. As mentioned previously, implementation of the sustainability agenda concentrated on the installation of sustainable technologies but social landlords were not incentivised to do this because of limited funds, difficulties with grants and difficulties with reliable technological information, unless it was driven internally from the goodwill of those involved in the maintenance process.

Lack of joined up legislation was a major issue. The volume, frequency and conflict of recent legislation left social landlords struggling to incorporate updates into their 30 year business plans and finding the additional monies to fund them.

Legislation and Lack of Government Leadership received the same number of votes by the interviewees. The biggest issue surrounding legislation was that there wasn't any quantification regarding the financial impact on social housing landlords, or any additional funds provided to aid the implementation of it and so the cost burden was placed upon already stretched finances. Lack of clarity was another problem with legislation at that time. The main issues social housing landlords had with Government leadership was that they didn't lead by example and didn't provide sustainability driven targets.

However one landlord pointed out that if there was the desire from within the organisation then no external barriers exist, thus, the successful implementation of the sustainability agenda within social housing maintenance depended largely upon the principals of those driving the agenda from within.

> *"I felt that actually if you're committed to it internally there are no external barriers because you have the funds."*

However, a larger number of landlords were of the opinion that in order for the sustainability agenda to be effectively addressed, it needed regulators to set specific targets which were finance driven.

**Table 6.13 External Barriers to More Sustainable Maintenance Practices**

| Barrier | No. | Quote |
|---|---|---|
| Lack of Government Leadership | 5 | *"I don't think the government has … really pushed the sustainability side of it very hard at all … when you've got a limited resource you have to put that resource to where it's going to count and when, we've got the audit commission which basically acts on behalf of the government who will come and inspect us and they publish their KLOEs which say what you need to do to be a good organisation … you then put resources against trying to achieve the best possible score you can."* *"I think what the government is saying and what they are doing are very different issues."* |
| Lack of Joined up Legislation | 7 | *"… there is no legislative requirements at the moment to make our buildings more sustainable, in terms of energy certainly, in terms of economic viability, well there's the DHS … lack of joined up legislation in the sense that if there was a clear mandate which said you have to achieve this by a certain period of time and here is the money to do it or here is the methodology for getting the money to do it, that's fine."* *" .. you still get policies and priorities coming out in one area which do conflict with policies elsewhere and again there's the driver for efficiency savings conflicts sometimes with your longer term sustainability."* |
| Lack of Technology | 3 | *"There's a lack of technology, a lack of information about it as well."* *"Lack of technology I think is a big one, things like PVs could actually be really good, if someone decided that you could actually start manufacturing them in this county…"* |
| Legislation | 5 | *"… when government brings out legislation they need to identify what it's going to cost in the social sector… all these legislative changes and such like have a massive impact on social housing and we go back to Ruth Kelly and the likes and say 'that's fantastic that's just cost you 25 kitchens and that then starts to hit things home, you say half a million to them, half a million to them in government is nothing, 25 families that aren't going to get a new kitchen, 'that's starting to make sense ... So legislation needs to be worked through a little bit."* *"… there's a lot of legislation recently that's been released by government, a lot is quite confusing unless … and I think if I could ever say anything to the government it would be to plain English everything for people who haven't got a degree in the environmental sciences I think."* |
| No Commercial Imperative | 2 | *"… we can't make a profit can we, we're a not for profit organisation so what we can make is a surplus so I suppose in that way it's trying to gear something to what reward can we get?"* |
| No Incentive | 10 | *"… we've got all these KPIs in place and performance, best value indicators and local performance indicators which we need, .. to [know] where we are going and what our targets are, but it ends up as target driven, and if you achieve your targets then it's what? We'll set you another target now, that's not an incentive, so there's no incentive there. The only incentive is 'yeah you're a better performing LA so we'll give you more freedom to develop, if you show us your stock is sustainable and you've invested wisely then we'll let you develop', that's an incentive, no it isn't, we do well 'oh we'll take your stock off you now and give it somebody else'."* *"… there is no real incentive for this council to do it apart from good will."* |

## 6.4 Climate Change

### 6.4.1 Confidence in Arguments for Climate Change

The UK government has concluded that climate change is occurring and is as a result of our actions by the production and release of greenhouse gasses, including Carbon Dioxide, into the atmosphere. There were a number of existing and announced policies which aimed to reduce the levels of global $CO_2$ including the Kyoto agreement, the Climate Change Bill and the Energy White Paper.

Table 6.14 provides a summary of the responses given to this question, the largest group agreed that climate change was happening and was as a result of our actions (column 2 represents the number of respondents). Nearly half of those asked however were unable to decide mainly because they found both sides of the argument compelling or were aware of changing weather patterns due to their own lifetime experiences and felt 'something' was happening but were unable to define it.

What did surface was regardless of climate change debate, there was a compelling argument to review how we build, maintain and live in our dwellings in terms of fossil fuel depletion, our impact on the environment (and air quality) and waste disposal practices.

**Table 6.14 Climate Change Causes**

| Climate Change | No. | Quotations |
|---|---|---|
| Man Made | 6 | *"As a company we have absolute confidence in it and we are following the governments lead on it to a large extent."*<br>*"I'm fairly convinced that yes it's definitely happening and that we are contributing, when you see the figures you can see that there is some other factor other than the natural …"* |
| Nature | 1 | *"… a lot of these things are cyclical, we had global warming a million years ago when we had no industry. I mean, quality of air, if nothing else should preclude people from churning out loads of $CO_2$ and particulates…. We've had hot spells and cold spells in the past which haven't been to do with the way we live and occupy the planet"* |
| Mix of Both | 1 | *"I suppose more settling in terms of 'when did the world ever stand still'. … the world hasn't just suddenly changed as a result of people burning fossil fuels. It may have contributed to speeding the process up but I still think the world will continue to change."* |
| No Confidence in Current Argument | 3 | *"I haven't got a lot of confidence in it to be honest; I think there is a lot of political rhetoric in it actually."* |
| Don't know Depends who's arguing | 3 | *"I tend to be on the side that yes it's happening there's loads of proof … then Patrick Moore came on the radio the other night and said what a load of nonsense it is and all of this and you think oh well maybe we've all been duped and there isn't really a problem."* |
| Both arguments are compelling | 1 | *"I find both scientific arguments convincing ... However my view is, I do believe in the precautionary rule and I also think, it's not only about what climate change can do as a result of our $CO_2$ emissions but we need to be thinking about our impact on the environment generally."* |
| Not enough knowledge | 3 | *"I don't know whether it's a natural cycle, but something odd is happening."* |

### 6.4.2 Mitigation and Adaptation for Climate Change

Only 2 landlords questioned did not believe they could contribute to the mitigation and/or adaptation of climate change through their work as providers and maintainers of social housing either because it was not on their agenda or because the work they were involved in were so marginal in comparison to the zero carbon housing agenda.

> *"I don't think we're in a position to do anything of the sort, we may have good intentions and I think, the authority itself is responsible in the sense that it's got strategies for doing so and we may make differences around the margins, for example, we have had a substantial programme of putting insulation in and double glazing in, in our properties, that has made a difference but overall when you're actually talking about reducing, getting houses to carbon neutral which I think personally we should be doing anyway, we're really not going to make much impact on that, … actually really getting onto reducing carbon then we need a hugely different programme."*

On the whole landlords believed they could help reduce the impacts of climate change through their work, but their reasons for this were quite varied. Within this group a number of landlords believed they were in a position to make an impact on the reduction of climate change because they were responsible for large numbers of properties which were (collectively) responsible for 25% of $CO_2$, with the largest contributions from space and water heating. By improving their housing to the highest possible environmental standards one landlord believed they were providing a legacy of quality housing when it is naturally transferred to the private sector. One landlord made the point that more effort should be spent at the source of electricity, nuclear, wind or biomass rather than concentrating efforts on the retrofitting of micro technologies.

Within this group (who believed they could influence climate change) were those who recognised climate change as a global problem requiring global solutions and until large economies such as USA, China and India bought into the process they felt their influence would be limited, therefore without genuine, global political no significant changes could occur and (one interviewee believed) the situation may even worsen.

Funding was another reason why these landlords believed their impact on climate change may be limited; the lack of it, difficulties acquiring it and grants being unrepresentative of practical requirements, e.g. grants are available for biomass boilers but not the infrastructure which can be cost prohibitive.

> *"Yes I feel like that definitely but then there's a cost and I know there's some fairly small grants you can get for doing electric to gas changes but there's not really much in the way of grant money to help, so whatever we do it's got to come out of the budget that's really used for doing all these other things like environmental improvements and maintaining the housing stock."*

In order for these landlords to realise the impact they can make and therefore set realistic targets for improvements and set budgets accordingly they need reliable, practical and robust methodologies for measuring progress in terms of carbon footprint and quantifiable and demonstrable $CO_2$ savings.

> *"There is obviously a role that we can play, the extent of that and the impact that can have on the global picture is open to some debate. Really in terms of all these things like carbon footprint, we understand in principle but we wouldn't be able to calculate. … we are struggling with some inherent problems in our housing stock, to try an achieve carbon neutrality across the whole of our stock is going to be an impossibility. Having said that there's a role for us to play and we can pick at energy efficiency but also the supply chain management … I think the impact we can have in terms of concerns about global warming … I think it's what we build and how we maintain it that will have the biggest impact."*

And finally, to ensure the $CO_2$ emissions targets are realised, the UK Government needed to take a greater leading role. As previously mentioned, social housing landlords were measured against targets set by their regulators and as a result much effort and resource went into achieving those targets. Therefore the government must align those targets with the sustainability agenda if significant reductions in $CO_2$ emissions are to be realised.

> *"I think we can have an impact, I think everybody has to do their bit. Whether or not we are being effective at the moment is another matter, as ever with these things, I think it will be government led and when our government tells us we have to do this, it'll happen"*

## 6.5 The Future?

### 6.5.1 Building Performance

The questionnaire suggested that in order to improve the sustainability of the existing social housing stock a new multi-criteria approach to maintenance was required based on in-use building performance instead of the single criteria condition based approach currently favoured. With this in mind the interviews were used to gauge landlords' opinion regarding building performance.

The interviewees were asked if they believed this was the right direction to be taking. Table 6.15 (the figures provided in column 1 represent the number of respondents) provides examples of their responses which have been broken down into, 'Negative' (they did not believe measuring performance in-use was the correct approach), 'Neutral' and 'Positive' (although they may not know how to proceed in such a manner or could see barriers to its implementation).

Those who believed measuring performance was not the correct course of action did so because it was cost prohibitive; due to data collection and because occupancy behaviour was unscientific and fluid and thus difficult to measure, or because they believed performance was only pertinent to new build.

The neutral position has been given to those interviewees who thought this course of action MAY be the way forward but were not sure how it could be effectively and economically implemented.

The majority (12 out of 20) of interviewees asked this question believed in-use building performance as a means of determining maintenance need was the right course of action for the future, although they noted that there would be problems relating to cost effective monitoring and occupancy behaviour. On a positive however, it was recognised that a new method was needed in order to tackle issues regarding climate change via carbon emissions from buildings.

**Table 6.15 Attitudes Towards Measuring Building Performance to Improve Stock Sustainability**

| **Attitudes Towards Measuring Building Performance to Improve Sustainability of the Stock** | |
|---|---|
| Negative 3 | *"No, I wouldn't look to going to those kind of depths, I think the expense of it and the data coming back would not be economically viable"*<br>*" because people live in houses and their behaviour is unscientific and not static"*<br>*"That's very difficult for us to quantify because we tend to work on the existing stock. I think that comes under the realm of our development programme."* |
| Neutral 5 | *"I used to be in the merchant navy, … when I was at sea you'd have a generator and every 6 months or every 6000 hours you'd strip it all down and rebuild it again, move that on 10 years and they never stripped it down, it's all computer controlled, they watched the graphs on all the systems … and when they saw that, that was starting to fail then they actually did the work and it meant that you probably, you could almost double in some cases the cycle between maintenance. We would do exactly the same with housing or the built environment if you had a suitable way of measuring it …"*<br>*"Difficult to say because it depends on what you term as the performance of a building, because if your needs are not aligned to the needs of the user or the user doesn't perceive them as being in-line with the same needs as you, you're not going to get anywhere in the long term."* |
| Positive 12 | *"…In theory you could put monitoring equipment all over your house, so it would tell a picture throughout the day of what was happening to it but currently we are limited to what we can afford and that at the moment amounts to SAP and carbon emission survey."*<br>*"… you need to take into account how people live as well. Some of our residents smoke heavily, which has an effect on the surroundings they live in, some are hoarders, some attract mice which can be a problem with the neighbours environmentally, some have never opened a window or they turn the extract fans off which is detrimental to them and the property …"*<br>*"Yes, … as a landlord [you're] restricted on what you can do depending on the build type and the age and the construction and things like that… So I think you can only work within the parameters you start off by and everyone will be starting off at different levels .."*<br>*"It's got to. Some of it is already covered by things like decent homes but there are other issues like pollution and air quality and such like that we tend to ignore, unless it becomes a problem… I think as other issues about the environment become more acute, then people are going to demand more out of their existing stock and not accept that it can't perform, it's got to be made to perform, but it has greater cost implications because you are stuck with what you've got, you've got the fabric, you've got its size and any alteration or modernisation, improvement etc. brings about its own different challenges."* |

### 6.5.2 What Should Be Measured in Terms of Building Performance?

**Table 6.16 Measurements for Building Performance**

| **Measurements for Building Performance** | |
|---|---|
| In-Use Costs | *"So we can then turn round to residents and say we've done this work and as a result you should now be using less energy, so you'll see …(savings)."*<br>*"… it would have been nice to be able to measure what the effects have been of increasing the loft insulation in the properties that we did last year to find out how much that has actually reduced the bills of our customers. Because then I think you've got some form of having a dialogue with the customer, in terms of then pursuing further examples of sustainability."*<br>*"Heating, we're measuring the performance of a building as people go in but we're not taking any data about how people, its cost in-use."* |
| Communities | *"I think we need to get closer to the sustainability agenda and try and identify some of the key indicators of the estate to find out what the real need is. So I think a suite of indicators for neighbourhood sustainability"* |
| Building Elements | *"we don't ever look at deterioration due to orientation of a building, the impact the sun has … it does deteriorate the fabric of the building more quickly, for instance …"*<br>*"I'd certainly like to look at life-cycles of elemental building elements"* |
| Energy Efficiency / Rating | *" … energy rating properties. It's not been sparked off by HIP packs and things like that, it's purely a sensible way of looking at a property… It gives us an understanding of our energy rating and sorry for going on about energy rating and SAP, it's just one of the big issues at the moment, obviously with global warming…"*<br>*"… energy efficiency, we've got to reduce the carbon footprint haven't we."* |
| Components | *"… efficiency of the components we're using …"* |
| Tenant | *" …. it's actually measuring what people, what's now expected."* |
| Procurement | *"… if the government is really serious about this, then as we do with asbestos, like we do with all the SAP ratings, SC things that measure our performance, we should introduce it that all contracts should be subject to annual audit checks of contractors systems to how they train their employees, that the products that they buy and use and waste and it should be part and parcel of the evaluation of any new product. And I think maybe some sort of checklist or template guidance that should do."*<br>*"We are now looking more at performance specifications and moving into that area much more now. Full life time costings, that sort of thing that should also influence our procurement, because obviously when we procure materials and supplies or when we are writing the specifications … For instance, within DH we do a lot of kitchens, we are looking at the eco panels within kitchens, and the way that they are manufactured and what sort of life they give. We've got government guidelines on how old a kitchen should be etc. But if we can exceed that and not just by stringing it out but by performance and good quality, investment at the front end, obviously it aids us and as an asset manager that's where I'm going."* |
| Noise | *"Sound and noise"* |

The interviewees were asked what they would like to see being measured to help improve the way maintenance need is determined. Table 6.16 provides examples of their responses which were quite diverse and have been categorised as, 'in-use costs', communities, building elements, energy efficiency rating, components, tenant requirements, procurement and noise.

### 6.5.3 Problems with Measuring Performance

The reasons why performance of a building in-use wasn't used to determine maintenance requirement and what might prevent its use in the future was investigated during the interview process. The reasons provided were;

- The difficulty determining actual failure rates of building components because they were influenced by factors such as geographical, social circumstances and occupancy levels. This was a similar argument for not using life cycle data, because there was a lack of reliable in-use data.
- Defining and agreeing what building component / element performance was and what a reasonable target was,

  *"… we had to set up performance targets for lifts and we had a great debate about the performance targets for lifts, the number of breakdowns, right we'll go for the average number of breakdowns in our 300 lifts, that's going to come in at, we agreed 8 breakdowns a year on average would be ok. Except our current monitoring was showing us 8.5 and we hadn't invested anything in lifts for the last 5 years because DH didn't require, now we're putting £14 million into lifts we were going from 8.5 down to 8 so that's not a very good return for anyone to be proud about. So then we knocked it down to 6 and then you are into the debate about what is a breakdown? What if they turn up and its vandalism … So we've looked at it and one of the things we're moving towards is where we will put in remote monitoring, we'll put in some for the percentage of time that the lift is actually operating and we'll aim for something like 98% of the time operating because you couldn't tell from breakdown how long it was out of use… but this remote monitoring will actually trigger a percentage that it's no longer available and then we can target, so it's using that kind of technology to actually improve the service as an example."*
- Difficulty measuring the impact of occupancy behaviour and perceptions of the performance of a property. Occupancy behaviour, because in theory components and systems are installed which have a predetermined life expectancy to ensure the dwelling performs, however an aspect of performance is determined by the manner in which occupants use the dwelling, and their behaviour can lead to poor/under performance. Occupancy behaviour is complex and reasons behind actions which have a detrimental impact on the performance of a dwelling may stem from a variety of issues such as the vulnerability of the tenant, education issues or language barriers.

  *"… the problems we always face is with condensation, people complain about condensation in housing but the problem is they always block up very often even those little trickle vents, they will block them up."*
- Occupancy perceptions because little is known about what people actually want from their property, but also because occupants have certain perceptions of what a property should look

like and how it should operate, which may not be in line with modern methods of building or technology.

> *"… it's automatic that people think a gas central heating system should go in. We've got projects now that, we've got the U-values down to about 1.7 on the walls, you can literally warm the flat with the television, but unless there is a radiator on the wall people still think they're cold."*

Other barriers to using building performance for social housing maintenance planning were, cost, traditional (way of doing things), education (occupant), lack of data, difficulty monitoring different build types and their impact on performance and the way in which buildings were monitored, how to avoid 'big brother' type issues.

### 6.6 Tenant Issues

#### 6.6.1 Tenant Relations

Social landlords provide general needs, sheltered and specialist housing for a range of different groups and ages of people within different regions of the country. Some landlords provide a mix of housing requirements whilst others catered for specific groups, so the interaction between landlord and tenant may be quite unique; the North East housing association providing sheltered accommodation for older clients will operate under a different set of circumstance to the housing association providing general needs housing for ethnic minorities in London. Regardless of circumstance, there were certain phenomenon that appeared common to all; a paternalistic relationship between the landlord and tenant, lack of choice (in terms of accommodation) and managing rising tenant expectations and aspirations.

> *"… it's not just my view on it, it's really what they [resident] think about it and I put the case forward and say look these are the issues how are you going to make you're decision on it and try to stir them, if they make a decision and I think they're well off track then I'll maybe put some other facts down and say have you considered this, this and this? Until they make a decision that you think is acceptable. I don't want to sound like I'm influencing them but if you haven't got enough information you'll make a decision based on the information that you've got."*

Landlords may operate a choice based lettings system but in reality there was often no choice for social housing tenants about the accommodation and location they lived in. The Audit Commission report stated that to ensure a tenant's happiness requires (amongst other things) "… residents who make conscious choices about where they live and whose services they receive are

more likely to put down roots and give support to the future of their locality … Where residents can exercise choice over their provider, this will encourage providers to ensure tenant satisfaction" (Audit Commission, 2007c). As the choice of location and accommodation was generally limited the importance of having choice over whose services tenants received and the manner in which they received them may seem even more important in terms of their behaviour.

> *"Generally speaking round here tenants don't get a choice on housing if we get a house come up we've got a waiting list to fill it. We go through choice based lettings but in reality there is not a choice."*

Lack of choice as well as the significance of the DHS could explain why the Energy Performance of Buildings directive had not had the impact on driving down energy use in this sector as it had elsewhere. The publication of energy certificates when properties become available for rent (and purchase) was expected to provide an impetus for energy performance improvement works because of market forces, however in the UK social housing sector tenants had very little choice regarding accommodation and therefore the same market forces did not apply.

How do you overcome and accommodate changing tenants' perceptions and desires as these can have a major impact on the cost and type of maintenance undertaken. This was a problem that constantly fluctuates as the occupants of dwellings change. To a certain extent these costs can at least be calculated and included in the maintenance budget (even if funds are not available to accommodate them) Olubudon, 2001.

> *"We could have a perfectly designed house, in perfectly good condition but nobody wants to live there because it's somewhere where no-one wants to live… example … we have 6000 houses and flats and only in the new build properties do we install showers. And showers now are seen by people as a prerequisite and 20 years ago having central heating was seen as a real plus whereas now it's a minimum isn't it and probably again 20 years ago plumbing for a washing machine was a plus, whereas now a dishwasher is probably a minimum. So it's actually whether, the house is fit for modern day purpose. And of course someone who's 60 or 70 is happy with a property, but if they die or move on, it might be completely inappropriate or unpopular because of the layout or fixtures and fittings for a younger person."*

However how can landlords truly understand the desires of their tenants? At one end of the continuum is this midland based housing association that recognised that their tenants placed importance in different aspects to housing than they did, but which had a very basic relationship

with their tenants in terms of property management and found it very difficult to get their tenants involved.

> *"I think the big difficulty dealing with social housing and dealing with our tenants is that they tend to have a very different view of the world and of what they consider to be important to them … it's difficult to get them interested in anything about the management of our properties. You'll know when a tenant isn't happy, because they'll complain … As far as the tenants are concerned, we have an agreement with them, if you can pay your rent, we won't cause you any grief, if you don't cause us any nuisance, we shall not rattle your cage and if you want a transfer then we'll do our best to help you, if you need some adaptation, to be honest we'll do our best to help you with that. It's a very simple contract."*

And then there were those that recognised that it could be difficult to attain representative views and participation from their residents but understood the importance that information has in terms of maintenance and development resource allocation and therefore sought to overcome those problems.

> *"As far as I'm aware, in the past couple of years we've done various, we've polled tenants, we have tenant forums where we get them on board and we've trained a lot of tenants up on these kind of issues – we took a load of tenants up to the Centre for Alternative Technology. I went with them last year, so we try and get them on board, we try to get the tenants themselves to come up with ideas, so we have like stirring groups. We have a stirring group which looks into all of these things, along with things that will improve [the estate] as a whole. So the master plan for instance was developed with a stirring group of residents and tenants"*

The single largest obstacle social landlords' faced was how to manage tenant expectations and rising aspirations. Much of this resulted from the DHS either because tenants had received property improvements and expected property management to continue at this elevated level when the reality was DHS funding was expended and (smaller) future maintenance budgets would not accommodate that level of management.

> *"So the more we maintain it and improve it to a higher standard, the more they want to keep it there and so the kitchen draw that would jamb a few years ago they would have put up with, today they won't and we've got to go fix it. So when people say 'you put a new kitchen in your response contract is going to save money' the answer is no, because people's aspirations and expectations of that draw working or that worktop being or good order or that tap dripping, they expect it fixed because it's their lovely new kitchen and they want it keeping that way."*

Or because they didn't received property improvements but believed the DHS would provide every tenant with a new kitchen and bathroom. But it was also a natural progression as progress is made and as quality of life improves.

Different perspectives also need to be managed; the landlord has a professional maintenance perspective whilst the tenant has an end-user perspective. The landlord will ultimately be concerned with the fabric of the building whilst (from a landlord perspective) the tenant will be more focused on comfort and safety and quality and quantity of product rather than its sustainability. As a result Asset Management and tenant aspirations were out of sync, many landlords were of the opinion that if the tenant couldn't feel or see an issue it had no relevance to them, so energy efficiency was of no consequence unless they could see reductions in their fuel bills.

> *"Obviously there are things like roofing programmes which tenants, which is very low on their priority, if their roof isn't leaking it isn't a high priority but the fact is it's an extensive process to recover a roof and because of the way, you've got a flat budget and the same amount each year, you've got to profile in the roofing you can't suddenly have a bulge of expenditure when they all start to fail in 10 years' time so we say, 'look we've got to start re-roofing these properties now so they don't fail in 10 or 20 years' time and they don't understand that, so things like that don't tie up with tenants aspirations."*

Naturally not all tenants were perceived by their landlords to have the same attitude and in some cases tenants were driving the sustainability agenda by requesting more recycling opportunities and inquiring about landlord vehicle fuel source and consumption.

In many cases social tenants were considered to be amongst the most vulnerable which meant careful consideration must be given to the technology installed, as installation of complex controls for instance, may lead to user misuse and increased demand on maintenance.

Completing a community/estate assessment was considered critical in allocating resources as the culture could change over a relatively short period of time from sustainable to unsustainable regardless of how much money was ploughed into it. But not all tenants lived on estates, much RSL housing was pepper potted and those residents were more concerned about their house than the community.

> *"… we had our status survey last year and we generally have that every 3 to 5 years and out of that, their priorities were, 1) carrying out day-to-day repairs, then it was number 2 which was stock investment and then is was ASB and it went down from there… It's probably a typical profile for lots of organisations … also last year we embarked on a stock investment strategy and review … and I did a series of workshops and questionnaires and things like that, and again most people were coming back that they want their security, their homes, they want windows looked after, again, it's their shell and the communities actually figured quite low."*

Some landlords who had a high proportion of tenants accommodated within mixed tenure estates

understood the importance of involving all residents, regardless of tenure in discussions regarding estate improvements, whilst others saw it as a barrier to improvement works. Significant problems occurred where high numbers of lessees were involved; this could limit the scope of work carried out on properties due to the cost of leaseholder contribution, a situation which was acerbated where such properties were sold to other property organisations who were even more concerned regarding maintenance expenditure.

Statements were made by a number of interviewees regarding group of tenants who were more demanding and maintenance intensive than others. Unemployed single white men were identified as a particularly difficult group of tenant who were prone to vandalism and petty crime whilst older tenants were identified as being keen to maintain their properties more and made fewer requests for maintenance work. However, this line of query was not a central theme to this research and general conclusions cannot be made. To date only the opinions of the landlords have been canvassed, and whilst they have made assertions about the attitudes of their tenants it is not possible to truly determine these without direct contact with the tenants.

### 6.6.2 Tenant Participation

The manner in which tenants could participate were numerous and clearly established within the sector, examples included, formal complaints procedures, tenant satisfaction surveys, board/cabinet membership, tenant steering groups, tenant/community associations and tenant panels and some forms of participation were unique to particular landlords. Table 6.17 provides landlord examples of common issues relating to tenant participation. One overriding problem was getting a representative collection of tenants to participate. Participation can be a powerful tool, not only can it shape property management strategies it can have significant benefits on tenant satisfaction. The shape and form of tenant participation at the time of the interviews was set by the landlord but tenants were encouraged to speak freely on issues of their choosing.

A balance must be found with calls to participate, too many can be seen as a nuisance and too few can be interpreted as lack of interest on behalf of the landlord and a failure in their duties. Some forms of questioning can also cause offense and extreme care must be taken.

> *"… there's a lot of tenants to get to grips with … because some of the things I have to get them to do, I need to get them to do this impact assessment on our Commission for Racial Equality(CRE) agenda which is going to take some persuading, they're already creating ructions about having to answer questions on sexual orientation*

*and religion and all that sort of stuff but it's what people need from CRE and they're using my work as a route to collect that kind of information which isn't going down well."*

For some organisation's tenant participation was still relatively limited but the benefits of wider participation were understood and practices were being put in place to expand it.

*"Not as much as we would like, again this is very historical in as much as before transfer there was a thing called the tenants federation and the council, they saw the tenant federation as being the be all and end all of engagement with tenants, through the federation. So all the tenant groups around the district fed into the federation and the federation fed into us. And that really was a very short-sighted, bottleneck approach. So what we are doing at the moment is developing a menu of involvement opportunities so people can be a lone voice, on the one hand, and they are quite welcome to come and talk to us, they can be a small tenant group who come direct to us, or they can go through the federation, or they can go any other route and we're trying to widen this menu so that people can get engaged as much or as little as they want to.*

Feedback can be received informally (during survey visits and day-to-day maintenance works) and formally (questionnaire responses, tenant forums etc.) and can have many benefits for both the landlord and tenant if the data is captured, analysed and implemented. Improved tenant satisfaction as a result of their opinions being considered and implemented benefits both parties, as it can also lead to reduced day-to-day maintenance works and fewer calls.

*".. the reason we offer the extra £100 for the bathroom for the soap dishes and mirrors and stuff, because when we were doing a refurbishment, afterwards, tenants would try and drill in our new tiles and they would damage it and we got a lot of feedback from that and so we thought for £100 we might as well put it in, they'd feel good about it but also we wouldn't get someone saying 'the contractors broken it' or you know."*

Whilst it is good practice to have an idea of what the answer will be before asking the question, consultation can yield unexpected results.

*"We are looking to consult with residents and leaseholders etc. about this and again its quite pleasing to note that once you broach it and say product A you can have and product B but product B has benefits because, people are quite willing to increase the service charge or something to pay for it, I won't say they would be happy to pay more rent, but if they thought they were getting a better product with a longer life, more energy efficient etc., they will actually be prepared to pay some towards it and that's been borne out by some of the local consultation that we've done."*

Consultation can also provide information regarding the benefit maintenance works can have on the end user.

*"I think we need to do more of 'well we'll do this and how are we going to measure how that is impacting on tenants'"*

**Table 6.17 Tenant Participation**

| **Tenant Participation** | |
|---|---|
| Same Faces | *"I think from our point of view that's the hardest thing that we're trying to do, is get their views of what they'd like to see in the service, getting them to engage, … it's the same half a dozen people that do everything and I'm not knocking it because obviously that's great but, it's always their views you're getting and not, we've got 9000 residents and we're looking at 9, we're not really getting a true representation of perhaps what people think …"* |
| Power of Participation | *"… we do try to maintain a balanced programme in accordance with tenants wishes, so it's not just DH, we've got tenant consultation … we've got a good idea about what they want and I'd say generally stock repair and improvement which is not things that come under DH."*<br>*"…I go to once a year where we set the budget and I say here's the budget for the year, we do a tenant survey once a year, so [from the] tenant data, these are the priorities that the tenants have said they want, this is our SC data of how we think the properties should be managed to make sure they're sustainable because the tenants priorities won't necessarily gel with proper Asset Management and then you've got the views of tenants at the meeting. They will then, with me, [consider] what the tenants' priorities are with what is the proper Asset Management of the stock within the budget. And then … you're moving money around so that they get what they want and so that I can see that it hasn't affected the Asset Management programme that much …"*<br>*"… if we get a lot of complaints about, for example, boilers, then we collect that information and that's going to drive what we do and how we do it and all along the way we're looking at what is value, how do we add value?"*<br>*"…its working with the tenants to find something that suits properties, easy to use, because again that reduces call out on the responsive side of the business, if you get something that is very easy to use, that really fits in the way people live their lives, takes limited space and it's a good quality product … we look at that whole package before we decide what we are putting into properties."* |
| Guidance | *"…they have a huge input into what we do, it's important, but you've also got to be mindful that you've got to guide them [to] where you see things, we're deemed to be professionals so we should be leading people down the right avenues but they still have a large say in what we do and what we invest in."* |

### 6.6.3 No Constraints

Interviewees were asked what maintenance works they would ideally like to undertake to improve the sustainable performance of their existing housing stock, if financing was not an issue. Table 6.18 provides a breakdown of the answers given, a wish list of sorts.

In the main, landlords would like to see current programmes enhanced, by speeding up existing ones, taking a property based approach to maintenance planning (rather than element), putting a

greater emphasis on planned rather than reactive maintenance, insulating beyond current requirements, replacing fencing and more use of long term strategic planning.

Beyond the customary maintenance agenda, landlords expressed the desire to demolish and rebuild, this would overcome the difficulties of improving the energy performance of existing properties, provide opportunities to tackle anti-social behaviour, and incorporate estate improvements which could extend and improve shopping and healthcare amenities as well as improved public transport. Whilst demolition works were a popular response, desirable rebuilding would in many cases replicate that which was demolished but with a modern twist, more suitable foundations, greater energy performance and more modern facilities.

Eliminating financial constraints would give landlords an opportunity to base decisions on quality rather than cost and to encompass the principles of 'life time homes' which impacts not only on the dwelling's performance but also facilitates a more sustainable community. There was recognition that a more community based focus was needed to maintenance because the dwelling and its environment were inextricably linked, and limiting resources to only one element would not lead to improved economic, environmental and social sustainability. It was this fragmented approach which had resulted in some labelling the DHS a failure. Installation of technology would also become more attractive as a result, mainly those which provide alternative energy sources, but to a lesser extent SMART / Intelligent technology.

Less frequent responses called for improvements to the asset management process with thorough evaluation and monitoring and annual MOT type property surveys.

Some landlords would focus on the social issues facing their tenants from quite broad aspirations to improve quality of life to quite specific agendas such as unemployment and improving tenants' perception of their social standing within the community.

By taking away financial constraints a greater focus could be placed on the social and environmental aspects of sustainability, more of what was already underway could be done to contribute to the wider sustainability of the existing social housing (i.e. no great change in approach needed to improve the sustainability of stock).

**Table 6.18 Desired Works to Improve Sustainable Performance of Existing Housing Stock**

| **Desired Improvements to Existing Housing to Improve Sustainable Performance (as stated by Landlords during the interview process)** |
|---|
| Products purchased for quality not price, Install more AC (for summer cooling) and better fitting products e.g. doors<br>*(summer overheating was identified as a risk to the built environment in DEFRA's inaugural CCRA (section 2.2.1.1) and thus of great importance to social landlords (section 2.2.1.2)* |
| Improved estate access (selective demolition) |
| Regeneration (large scale demolish and rebuild with emphasis on mixed tenure)<br>Compulsory purchase of poor performing RSLs<br>Improve public transport<br>Pay residents to maintain the areas where they live |
| Build Intelligent buildings and rebuild as existing |
| Estate feasibility and health check, probably resulting in selective demolition and rebuild to ensure estate wide environmental improvements including improved local shopping amenities, public transport, health centres and community policing |
| Use more sustainable materials and finishes, install more water conservation measures and LZC technology where practicable |
| Redevelop with more modern buildings (but as a LA so not practicable)<br>Spend money on maintenance and demolish and rebuild of hard to treat system built stock Have LA act in a more business-like manner and use tenancy agreements in the way HAs do but whilst maintaining high quality and diverse customer service<br>Create utopia |
| Demolish and rebuild parts of the city to meet tenant expectations and provide employment opportunities to alleviate the problems associated with 3rd generation unemployment |
| Environmental improvements<br>Convert all electric to gas with the most sophisticated controls and appliances with renewable energy sources. BMS for sheltered housing schemes |
| Provide more internal housing space (at least 1 bedroom and 2 receptions)<br>Improved economic incentives for installation of LZC technologies |
| Install LZC technologies |
| Long term strategic planning, effective asset management system with thorough evaluation and monitoring and more value engineering<br>Improved quality of products for improved environmental impact<br>Improve quality of life of tenants through coordinated improvement works |
| Insulate to good level and invest in renewable energy sources |
| Redesign schemes based on reduction of ASB with future demands in mind rather than cost<br>Improve the quality of life of tenants who perceive themselves as 2nd class citizens<br>Refurbish all properties and install modern facilities |
| Improved estate environments (safety and security and general environment) which may include some demolition and rebuild. Life time homes |
| Demolish and rebuild all prefabs, invest in SMART houses and sell off old stock and buy in 'posher' places with a more stringent tenant selection processes.<br>Develop prefab and concrete housing for high volume developments with lots of technology and plenty of nurturing and training for customers on how to efficiently operate that house. |
| Greater long-term planned maintenance looking at the whole property not just elements / systems |
| Much greater emphasis on community sustainability (via development of sustainability index) |
| Ensure insulation is in excess of current requirements, replace all fencing<br>Speed up current 5 year maintenance programme and increase level of PPM<br>Conduct annual MOT for housing and improved quality of life of tenants |

## 6.7 Summary

This chapter has provided a review of the interview results which sought to address two key research questions;

1. What is the range of criteria that social housing maintenance managers need to address when assessing the sustainability of their existing social housing?

From the interviews it was clear that, social housing landlords wished to consider a wider range of criteria than was being used to plan maintenance works via the DHS. The extended criteria still reflected regulatory requirements but surpassed that of DHS.

Landlords considered the maintenance process and maintenance to the property concurrently and appeared to have a greater understanding of economics and environmental criterion than social. The combined list is extensive, not all criterion would translate into meaningful KPIs and nor would landlords choose to measure their housing stock or maintenance processes against them all, instead choosing the criterion which best reflected the national and local requirements.

Figures 6.1 and 6.2 provide an illustration of the criterion proposed by all landlords interviewed with the top two tiers of the 'House Going Forward' hierarchy reproduced below in Figure 6.3.

2. How can this criteria be integrated into a decision making model that is robust and defendable?

Those organisations who were integrating the broader sustainability agenda into their maintenance strategies appeared to be those taking a holistic, long- term approach to maintenance. They had moved on from the traditional 'silo' approach to working to a more open, cross-departmental approach. Success could also be attributable to the assimilation of tangible and non-tangible benefits, recognition of long term benefits over short term and acknowledged the contribution of tenants.

It would appear that this group of landlords, in particular, would benefit from the approach to maintenance planning described in chapter 3 which presented the performance based social housing maintenance model and the AHP approach to prioritisation of maintenance need.

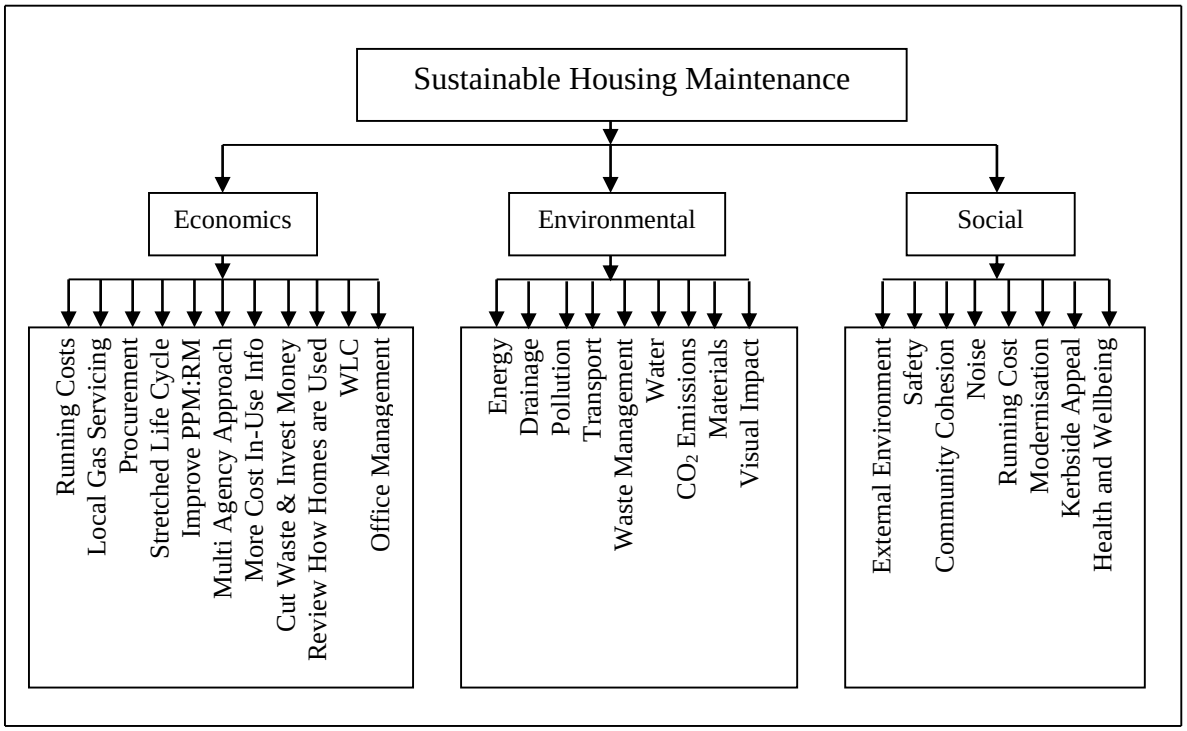


**Figure 6.3 Abridged Sustainable Maintenance Hierarchy – House Going Forward**

# Chapter 7

# Reflection and Discussion – Part 1

## 7.1 Introduction to Part 1 of the Reflection and Discussion Chapters

This chapter presents a discussion of the results presented in chapters 5 and 6 in relation to the literature review presented in chapter 2 and specifically to the aims and objectives of the research proposal discussed in chapter 1. The research questions identified in chapter 3 are addressed in Sections 7.2 and 7.3. The Performance Based Sustainable Social Housing Maintenance Model is discussed in section 7.4 and the chapter is summarised in section 7.5.

## 7.2 Discussion from the Questionnaire Survey Results

This study sought to answer the question, 'How can current social housing maintenance decision making processes be adapted to address the triple bottom line of sustainable development to improve the sustainability of existing social housing', by addressing via a large scale questionnaire survey;

1. Has the sustainability agenda influenced the way that social housing maintenance is perceived, planned and implemented in England?
2. Are the current practices/toolkits used by maintenance managers conducive to improving the sustainability of the existing social housing stock?

And via in-depth interviews;

1. What is the range of criteria that social housing maintenance managers need to address when assessing the sustainability of their existing social housing?
2. How can these criteria be integrated into a decision making model that is robust and defendable?

### 7.2.1 The Sample

The questionnaire survey sought to ascertain whether the sustainability agenda had influenced the way social housing maintenance was perceived, planned and implemented; and whether the current approaches/tools were conducive to improving the sustainability of the existing UK social housing stock. In addressing these issues the questionnaire survey sought to gain as wide a range of views from those directly responsible for social housing maintenance decision making as possible. Details of the questionnaire survey can be found in Chapter 4 and the results in Chapter 5. Given the number and type of organisations responding to the survey, the number and type of social dwellings managed by these organisations and their maintenance expenditure profiles, the author believes that the questionnaire survey results were representative of English social landlords.

### 7.2.2 Impact of Sustainability on the Built Asset Maintenance Model

The general theory of built asset maintenance (Figure 2.17) suggests that organisational policy is translated into specific information that is collected to inform stock models that aid planning and lead to action and feedback. In principle this model was followed by all those who responded to the questionnaire survey. The stock condition survey was used by all respondents to identify maintenance need which was combined with available budgets to produce life cycle models of need going forward. Annual maintenance need was then prioritised using local considerations and maintenance strategies developed that reflected local priorities (PPM v RM). Once maintenance actions were completed, feedback in the form of tenant reports or re-survey was used to inform policy and provide input into future models.

What was not so clear was the extent, if any, that the sustainability agenda had had on this process.

### 7.2.3 Policy

Sustainability as a concept was generally understood by those who answered the questionnaire and considered to be relevant to their work in maintenance management. Approximately 50% of respondent organisations had some form of sustainability strategy in place. Where strategies existed they tended to cover specific aspects of environmental performance, and to a lesser

extent social and economic issues. In only a small number of cases was an integrated approach to sustainability present. This lack of integration and/or penetration was further highlighted by respondents themselves who indicated that sustainability had only had a slight to moderate effect on their maintenance practice and that there was still significant room for improvement in the way organisations developed their maintenance strategies.

The DHS was the primary policy consideration driving maintenance (and refurbishment) decision making. Whilst the DHS was perceived to have raised the quality of social housing, it was not universally accepted that it had done so in a sustainable way. In particular there were concerns that the DHS policy was minimalist in its approach and not linked to the wider sustainability agenda, focusing too much on the condition of individual dwellings rather than on the performance of the dwelling as a home.

Thus, whilst sustainability as an issue was acknowledged to be important to the work of social landlords, it has yet to become widely adopted as a major policy driver to inform maintenance decision making.

### 7.2.4 Information

Whilst the vast majority of respondents believed that their maintenance practices could be improved in terms of sustainability, and 50% of organisations had some form of sustainability policy in place, only about a third of respondents actually measured the sustainability of their stock. Of those who did measure sustainability, most had developed their own metrics and toolkits to reflect their specific interpretation of the sustainability agenda rather than using the standard toolkits being promoted by third parties (e.g. EcoHomeXB). The main reason for this appears to be a perceived lack of fit between the standard toolkits and the specific interpretation of the sustainability agenda by individual organisations. Where sustainability was measured it tended to be as a consequence of legislation (e.g. requirement for SAP ratings) rather than as a consequence of a pro-active decision to translate the sustainability agenda into maintenance action plans.

Whilst the DHS was not necessarily considered to be a ‘sustainability standard’, the one area where it was perceived to have had a positive impact on the sustainability agenda was in the area of maintenance budgets. Whilst inspections combined with previous years spend was the most

commonly used budget setting criteria there was some evidence that this prescriptive approach was changing. It was generally agreed that the DHS had raised the profile of maintenance within social housing organisations, resulting in increased investment and the acceptance of a more long term approach to maintenance planning, including the use of maintenance partnering agreements.

There was some evidence to suggest that the sustainability agenda and DHS were beginning to have an impact on the specification of maintenance activities. The majority of organisations stated that they were taking the opportunity to enhance the quality of the repairs/replacements that they carried out above that which they would have previously done and that these enhancements were focused at the broader sustainability agenda (e.g. social improvements). This assertion was also supported by considering the number of organisations that had incorporated sustainable technologies into refurbishment programmes and the increased finance that organisation were prepared to commit (typically between 3-5% extra) for more sustainable solutions.

Thus, whilst sustainability information was not yet widely collected to inform maintenance decision making, where it was collected there was evidence that it informed the decision making process.

### 7.2.5 Modelling

Evaluating the impact of the sustainability agenda to social housing maintenance and refurbishment in a holistic manner was perceived to be the most underdeveloped aspect of the built asset maintenance process. Whilst life cycle costing and management information systems were being used to inform maintenance planning, the models used to evaluate options and assess risks tended to be component condition based. Whilst this had an impact on the economic aspects of the sustainability agenda it didn't allow the broader issues associated with environmental and social performance to be effectively integrated into the decision making process. As such environmental and social interventions tended to be ad-hoc in nature. This lack of integration was further seen in the suggestions made for improving the sustainability of the maintenance process where a more comprehensive approach to the sustainability agenda combined with a diverse range of sustainability criteria were identified as areas for improvement. In order to incorporate this wider range of criteria a new approach to modelling will need to be

developed that can balance the importance of the different criteria to individual organisations. Such a model needs to adopt a multi-criteria approach in which both quantitative and qualitative data can be used to inform the decision making process.

### 7.2.6 Planning

Prioritising maintenance actions had been affected most by the DHS, either by focusing attention onto quality issues or by supporting a move to a more planned maintenance programme in which incremental upgrades were included above and beyond those identified through a basic 'needs' model. Whilst the influence of the DHS was seen as positive in this context, there were concerns that it could have a negative impact on the long-term sustainability of the housing stock. In particular there were concerns that the DHS was distorting priorities away from the tenants' agenda to a central (Government) agenda which didn't always coincide with tenants' needs or desires. Also, the limited nature of the DHS, both in terms of its remit and timescale, was considered by some respondents to be storing up problems for the future and forcing organisations to address current maintenance issues in a non-sustainable way. Thus, whilst the DHS had affected priority setting, the lack of linkage between the DHS and sustainability agenda meant that many maintenance actions did not reflect the sustainability agenda.

The DHS was perceived to have had a generally positive impact on maintenance strategies. The ability to programme works in a planned manner and the increased use of partnering agreements had reduced costs and improved contractor efficiency which had resulted in more actions being undertaken for the available resource. Further, in a few cases an integrated approach was adopted to management of the supply chain which allowed the sustainability of contractors' polices to be evaluated and used as part of a SMART procurement process (e.g. typically considered as a component of the quality assessment under a balanced scorecard approach).

### 7.2.7 Action/Completion

There was little evidence to suggest that the sustainability agenda had an impact on the process by which maintenance actions were carried out except that the use of local labour was perceived to be a desirable attribute of a sustainable maintenance strategy and that tenant feedback was beginning to inform sustainable maintenance decision making.

### 7.2.8 Summary

Research Question 1. Has the sustainability agenda influenced the way that social housing maintenance is perceived, planned and implemented in England?

From the questionnaire survey it is clear that, whilst sustainability was considered by the vast majority of respondents to be an important issue for maintenance departments, it hadn't yet had a major impact on the social housing maintenance process. In the small number of organisations that had adopted a "sustainable maintenance policy" there was:

- A clear link between the interpretation of the organisation's strategic sustainability agenda and the information collected for maintenance decision making – one size doesn't fit all;
- An acceptance that a wider range of information needs to be collected than that normally associated with the stock condition survey;
- Evidence that the information collected was analysed in a way that supported a multi-criteria decision making process in which the relative importance of the different factors (e.g. economic, environmental, social) could be balanced;
- An acceptance that sustainability required a much wider range of analytical approaches, including the use of whole life performance models, to plan interventions over a long-term and to measure the impacts and pay-back.;
- An acceptance that tenants feedback was critical to setting sustainability targets and agendas.

Research Question 2. Are the current practices/toolkits used by maintenance managers conducive to improving the sustainability of the existing social housing stock?

Toolkits used to inform the maintenance decision making of the majority of landlords were SCS, HHSRS, and SAP, This was unsurprising as such toolkits were central to the traditional social housing maintenance process and the maintenance process at the time was dominated by the DHS and the Government's target that all social properties achieve decency by 2010. Can such tools improve the sustainability of the existing social housing stock? The HHSRS and SAP could be used to inform very narrow aspects of the sustainability agenda, for instance SAP could inform energy use (economic), thermal comfort (social) and GHG emissions (environmental) but

care must be taken when applying this toolkit as it is compliance rather than a performance in-use tool and as such does not adequately account for occupant behaviour, the results of which can be misleading.

However, the use of traditional toolkits did not preclude landlords from applying the principles of EcoHome when developing their maintenance schemes. The SCS survey would identify which building elements and components needed replacing, the EcoHome principles (for approximately one-third of the respondents) then helped determine which materials, heating systems and controls etc. should be installed. Once again the application of the EcoHome principles appeared limited to improvement to the thermal comfort of the dwelling, which in itself is unsurprising as landlords were under government (and tenant) pressure to eradicate fuel poverty.

In five instances, traditional toolkits were also used in association with targets informed by the EcoHome principles; examples provided included targets for waste management, water and energy consumption.

## 7.3 Discussion from the Interview

### 7.3.1 Organisations

The three different types of landlord were represented in the interviews and whilst they all had the same remit, operated in fundamentally different ways. This, to a certain extent can be attributed to the personal convictions of those with authority within the landlord organisation, be it the chief executive, the maintenance manager or other with influence. This will be demonstrated in a number of ways in the following sections.

All social landlords were subject to regulatory controls and government agenda but dependent upon the attitudes of those with influence, organisations either allowed government agenda to skew decision making against the sustainability agenda or actively promote it despite government.

Regardless of the size of the organisation they ultimately had the same problems and worked within the same constraints so why did their approach differ so greatly; why can one organisation

recognise non-financial benefits within its accounting mechanism and not another; why did one think more sustainable practices would save money and another think it was a cost burden? It's dependent upon the ethics of those involved and not on their level of maintenance allowance. The difficulty in attaining knowledge; understanding government text, being able to sift through the mountainous volumes of text to find out what was important and what was not, economic collection and analysis of property data had come through as barriers to more sustainable practices but it was knowledge that was at the heart of the proposed performance based maintenance model and a different approach to its collection is required.

### 7.3.2 Housing Maintenance

Traditional maintenance practices encouraged fragmented, silo working coupled with limited maintenance allowances meant that careful allocation of resources was paramount. Traditionally, attitudes towards resource allocation meant that firstly government and regulatory targets must be achieved and if there was anything left over (which there invariably wasn't) then 'other' work could be carried out. Within this model sustainable development type issues may appear impossible to implement as changes which make environmental and social sense did not make economic sense. Improving the sustainable performance of housing stock was seen by most as a separate entity to their work maintaining social housing which was why 'sustainability work' wasn't a priority and works with such a label didn't ever rise high enough up the priority rating to be undertaken because government didn't provide money to cover these additional costs. Those organisations who were driven by the sustainability agenda were changing their working methods and permitting a more holistic systems approach to maintenance to take place. In this case the sustainability agenda was not seen as a separate entity to maintenance work but a central theme.

Whilst the DHS had provided a mechanism for social landlords to produce long term maintenance programming and to set budgets over that period (over 25 years), work was still essentially carried out on a short term basis (12 months). This position, in terms of incorporating the sustainability debate was exacerbated because of the government's efficiency gains policy and the way in which landlords were funded which both encouraged short term practices. Sustainable maintenance requires long term planning, commitment and investment to gain the environmental, social and economic benefits which often occur at some point in the future

therefore policy was required which acknowledges long term benefits as well as recognising financial as well as non-financial benefits.

### 7.3.3 Housing Quality

The DHS had succeeded in raising the status of maintenance at board level and had gone some way to improving the quality of existing social housing but it was never intended to be a sustainability standard and as such appeared to be have little impact on this aspect of UK social housing stock. Social housing landlords had mixed views on the DHS but one aspect appeared to unite them all and that was that the introduction of the DHS has led to rising tenant expectations and it was the management of those expectations which they were finding increasingly difficult to manage. Future asset management strategies need to be aligned against tenant expectations so that there are clear links between expectations and maintenance decision making as it will not be possible to deliver against all expectations.

### 7.3.4 Sustainability Agenda

To ensure systematic incorporation of the sustainability agenda within the built asset management strategy, an agreement within the landlord's organisation, at least, of what that means is essential. All too often there was lack of understanding and a lack of definition as to what sustainability meant to their housing and their residents which needs addressing and which needs to combine the three aspects of sustainability holistically and not as separate agendas.

The results of the interviews show that in general, a wider range of criteria should be incorporated into the maintenance decision making process to accommodate sustainability than is currently included. The lack of uptake was suppressed by the UK Governments agenda, the DHS being the primary focus for maintenance planning. The criteria selected to date reaches far beyond that of the Decent Homes Standard signifying its irrelevance in terms of sustainability of the existing housing stock and maintenance. The emphasis on the DHS and (in the main) limited resources meant economic sustainability was still the principal factor. Given the opportunity to carry out maintenance work with current constraints removed landlords would concentrate their efforts more on works which would improve the social aspect of sustainability, essentially providing places where people were willing and happy to live, the positive impacts of which overlap all three aspects of sustainability.

Those involved with maintaining Local Authority owned and managed housing appeared to have a more mature understanding of the issues surrounding sustainability. Their attention was focused on the benefits of wider participation, going beyond that of a provider of social housing, encompassing other agencies such as the NHS and the police. This group appeared to take a community perspective than the RSL group, which took a more pragmatic, business-like approach.

Current government policy is driven by reducing greenhouse gas emissions which had concentrated upon new build. However with the Climate Change Bill and the Energy Bill gaining royal assent the need to address the carbon footprint of existing housing at last appears to be gaining in importance. The Climate Change Bill requires deep cuts in $CO_2$ emissions of 80% compared to 1990 levels but research carried out by Shipworth (2008) estimated that only around a 5% reduction in $CO_2$ emissions would be achieved by 2050 based on an analysis of demolition rates and assuming all new housing in the UK is carbon neutral. Therefore if these targets are to be met the carbon footprint of existing housing must be addressed. But retrofitting energy efficiency and LZC technologies is hindered by high upfront costs despite significant improvements to life cycle savings (fuel bills) for occupiers (DCLG, 2006c). This is no more evident than within the social housing arena where limited resource allowance, government fiscal policies and the necessity to protect the most vulnerable members of society leads to risk aversion in terms of the technology employed within their housing stock. Landlords are forced down the route of implementing tried and tested technology rather than being free to be innovative and to develop schemes which may be more suited to their specific requirements.

The technological fix is only part of the solution to achieving the 2050 target, people's lifestyle and behaviour must also be addressed. To this end: greater community engagement; deliberative forums to help people live more sustainable lifestyles; investigating ways in which stakeholders can influence decision making; new commitments to support education and training in sustainable development; and response to key environmental taxes are all challenges that those seeking to create future sustainable communities need to address (Defra, 2005). Currently none of these issues regularly inform built asset management strategies.

### 7.3.5 Driving the Debate Forward

Incorporating sustainability as a central issue to social housing maintenance does not stop with a new model and set of toolkits for measuring the performance of a building in use, it requires complete buy-in from the organisation and a new way of working. Sustainability issues are cross-departmental issues and require a holistic approach to management, much different to the traditional management structure which encouraged silo working.

Ideally improved sustainable performance should be derived via technological solutions and occupant behaviour. Social landlords' efforts were focused on technological solutions which were impeded due to high installation costs and long payback periods. Improved fiscal incentives via a more effective grant system or tax rebate system with a legislative requirement for installation would not only reduce initial costs but would provide greater certainty for manufacturers of LZC technology which would help drive costs down further over time. Reduced installation costs would help reduce risk to the landlord and tenant regarding energy supply of LZC technology as more pilot programmes would be possible. Greater promotion is also required regarding the benefits landlord culture and occupant behaviour can have. Changes in behaviour and office culture can have a zero initial cost but significant financial and non-financial benefits.

Maintenance works and allocations need greater certainty and long term planning. Allocations in particular need to consider legislative changes and other external variables, whilst long term planning will encourage partnering with its associated efficiencies which have been known to have benefits for the wider community. Tenant profiling and understanding of their impact on properties will lead to more efficient use of resources

Procurement is an effective means of ensuring the supply chain has bought into the sustainability agenda by agreeing levels of responsible sourcing of materials, waste management etc and if such items were included as part of landlords regulatory reporting mechanism it would ensure that the sustainability agenda was given a higher priority.

### 7.3.6 Summary

Research Question 1: What is the range of criteria that social housing maintenance managers need to address when assessing the sustainability of their existing social housing?

The range of criteria identified by social housing landlords for addressing the sustainability of their existing housing stock was far wider than considered by maintenance managers and the DHS. Upon answering this question landlords concurrently answered in terms of 'maintenance practice' (the maintenance process) Figure 6.1 and the 'house going forward' (maintenance work carried out on the property) Figure 6.2. Of course not all landlords would utilise all criteria presented in these figures as they represent the totality of responses provided. In fact it supports the idea that landlords would create a list of criteria unique to their organisation rather than a need to create a generic 'fits all' list.

**Table 7.1 Common Responses by All Landlord Types to Sustainable Criteria**

| **Common Responses by all Landlord Type** | | |
|---|---|---|
| **Economic** | **Environmental** | **Social** |
| WLC | Waste<br>Energy<br>Materials<br>Water<br>Pollution | Safety |

The common responses presented in Table 7.1 are reflective of government legislation and best practice and therefore this commonality would be expected. The outlying criteria may represent the individual and local requirements of landlords, their tenants and their housing stock.

## 7.4 The Performance Based Sustainable Social Housing Maintenance Model

In order to answer Research Question 2; How can these criteria be integrated into a decision making model that is robust and defendable?

Chapter 6 concluded that those organisations who were integrating the broader sustainability agenda into their maintenance strategies appeared to be taking a holistic, long-term approach to maintenance. They had moved on from the traditional 'silo' approach to working to a more open,

cross-departmental approach with success attributable to the assimilation of tangible and non-tangible benefits, recognition of long term benefits over short term and acknowledged the contribution of tenants.

This group of landlords, in particular, could benefit from the approach to maintenance planning described in chapter 3 which presented the performance based social housing maintenance model and the AHP approach to prioritisation of maintenance need. The application of boxes 1, 2, 3 and 6 of the 'Performance Based Sustainable Social Housing Maintenance Model' were further investigated.

The interviews support the author's portrait of the traditional social housing maintenance model as one which should be driven by organisational policy, but all too often the policy objectives are not clear and no direct links exist between the organisation's strategic objectives and their maintenance plans. Therefore it is recommended that social housing landlords assemble maintenance strategies with organisational key strategic drivers to ensure efficient use of resources so that operations portray strategic aspirations. In order to do this the landlord will need to define what sustainability and sustainable development means to their organisation and determine their Key Strategic Drivers incorporating the sustainability agenda of the 'Performance Based Sustainable Social Housing Maintenance Model (Box 1 in Figure 3.2). This will improve efficient use of resources and provide clarity for the different stakeholders in terms of what sustainability means to social housing and will ensure that the term is given suitable importance.

Box 2 in Figure 3.2 (as discussed in section 3.4.1.2) calls for the need for a maintenance action to be identified through a series of performance toolkits that asses how well a house / component is performing against the landlord organisation's sustainability agenda (examples of such toolkits are provided in Table 7.2). This is supported by those interviewed who were asked what they would like to measure given the opportunity (Figures 6.1 and 6.2). Whilst the answers were diverse they were all based on the performance of the building or maintenance process, incorporating social, environmental and economic issues. The toolkits used echoed the data requirements placed upon them by their regulators, this too is unsurprising considering the economic constraints landlords operate within. This was demonstrated as the only landlord to apply Ecohome XB did so as they believed it would soon be a regulatory requirement and early utilisation would place them ahead of regulation.

To overcome the perceived problems associated with measuring performance the toolkits established must be quick and easy to use and cost effective. More importantly perhaps they must be able to effectively identify and measure social impacts. This research suggests that there is better understanding of economic and environmental issues than the role social housing maintenance can play in the social arena. Of significant importance within this is the need to establish a robust and unobtrusive method of identifying the impact occupancy behaviour can have on housing performance. By incorporating tenant attributes maintenance budgets will be more efficiently allocated (by as much as 25% according to Olubodun, 2001)

Any single or combination of criteria then identifies those houses / components that require further investigation.

**Table 7.2 Performance Toolkits (Box 2)**

| **Physical Performance** | **Social Performance** | **Environmental Performance** | **Economic Performance** |
|---|---|---|---|
| Health & Safety<br>Statutory Requirements | Tenant Wellbeing<br>Community Engagement<br>Community Security<br>Household Running Costs | Water Consumption<br>$CO_2$ Emissions<br>Material Use & Sourcing<br>Pollution<br>Waste<br>Energy | Asset Value<br>Future Exposure & Risk<br>Climate Change<br>Whole Life Costing |

Box 3 (of figure 3.2). As discussed in section 3.4.1.3, simply knowing that a house / component is under-performing is not enough to justify maintenance intervention. In many cases under-performance may be a symptom and not the cause.

Section 3.4.1.3 also discussed the analysis toolkits which could be incorporated which are re-presented in Table 7.3. What the interviews determined was that many landlords were already using these kinds of toolkits (for a variety of reasons – to satisfy organisational and regulatory requirements) but because they didn't have clear well defined maintenance goals they were used in a fragmented way.

**Table 7.3. Analysis Toolkits (Box 3)**

| Inquiry (Unique or Systemic Issues) | Design | Statistics | Experimental |
|---|---|---|---|
| Interviews<br>Surveys<br>Case Study Reports | Root Cause Analysis<br>Failure Mode Effects Analysis | Repairs Analysis<br>Whole Life Costing<br>Portfolio Analysis | |

Design Toolkits are similar to those identified in Integrated Logistics Support Toolkits suggested by El-Haram & Horner (2003)

Box 6. As discussed in section 3.4.1.6, the traditional social housing maintenance model implies a feedback loop exists, but in reality this is rarely the case which means the same mistakes keep reappearing and no learning takes place within the design process (Arditi & Nawakorawit, 1999)

Section 3.4.1.6 recommended that a set of toolkits be established (e.g. performance indicators, tenant feedback etc) to compare actual improvements in performance (that result from the maintenance intervention) against the improvement requirements contained in the action statement. It recognised KPIs and tenant feedback were the primary functions undertaken by Social landlords and as such a radical departure from current practices would not be required. However the results of the interviews suggest that existing KPIs will need to be revised as a far wider set of criteria has been identified for the inclusion of the sustainability agenda.

The difficulty of assimilating a range of performance data into a transparent, holistic, defendable measure of asset performance is well recognised. The scope of this research therefore is to present the 'sustainable performance based maintenance' model to a social housing landlord to populate it against their current building asset management strategy, develop a new set of KPIs and crucially, develop an AHP model based upon a hierarchy of the performance sustainable maintenance criteria similar to those presented in Figures 6.1 and 6.2. It is not the intention of this research to develop new toolkits for boxes 2, 3 and 5 of Figure 3.2.

## 7.5 Summary

This chapter has provided a review of the results from the large scale questionnaire survey and follow up in-depth interviews.

The performance based sustainable social housing maintenance model was presented as a precursor to the action research chapter, the development of the model and its implications will be discussed in detail in the Discussion Chapter – Part 2, chapter 9.

# Chapter 8

# Participatory Study and Results

## 8.1 Introduction to the Participator Study and Results Chapter

This chapter is made up of two parts. A case study of Octavia Housing (the participatory research partner) is presented in section 8.2 and the results of the participatory study are presented in section 8.3.

Section 8.2.1 provides a brief introduction to Octavia Housing's Victorian founder who was a trail blazer for social housing and provides the modern day social landlord with a guiding philosophy for housing and tenant management. Section 8.2.2 provides an overview of the property portfolio and how representative it was of the sector. Section 8.2.3 briefly describes Octavia Housing's current approach to BAMS and how recent innovative research projects have informed this going forward. Section 8.2.4 takes a critical look at the implications of Octavia Housing's current and proposed approach to BAM to this research.

The aim of the participatory research was to populate the 'Sustainable performance based social housing maintenance model', determine the sustainable maintenance Analytical Hierarchy Process (AHP) criteria (objectives) and undertake the pair-wise decisions to aid maintenance prioritisation.

In 2008, two workshops were run with Octavia Housing, one with staff and one with staff and tenants, the purpose of which was to populate boxes 1, 2, 5 and 6 (Figure 8.5) of the Performance Based Sustainable Social Housing Maintenance Model and to establish the criteria they would like to measure in order to improve the sustainability of their existing housing stock for use in the AHP model. The aims, objectives and methods used have been presented in sections 4.5.2.1 and 4.6.2.2 and will not be repeated in this chapter, results of the two workshops are presented in sections 8.3.1 and 8.3.2 respectively. Thus far the research has concentrated on the views and opinions of landlords, in order to balance this with those of the tenant; a tenant

telephone survey was conducted by Octavia Housing in order to gain a better understanding of the social criteria within the sustainable maintenance hierarchy. The results of this questionnaire are presented in section 8.3.3 together with the 'Octavia Housing Performance Based Sustainable Social Housing Model'. In 2013 a further workshop was run with Octavia Housing staff to reconceptualise their built asset management strategy which was used to check the reliability and validity of the data collected in 2008, the results of which are presented in section 8.3.4. Based on the results of the workshops and questionnaire, section 8.3.5 presents a new set of KPIs for Octavia Housing to be used in association with the maintenance model presented in section 8.3.4. Octavia Housing's AHP hierarchy and pair-wise decision model to help inform box 5 of the 'Octavia Housing Performance Based Sustainable Social Housing Model' is presented in section 8.3.6 and finally the results section is summarised in section 8.3.7.

## 8.2 Octavia Housing

Octavia Housing is a Registered Social Landlord (RSL) based in inner London operating as a non-profit making organisation. It has a property portfolio of 4088 properties and provides a range of service including below market rental property; sheltered accommodation and shared ownership properties.

Octavia Housing was founded by Octavia Hill (1838-1912), a Victorian philanthropist, social reformer, pioneer of social housing, founding member of the National Trust and the first campaigner for clean air in London. She began working with London's poor the 1860s, purchased her first properties in 1865 and was one of the first to understand the impact poor housing had on the health and wellbeing of occupants. Octavia Hill was strict about rent collection, she felt weekly collections provided tenants with consistency and an opportunity to discuss housing and welfare issues as well as ensuring investors received prompt returns on their investments. She understood the importance of a planned approach to property maintenance and improvement work; money was set aside on a regular basis for such work to be implemented throughout the year and any remaining funds was redistributed to her tenants so that they could carry out their own home improvements.

Octavia understood the importance of mixed communities and the damage that could occur due to inappropriate lettings policies, the importance of open spaces on wellbeing (she was an advocate for the Green Belt) and that an integrated approach was necessary; combining property

improvement/regeneration, employment opportunities and youth programmes. The modern day Octavia Housing follow the principles of its founder and believe people and buildings make for successful regeneration. (Octavia Hill, 2014).

### 8.2.1 Octavia Housing's Building Portfolio

**Table 8.1 Stock Numbers: January 2013 (QLX)**

| Borough | General Needs | Leasehold/Shared Ownership etc | Total |
|---|---|---|---|
| Barnet | 12 | | **12** |
| Brent | 341 | 138 | **479** |
| Camden | 38 | 8 | **46** |
| Harrow | | 31 | **31** |
| Hillingdon | 1 | | **1** |
| Hounslow | 53 | 31 | **84** |
| Hammersmith and Fulham | 318 | 36 | **369** |
| Royal Borough Kensington & Chelsea | 1192 | 71 | **1263** |
| Southwark | 64 | | **64** |
| Wandsworth | 45 | 7 | **52** |
| Westminster | 1621 | 66 | **1687** |
| **Total** | **3685** | **403** | **4088** |

The 4088 properties Octavia Housing managed were located across 11 London boroughs (Table 8.1), 81% of which were let at below market rent, 10% were shared ownership and the remainder were special projects such as care homes for the elderly. The value of this stock exceeded £1 billion.

Octavia Housing's stock portfolio was diverse and ranged from large modern purpose built blocks, to Victorian street properties, some properties were listed whilst many others were located in Conservation Areas. The diversity of stock meant that many properties were hard to treat, especially in terms of climate change adaptation. More than 86% of these properties were maisonettes and flats, mainly due to house conversions rather than purpose built. In terms of

property size, the general needs stock consisted mainly of bedsits / one bedroom properties and two bedroom properties (Figure 8.1). In terms of age, nearly half of Octavia's stock was constructed before 1919. This is a much larger proportion than other landlords (Figure 8.2 and 8.3).

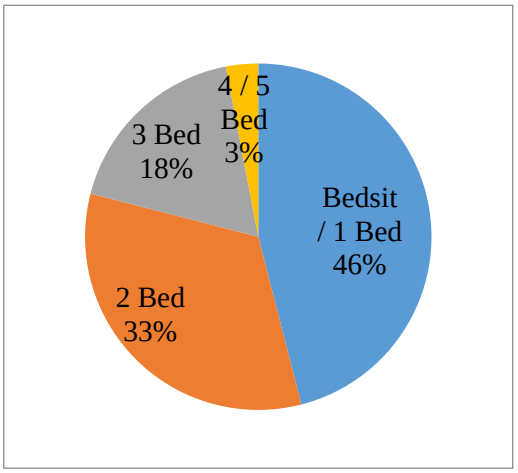


**Figure 8.1 Property Size Profile**

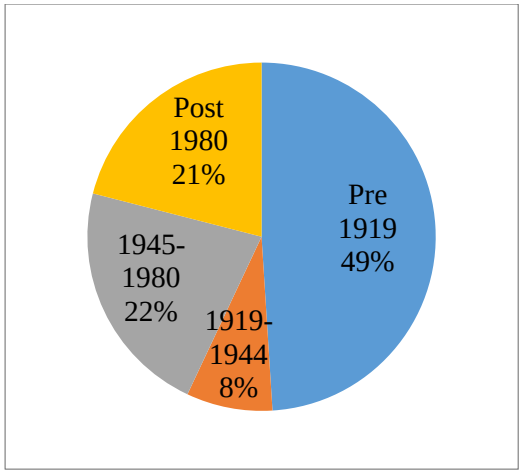


**Figure 8.2 Property Age Profile**

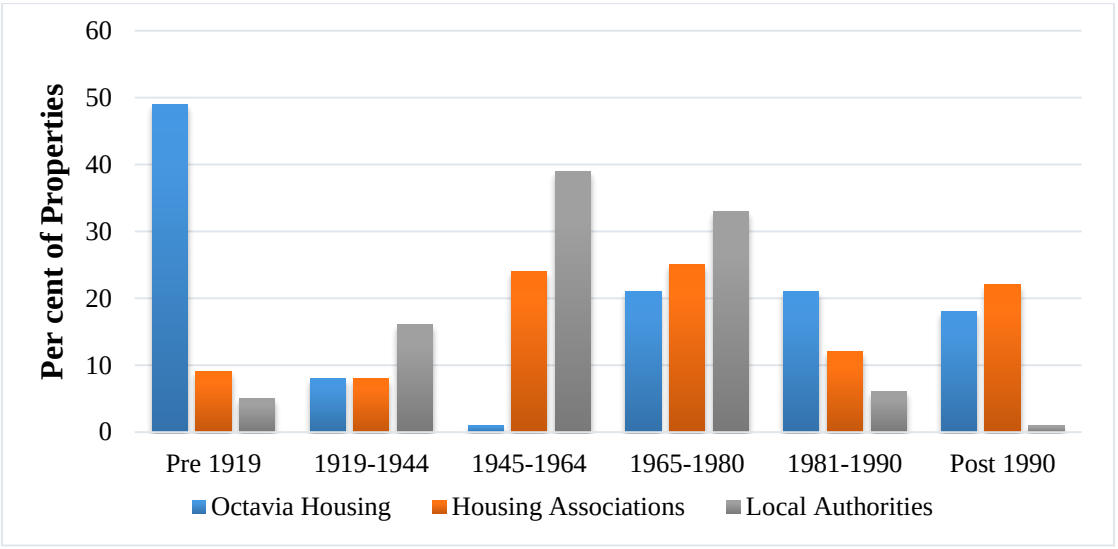


**Figure 8.3. Octavia Housing and EHS Property by Age (**English Housing Survey 2011-12 and Octavia QLX data January 2011)

### 8.2.2 Octavia Housing - Housing Asset Management Strategy

8.2.2.1 Octavia Housing In 2008 – Policies and Procedures

At the outset of the research Octavia Housing was very much an organisation in flux and was in the process of building up its building asset management policies and strategies. Documents at the time were ad-hoc, simplistic and fragmented with a degree of duplication. Much of the BAMS knowledge and procedures were 'held in the head' of staff rather than captured systematically and policies were not linked to the organisation's strategy.

Octavia Housing had a policy for homes to achieve their DHS+ and DHS++ standard but the reality was that a minimum standard based upon the HHSRS was being achieved with critical themes of energy efficiency, fire risk assessments and asbestos being covered. There was a heavy bias towards responsive maintenance; however they aspired to have a greater proportion of maintenance carried out in a planned preventative manner for better resource use and tenant satisfaction.

In 2008 Octavia Housing aspired to survey 100% of its stock over a 5 year period, as with traditional social housing maintenance Octavia Housing's SCS was the central basis upon which maintenance need was based which was still considered to be the most appropriate method. Although there were doubts regarding the accuracy of the SCS it was trusted as a methodology but getting non-technical members of the board to trust in it was a significant problem.

In the 5 years prior to 2008, the asset management department found that the amount of money actually spent on repairs and the amount of money budgeted via the SCS was generally the same but the areas where repairs were carried out, varied. As a result their question was 'are you tailoring your spend to match your budget or are you repairing in accordance with the need of the stock?'

Work practices within the asset management department were split between planned preventative maintenance, void maintenance and responsive maintenance with a degree of silo working between the different teams. There was dialogue between the teams but any links were informal as strategies didn't integrate planned and responsive maintenance. In an attempt to avoid expensive duplications Customer Service Officers (who were the first point of contact for

residents reporting repairs and maintenance issues) could only authorise works with a maximum value of £500. All other requests for maintenance and repair required a surveyor's authorisation.

There was no formal structure for interdepartmental dialogue, specifically between the asset management and the resident initiatives, although there was good day to day communication and regular staff briefings. Property, maintenance and information relating to orders was not held centrally or integrated for easy access and interrogation although their IT system was undergoing further development.

8.2.2.2 Octavia Housing In 2008 – Budgets

Budgets were not set scientifically; there was no methodology for getting the organisation from its current position to where it wanted to be in the future. The preferred procurement route was partnering, however the budgets calculated did not match the estimates/actual costs so there were problems reallocating monies. There was a strong desire for decision making to be transparent, clear, easily tracked and expressed clearly to the board.

Rental income did not meet the cost of maintaining and improving homes and the new fire regulation was having a profound impact on their budget. Tenant behaviour as an impact on the dwelling was not accounted for during maintenance planning and budgeting.

8.2.2.3 Octavia Housing In 2008 – Contractors / Procurement

The approved contractors list was extensive and fragmented. Octavia Housing were going through the process of streamlining their procurement and moving to a fully electronic maintenance ordering and job completion logging system to improve efficiencies.

Specific problems with the responsive repairs and maintenance procurement were;

- Too many short-term bespoke contracts
- Inability to demonstrate value for money
- Need to improve resident satisfaction and involvement
- Lack of quality and performance monitoring for repairs
- Need to improve budget monitoring and reporting
- Skills and training gap to be assessed

They were in the process of moving to a single partnering agreement for their responsive and void maintenance with the aim of;

- Consolidating the numerous individual repairs service contracts to demonstrate value for money
- Reduce duplication and achieve a 'right first time' culture
- Improve performance in the short term
- Develop long-term contractual relationships
- Develop and ensure staff development is linked to business objectives
- Develop a platform for continuous improvement

8.2.2.4 Octavia Housing In 2008 – Tenants / Tenant Satisfaction

The resident profile consisted approximately of 25% who were aged 65 and over, 43% had some form of limiting long term illness, both of which places a greater demand for aids and adaptations. Approximately 5% of residents lived in over-crowded conditions which, due of changes in the definition of overcrowding (in line with the HHSRS) was expected to rise. Octavia Housing house a diverse population which placed a greater demand on access to foreign language television channels and provision of cultural facilities.

There were 153 leasehold properties, which was expected to rise annually as more properties were developed with mixed tenure. This places a greater emphasis on demonstrating delivery of value for money in the procurement of services and leasehold residents must be properly consulted and agreement sought for maintenance, repair and improvement works or risk non recovery of work costs.

A significant issue for Octavia Housing (like so many other organisations) was rising tenant expectations. They planned to manage this through better communication of their standards, timeframes and financial constraints so as to avoid dissatisfaction.

Octavia Housing provided various opportunities for tenant consultation but they had a fundamentally paternalistic relationship with their tenants, although much effort was being made to overcome this and to encourage dialogue with all residents. Holding 'Open Space' events was a favoured approach; this provides a methodology for holding meetings that people self-organise. There were no speakers, no set agenda and timings were loose. The main issues raised were;

- Energy Efficiency
- Training
- Gardening
- Cleaning of communal areas
- Strengthening and clarifying communication
- Maximising the skills of the elderly
- Planning and monitoring work on new build

The aim of tenant involvement was to improve services by responding to the information provided by residents, responding to their needs and to improve accountability by involving residents throughout the decision making process.

Satisfaction with the repairs and maintenance was surveyed annually by an external consultancy. A random sample of 200 residents who have experienced repairs and maintenance within the 12 month period were surveyed results suggested there was consistently high levels of repairs satisfaction and that the majority of Octavia Housing's KPIs were being met, however Octavia Housing felt they were not meeting tenant aspirations and held doubts regarding the accuracy of the reporting.

8.2.2.5 Octavia Housing In 2013

Octavia Housing reviews its Built Asset Management Strategy (BAMS) on an annual basis to help inform the Business Plan financial forecasts; this develops short term (annual budget), medium term (5 year) and long term (30 year) plans. The Octavia Standard (Appendix G) goes beyond the requirements of the DHS and requires all homes provide a safe and healthy environment, all key property components are in good working order and are fit for purpose. It covers dwellings and common areas including paths, yards, boundary walls and outbuildings but it does not include fixtures or fittings provided by the occupier (unless they have been adopted by the landlord) or grounds maintenance. This standard forms the basis of Octavia's BAMS, such that SCS and tenant feedback are used to evaluate property against the standard and any failing property is automatically included in the urgent repair or planned work programmes. The standard is reviewed regularly to ensure it reflects national housing policies, Octavia's aspirations and feedback from residents.

The last full SCS was undertaken in 2007 when Rand Associates surveyed 83% of Octavia's stock and found 27% failing the DHS which triggered a 5 years reinvestment programme. By 2013 approximately 3% of Octavia's stock remained non-decent, lower than the 15% reported in the wider English Housing Associations stock (DCLG, 2013).

In 2011 the average SAP rating of Octavia's stock was 69 (this compared well to the wider housing sector as shown in Figure 8.4) and their aspiration for 2023 is that all properties will have a minimum SAP rating of 75. Considering the age profile and locational constraints of its stock, this is an ambitious target and will require significant investment.

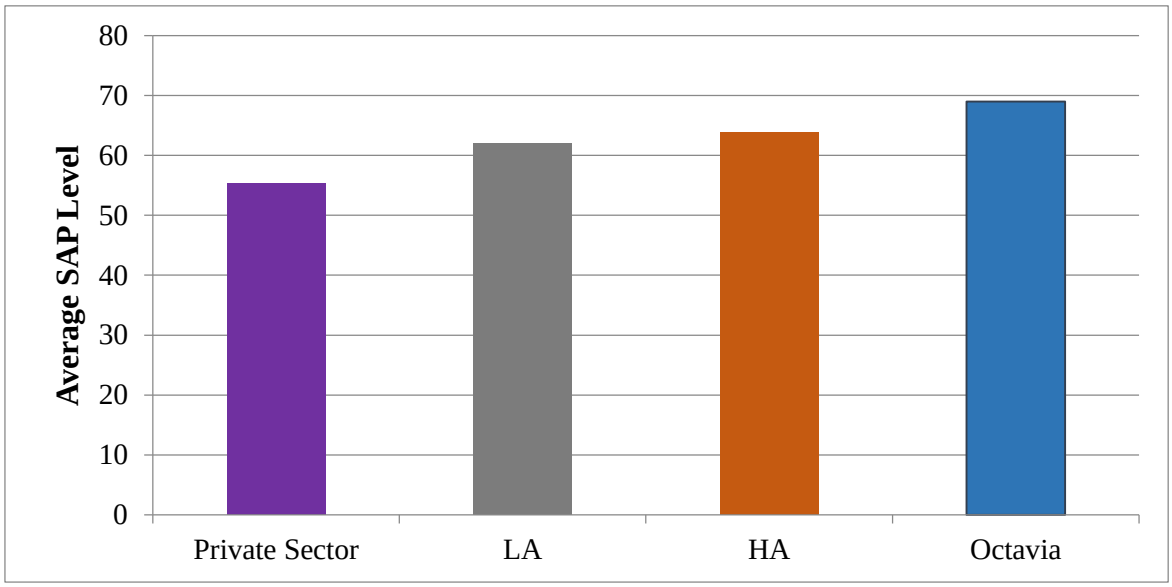


**Figure 8.4 Mean SAP Rating by Tenure 2011 (English Housing Survey)**

Whilst Octavia take a traditional approach to BAMS. They recognise the limitations of the current approach and strive towards expanding BAMS to eventually incorporate climate change adaptation. During the period of this research Octavia have completed the first passive house retrofit through a Technology Strategy Board (TSB) sponsored project; participated in the Community Resilience to Extreme Weather (CREW) project funded by the Engineering and Physical Sciences Research Council (EPSRC) during which a sample of their stock was "assessed against generic vulnerabilities and resilience to flooding and heat waves as well as the adaptive capacity of Octavia as an organisation to recover from such events" (CREW, 2013); the TSB sponsored Design for Future Climates (D4FC) which sought to develop a climate change adaptation strategy for inclusion in their BAMS; and joined SHIFT in 2011 achieving the Silver rating in 2012.

According to the CREW and D4FC projects Octavia Housing's asset management strategy for the five years to 2019 should incorporate delivery against the Octavia Standard, improved energy efficiency and appropriate adaptation to improve property resilience. Of course these do not have to be discrete work packages as energy efficiency retrofit work can also adopt climate change issues, such as, solid wall insulation work to improve the thermal performance of properties will address coolth as well as warmth. The revised BAMS should address properties vulnerable to pluvial flooding (not previously addressed) as well as fluvial; improve the resilience of existing stock to such weather events and improve Octavia Housing's disaster recovery and business continuity. Properties were also vulnerable to heat waves, however detailed analysis and the development of specific adaptation solutions was incomplete. (Jones and Brosnan, 2014).

### 8.2.3 Summary and Implications for Research

With approximately 4100 properties in its portfolio, Octavia Housing is a small London based HA. Its founder was a Victorian philanthropist and social reformer and her philosophies still guide the modern HA in their property and tenant management. It has a traditional approach to housing maintenance prioritisation but in the later years of the study became more progressive in terms of its desire to incorporate climate change need into its BAMS. There had been much progression in terms of Octavia Housing's BAMS since the research commenced, however how to systematically incorporate the broader sustainability agenda, improve housing performance in-use and the desire for transparent, clear, easily tracked and expressed decision making remained an outstanding issue as the traditional condition based approach was still used.

## 8.3 Participatory Results

### 8.3.1 Octavia Housing STAFF Workshop (Workshop 1)

The first workshop with Octavia Housing was held at their offices on the 8th August 2008 from 11am until 1pm and was attended by 12 members of the Asset Management Department and the New Development Department.

This group identified Reduce Cost / Energy, Government Policy, Reduce Waste, Efficient Programming and Fuel Poverty as Octavia Housing's top 5 key strategic drivers as shown in Figure 8.5.

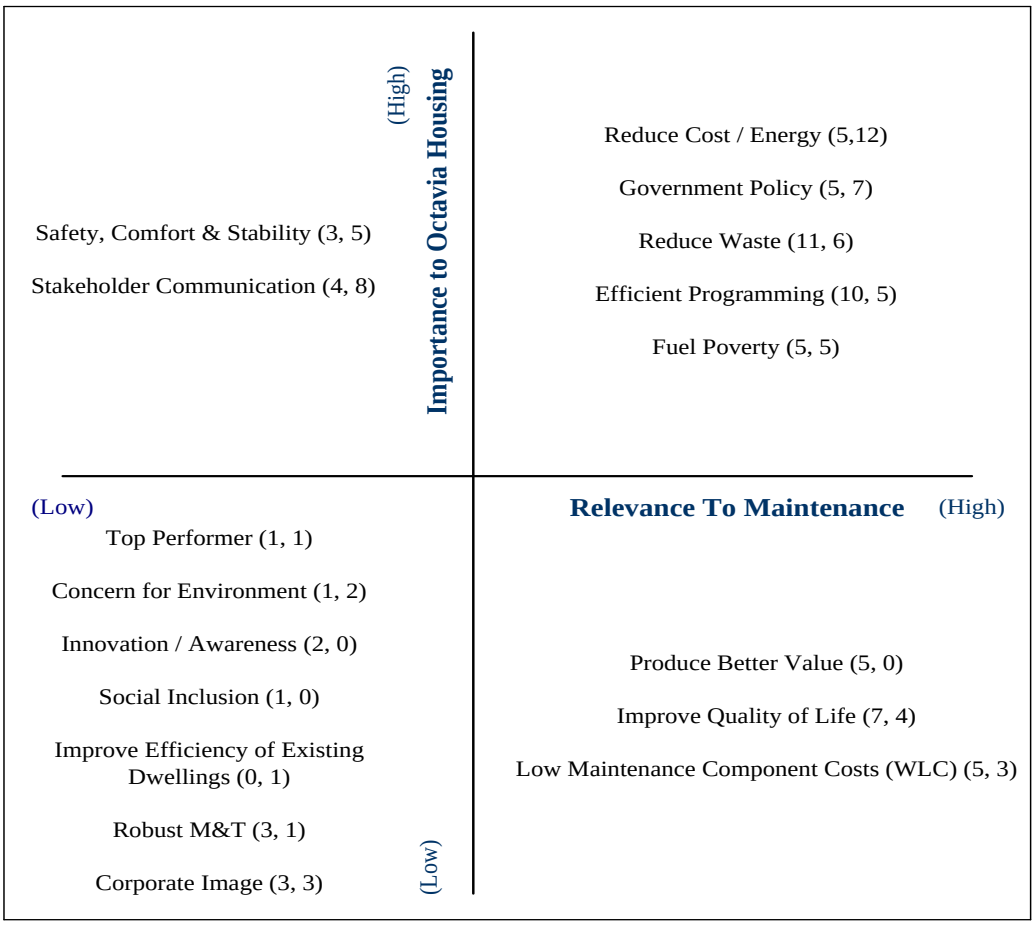


**Figure 8.5. Octavia Housing's Strategic Drivers**

What these drivers meant to the two groups in terms of their importance to Octavia Housing and their relevance to maintenance was further explored, the results of which are presented in Table 8.2.

**Table 8.2 Analysis of Octavia Housing's Strategic Drivers**

| Group 1 | Group 2 |
|---|---|
| **Reduce Cost / Energy**<br>• Low maintenance components<br>• More standardisation in components<br>• Reduce usage of energy (boilers / insulation, etc.)<br>• MMC<br>• Better supply chain management<br>• Better integration within the organisation<br>• Pilot studies (trials) to measure performance | **Reduce Cost / Energy**<br>• What are the initial costs (starting point)<br>• Bulk cost, supply chain management<br>• Efficient programming<br>• Efficient use of product to reduce energy<br>• Capital vs. revenue cost to reduce cost (links to efficient programming)<br>• Starting point for energy data (D. E. Assessment)<br>• Educate stakeholders (domestic energy)<br>• Monitoring of carbon footprint – use info to reduce energy |
| **Government Policy**<br>• Meet targets<br>• Innovation to actual needs<br>• More "joined up thinking" at local level | **Government Policy**<br>• Corporate plan linked to government policy<br>• Octavia + policy<br>• Can we influence policy / challenge<br>• Awareness – consult with stakeholders<br>• Join relevant groups to use 'shared knowledge'<br>• Resources to comply if required<br>• Right schemes (IT) to manage<br>• Training i.e. DES and HHSRS<br>• Development of policy and procedures (robust) |
| **Reduce Waste**<br>• Recycling of surplus building materials<br>• Better distribution of resources (plant/labour)<br>• Reduction of water – dry forms of construction<br>• More greywater use – rainwater etc.<br>• Awareness – education | **Reduce Waste**<br>• Clear policy and procedure<br>• Define waste – work with stakeholders, contractors, LA etc.<br>• Manage through efficient programming and contractual control<br>• Recycling policy<br>  ○ Reduction of use of water<br>  ○ Use rainwater<br>  ○ Greywater |
| **Efficient Programme**<br>• Better use of resources<br>• JIT approach – based on accurate stock data<br>• Improved processes | **Efficient Programme**<br>• Supply chain management<br>• Procurement strategy<br>• Use of relevant data, asset management tools<br>• Resource planning<br>• Combine programmes where possible to gain efficiencies<br>• VFM (economies)<br>• SMART KPIs<br>• Training<br>• Consultancy |

The group was asked to review the Octavia Housing strategic drivers graph (Figure 8.5) and the analysis of the drivers (Table 8.2) to ensure all participants agreed they had captured criteria of importance/relevance to Octavia Housing and that drivers had been allocated the correct

weightings. It was then brought to their attention that customer satisfaction did not feature explicitly in their drivers. The ensuing discussion couldn't determine if this was because participants felt customer satisfaction was intrinsic to their work as maintenance providers and was therefore built in or because they didn't rank it highly as part of their work.

The group was asked if they thought the same issues would be raised if this process was repeated with board members present. It was agreed that the board would have client satisfaction as a top driver but that generally speaking, the issues would be similar.

Just-In-Time was the favoured mode for maintaining buildings and responsive maintenance was seen as being more expensive than planned maintenance, however, implementing a JIT approach to maintenance was a move towards responsive maintenance albeit in a very planned manner in which accurate building performance data would be required to enable maintenance managers to plan replacements just before they fail.

The generic Performance Based Sustainable Social Housing Maintenance Model was presented to the group. It would appear from the workshop discussions that this group 'knew what it didn't know' and had a reasonably mature knowledge of sustainability /maintenance issues. Superimposing these findings onto the performance model it was possible to complete boxes 1, 2, 5 and 6 as the critical success factors were identified from the strategic drivers and from the analysis of the strategic drivers the kinds of toolkits needed (SMART KPIs runs across all 4 top drivers) could be determined. Figure 8.6 presents the performance based sustainable social housing maintenance model superimposed with the responses given during tasks 1 and 2 of the workshop (red).

The performance criteria identified were superimposed over the performance criteria hierarchy (maintenance practices) established during the interview phase, Figure 8.8. The red text identifies Octavia Housing's preferred sustainable building performance criteria (reinforcing the point that social landlords' sustainable performance criteria will be unique to them).

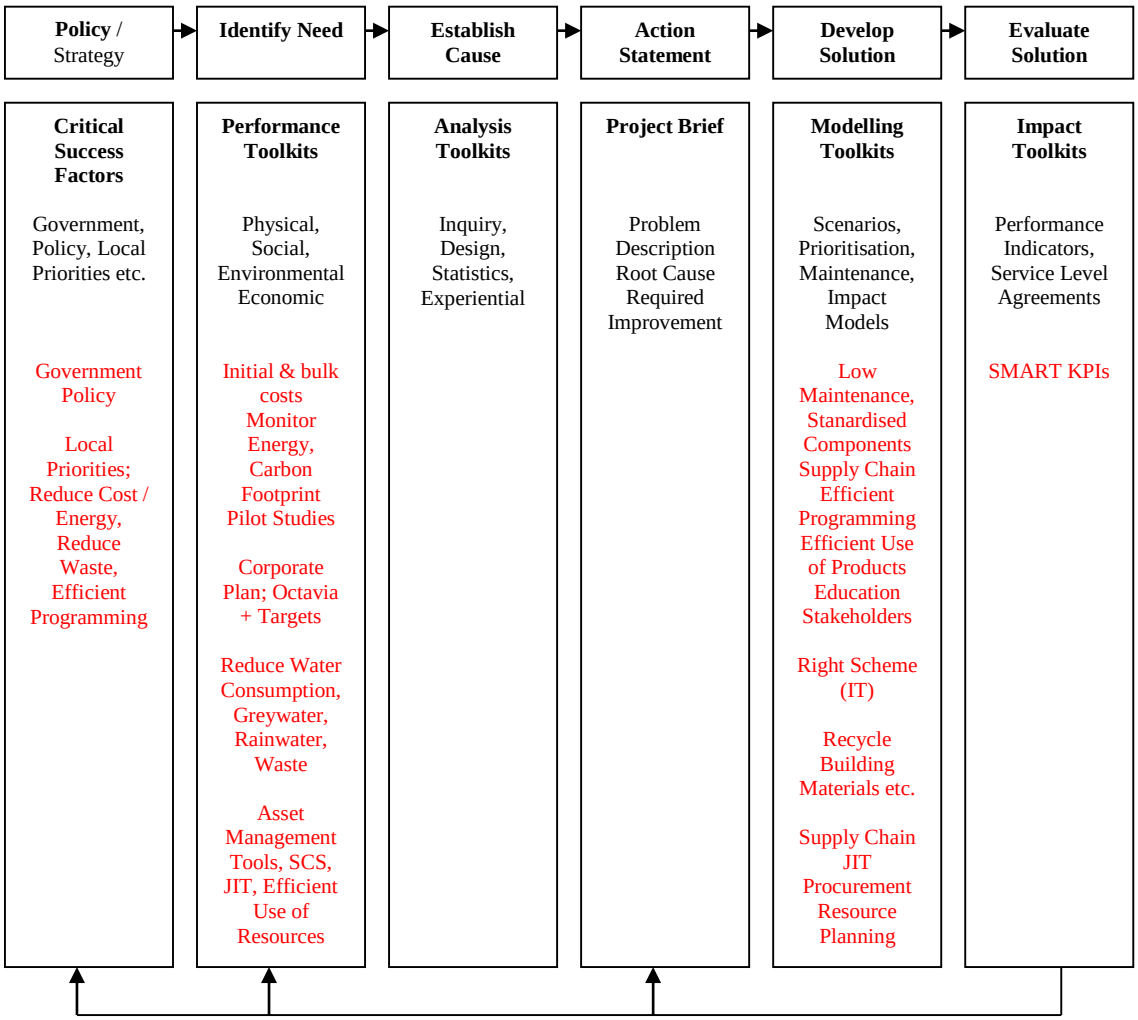


**Figure 8.6. The Performance Based Sustainable Social Housing Maintenance Model Incorporating Criteria Identified by Octavia Housing During Workshop 1**

### 8.3.2 Octavia Housing Staff and Tenant Workshops (Workshop 2)

The second workshop with Octavia Housing was held at their offices on the 13th August 2008 from 6.30pm until 9pm, attended by both staff and 6 residents (2 of whom were also members of Octavia Housing Asset Management team) to determine how to measure performance and establish a set of KPIs. The KPIs identified by the staff and resident participants are presented in Table 8.3. As can be seen the resident group selected a broader set of KPIs than the landlord group who looked at very specific environmental/economic performance measures. As expected the tenant group identified a range of social KPIs associated with issues they were facing within their homes and communities at the time of the survey. They also sought a more planned approach to maintenance which improved overall performance of the home over time, not dissimilar to the landlord aspirations. Both groups identified Energy as an important KPI, this

was not unexpected as fuel poverty (section 2.2.2) is a serious issue within the social housing sector.

**Table 8.3 Results of Tenant and Staff Workshop**

| Tenant KPIs | Landlord KPIs |
|---|---|
| Building Security<br>ASB<br>Energy Consumption (Cost)<br>Community Cohesion<br>Planned Maintenance<br>Number of Difficult to Treat Homes<br>DHS + | Water – Octavia Housing would like to measure this metric but it is not currently possible across the whole stock because not all properties are metered<br>Energy - It should be possible to measure directly from energy meters and residents are not expected to object to this type of data collection and perception of use could also be measured through Tenant Satisfaction Questionnaires. |

In addition to the water and energy KPIs, the landlord group also identified the following as important issues for future consideration within their BAM,

- Benchmarks (overlaps with Establish Cause box of Figure 8.6)
    - Tenant profiling required – A better understanding of the consumption demands of different tenant profiles is needed and how best to accommodate changing tenant profiles (e.g. more single parent families) to avoid overcrowding and incorporate adaptability. Tenant profile issues need to be integrated into decision making (Develop Solutions box of Figure 8.6)
- Expectations – A better understanding of tenant expectations is needed so that the asset management strategy can be aligned with them. Recognition is needed that it will not be possible to deliver against them all but that clear links need to be established between decision making and expectations, e.g. don't offer fuel poverty improvements that can't be delivered by direct action. How expectations can be met also need to be integrated into decision making (Develop Solutions box of Figure 8.6)
- Well Being
    - 'Feel Good Factor' needs to be understood and monitored, for instance, are residents concerned about their carbon footprint and the green credentials of Octavia Housing?
    - Security (perception of)
    - Climate change (was not being addressed by Octavia Housing at the time)
    - Comfort – Are residents affected by noise, overheating, location issues?

- Payback
    - Wellbeing discounts must be included; Action Statement should address the triple bottom line of sustainability (Action Statement box of Figure 8.6).
    - Life Cycle Costs should also be integrated to maintenance decision making. Such data could be used to inform prioritisation (Develop Solutions box of Figure 8.6)
- The group discussion concluded that Octavia Housing were not giving their residents what they want and a matrix approach to prioritisation which integrates tenant and stock profiling should be developed.

8.3.2.1 General Comments Relating Workshop 2

The workshop took place following the Contract Panel Event which influenced the workshop in a number of ways

- The panel event assembled technical staff members and residents who stayed beyond the event to attend the workshop, however the majority of staff who attended workshop 2 also attended workshop 1 so there was also an element of continuation;
- The panel event overran which reduced the time allocated for the workshop;
- Discussions in both parallel sessions were influenced by the issues raised during the panel event and to an extent the workshop provided a forum for a continuation of the panel event. This was to be expected considering the contentious issues discussed during the previous event;
- Due to the presence of the Customer Support Officer from the Asset Management Department the initial quality of life discussion took the format of a Q&A session between residents and Octavia Housing. This too was unsurprising as residents took the opportunity for immediate Octavia Housing feedback to their concerns raised during the panel event. It was suggested that whilst it was very important that these issues get resolved that perhaps this workshop was not the most appropriate forum;
- The general discussions in Parallel session 2 had a strong ‘social’ influence.
- Figure 8.8 demonstrates how Octavia Housing criteria overlaps with that identified through the phase 2 interviews

Figure 8.7 incorporates the findings of workshop 1 (red) and workshop 2 (purple) within the Performance Based Sustainable Social Housing Maintenance Model proposed by the research.

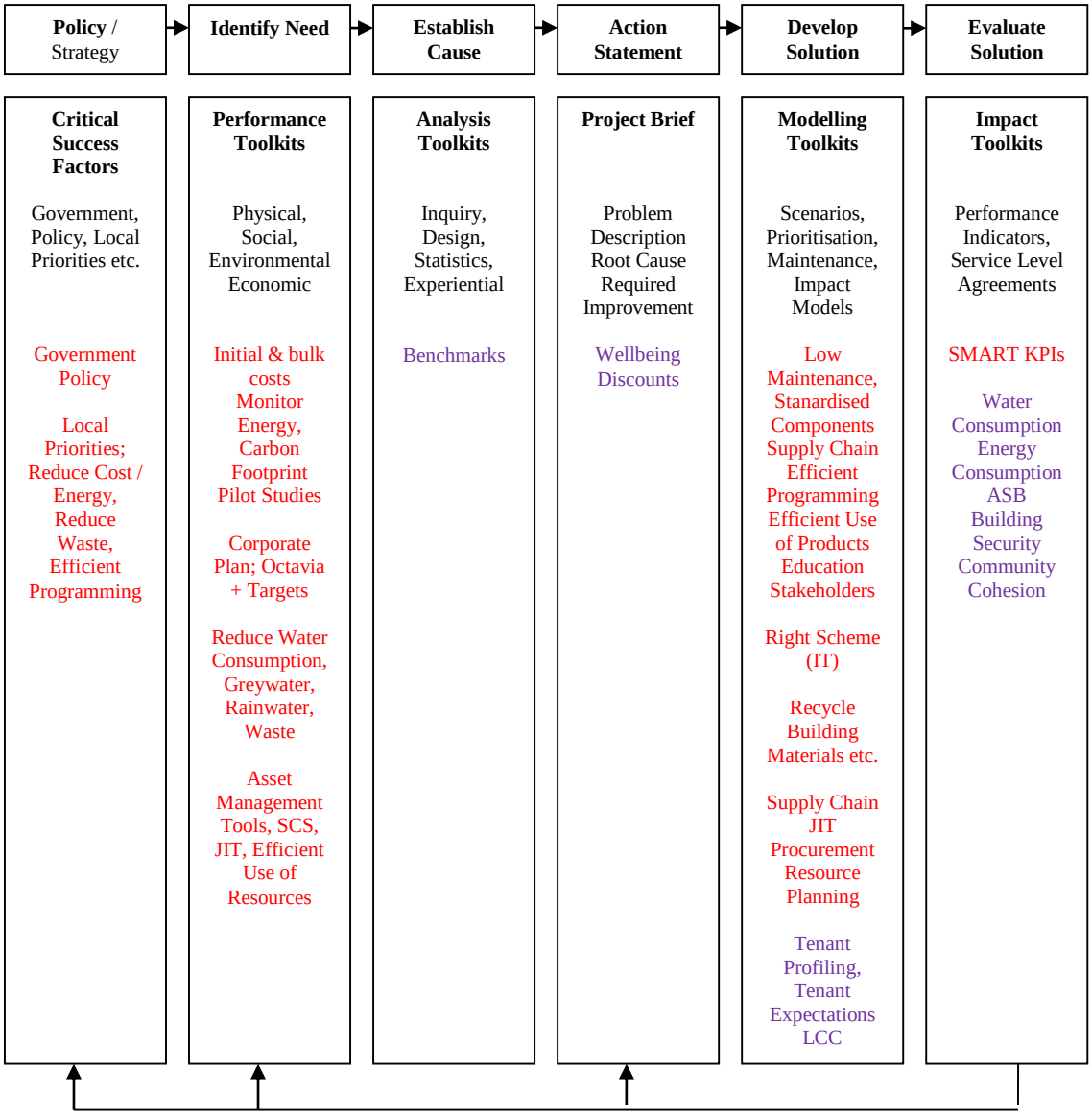


**Figure 8.7. The Performance Based Sustainable Social Housing Maintenance Model Incorporating Criteria Identified by Octavia Housing During Workshop 1 and 2**

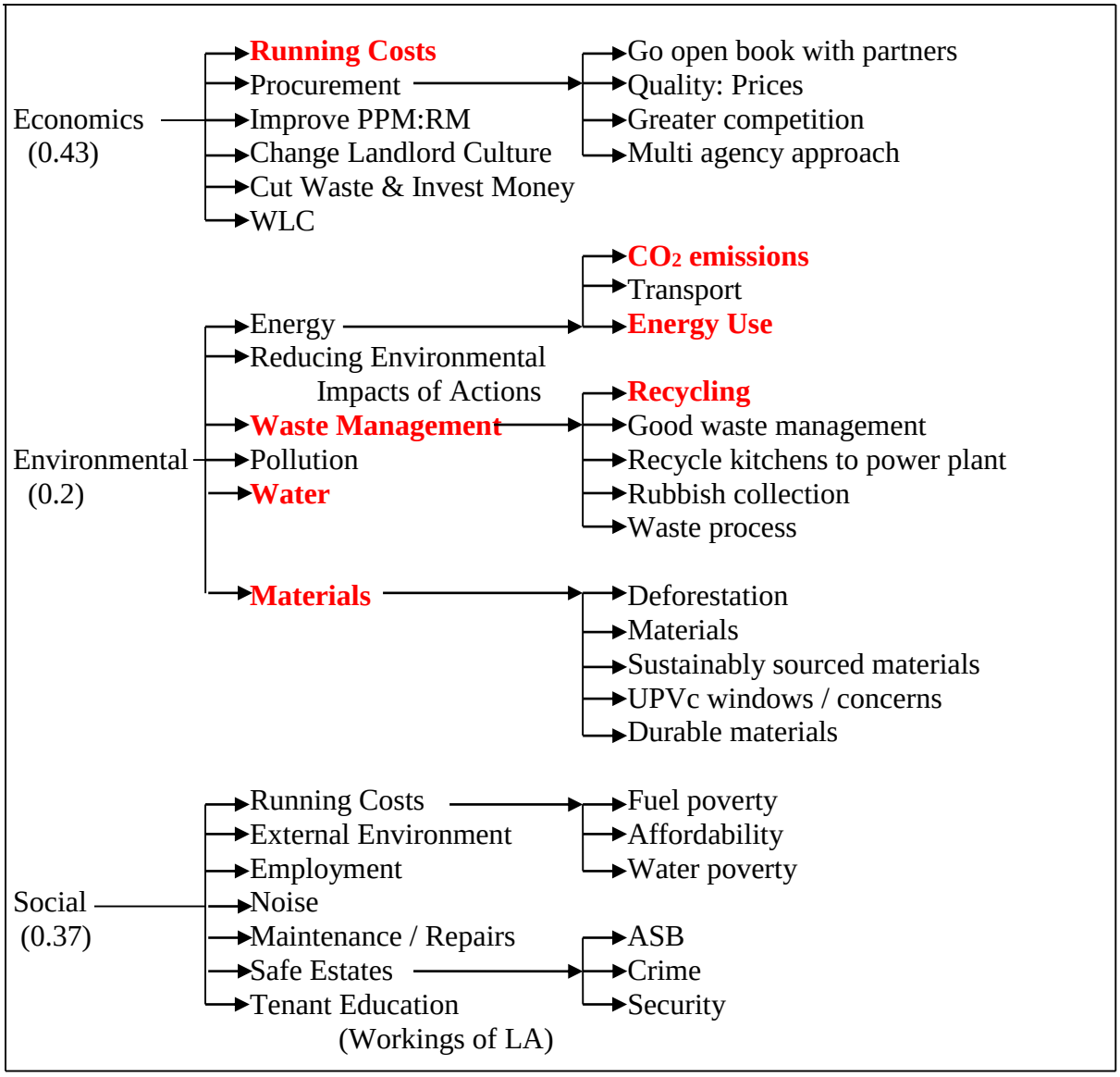


**Figure 8.8 Sustainable Maintenance Hierarchy (Established from the Interviews) – House Going Forward Overlapped with Criteria Established by Octavia Housing**

### 8.3.3 Tenant Survey

The approach taken to conducting the tenant survey was discussed in section 4.6.2.3 and as such has not been repeated. Forty one tenants participated in the main survey, all of whom occupied general needs homes. The survey template can be viewed in Appendix E.

#### 8.3.3.1 Age of Participating Tenant

Figure 8.9 shows the age profile of those tenants participating in the study, it appears to over represent those tenants in their 50s and beyond. This may be due to the timing of the calls.

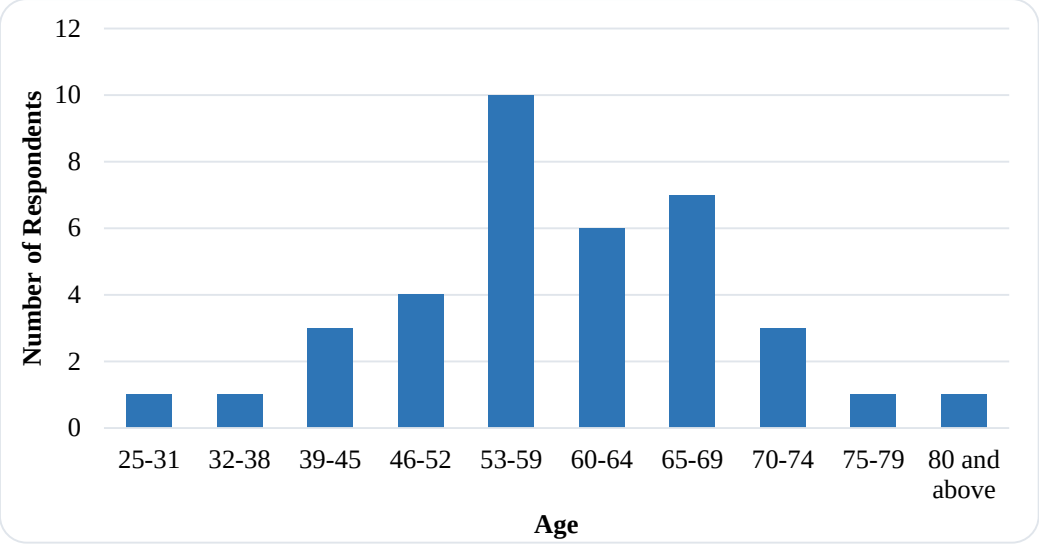


**Figure 8.9 Age of Participating Tenants**

8.3.3.2 Size of Household

Average size of participating household was 1.8 as shown in Figure 8.10. The average household size in the UK was 2.4 according to the National statistics for 2003/4, made up of 1.8 adults and 0.5 children. Participating households appear to be smaller than the national average.

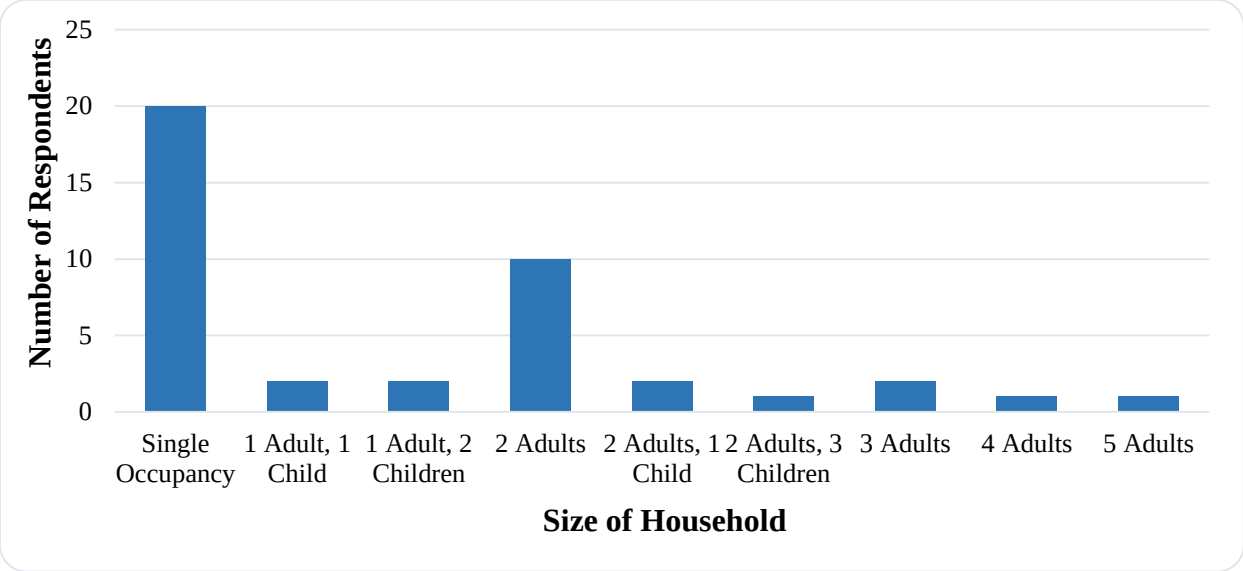


**Figure 8.10 Household Size**

8.3.3.3 Impacts on Quality of Life

This question follows on from the tenant workshop carried out the previous November and unsurprisingly identifies household running costs as the main negative impact on the quality of life for tenants, although rent and service charges did not appear to cause much concern (information relating to benefits was not collected and a large number of tenants were retired and

so may have their rents in part of fully paid for by benefits). Approximately one quarter of tenants believed Octavia Housing maintenance impacted negatively upon their quality of life (Figure 8.11).

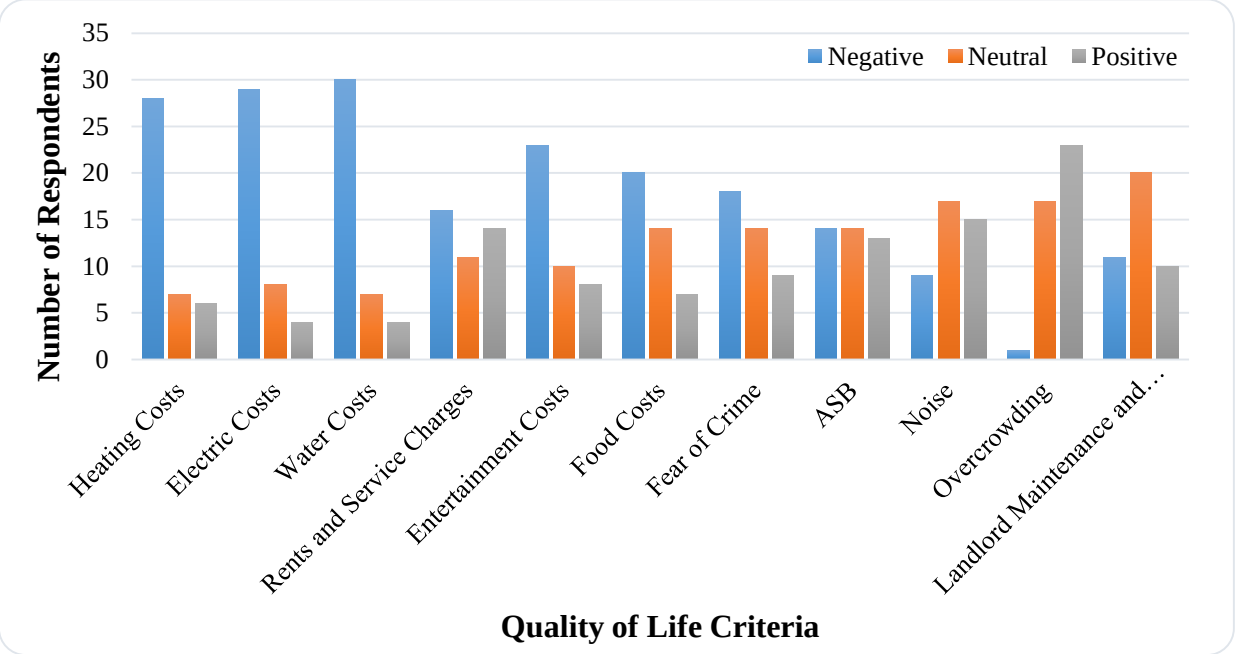


**Figure 8.11 Impacts on Quality of Life**

8.3.3.4 Overall Satisfaction

The homes within this area had been identified by Octavia Housing SCS as being in 'maintenance need'; however the levels of satisfaction with the size and quality of the home and quality of the neighbourhood was high, with the exception of modernisation (Figure 8.12). Levels of dissatisfaction with the communal and external areas was also low, however Figure 8.13 suggests effort is needed to improve the appearance and cleanliness of communal areas. (Communal space refers to the hall, stairs and landing of flats and security access refers to flats only).

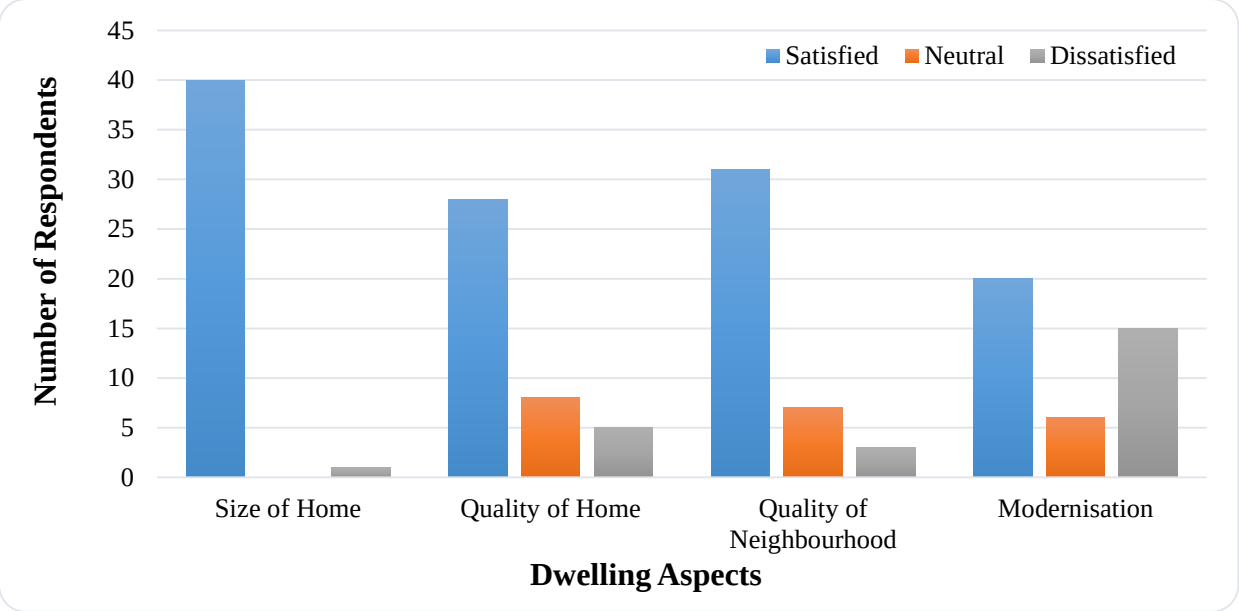


**Figure 8.12 Overall Satisfaction**

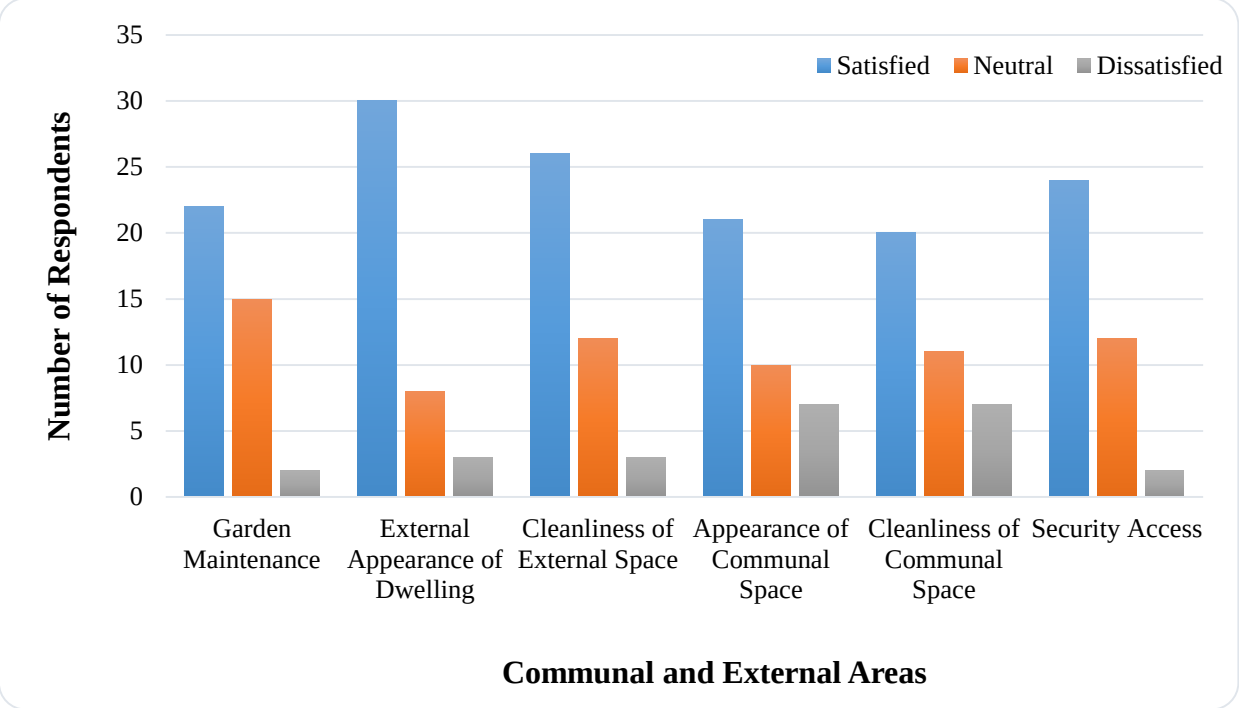


**Figure 8.13 Satisfaction with Communal and External Areas**

8.3.3.5 Feeling of Safety Within the Home and Local Area

Safety and the perception of crime did not appear to be an issue for these tenants. Only those who felt unsafe were asked what Octavia Housing could do to make them feel safer (options provided by the questionnaire). There were 3 residents who felt unsafe and none of them felt unsafe in both their home and local area. One felt unsafe in the home and thought Octavia

Housing could install/improve secure gate, install/improve fencing, provide a burglar alarm and install/improve security lighting in order to improve their feelings of being safe. This participant thought ASB was a problem and ranked crime against the property as 2nd, crime against the person 1st and vehicle 3rd (Figure 8.14). The other 2 residents only felt unsafe in the area. One did not know how Octavia Housing could help (all the questionnaire suggested interventions were at the house in which they felt safe) and didn't feel ASB was an issue. It appears to be an isolated incident as 32 out of the 37 residents who answered this question all felt safe in the area and live in the same postcode. The remaining resident who also felt unsafe in the area thought Octavia Housing could provide a burglar alarm and install/improve security lighting and believed ASB was a problem in the area.

8.3.3.6 Fear of Crime

Forty participants answered this question, 33 ranked crime against the person as their main concern, 32 ranked crime against the property as 2nd and 36 ranked crime against the vehicle as 3rd as show in Figure 8.14. What this didn't measure was the level of threat they felt of such crime occurring, for instance crime against the person has been rated as the type of crime most feared by the participants but those same participants may not perceive there is a real threat of that crime occurring, hence the large number who felt safe in their local area (Figure 8.12). The large number of residents who place fear of crime against a vehicle in 3rd place could be indicative of the number of residents who do not own a car. Those participants who felt unsafe in the area and the home rated fear of crime (by type) in the same way as other participants.

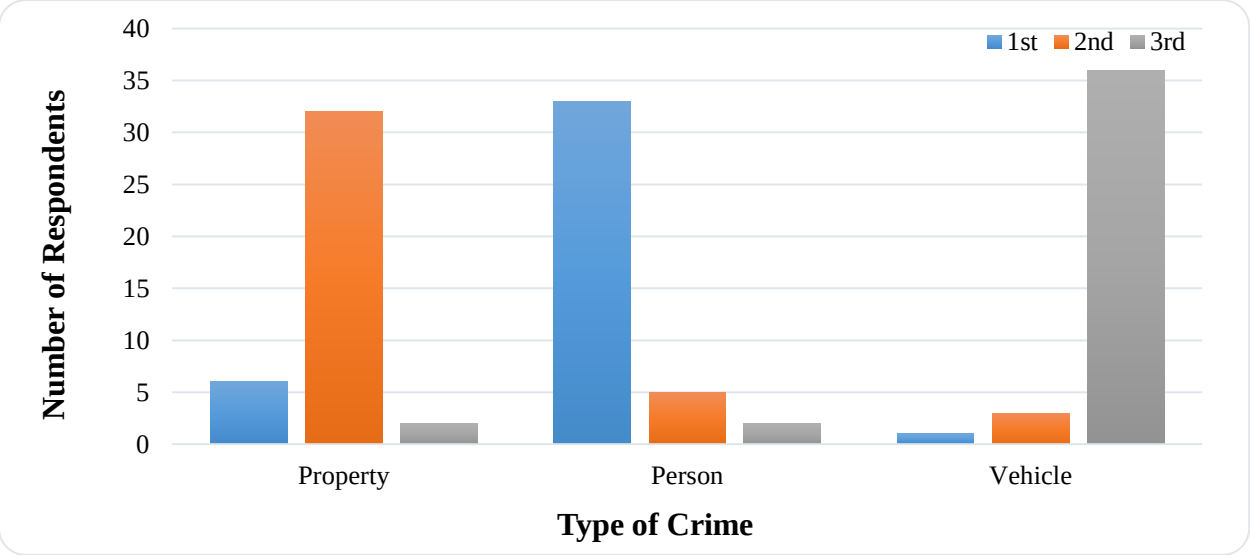


**Figure 8.14 Fear of Crime**

8.3.3.7 Health and Safety Concerns

Participants were asked about their concerns for health and safety around their home, the results of which are provided in Figure 8.15. The biggest concerns were damp and mould, draughts, falls and pest infestation. On the whole however, residents did not seem appear concerned regarding the Health and Safety of their home.

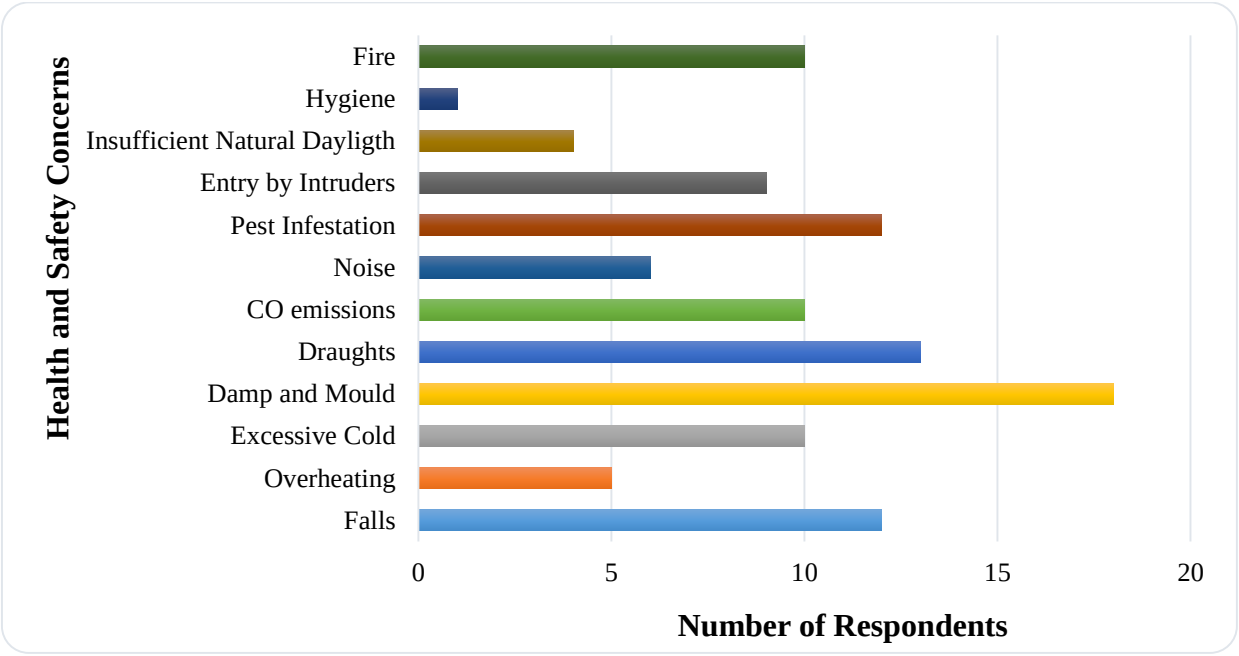


**Figure 8.15 Health and Safety Concerns**

8.3.3.8 Energy Conservation

Participants were asked to rate the importance of energy conservation within the home on a 5 point Likert scale from Very Important to Very Unimportant. All 39 residents answered this question and nearly 80% confirmed it was very important to them, with the remainder stating it was important. None considered energy conservation unimportant. Thirty seven of these participants were actively trying to reduce their household energy consumption and over 80% of the 38 participants who answered this question, were saving energy in order to reduce household energy bills as well as reducing carbon dioxide emissions. Over 90% thought the responsibility for energy conservation within the home lay with both themselves and their landlord. Figure 8.16 demonstrates the actions that were being taken by tenants to save energy within the home. It appears that in the majority of cases (generally above 80%) tenants were undertaking the household energy saving behavioural activities that were within their control, loft insulation may be seen as a landlord activity and as such not an activity the tenant would participate in.

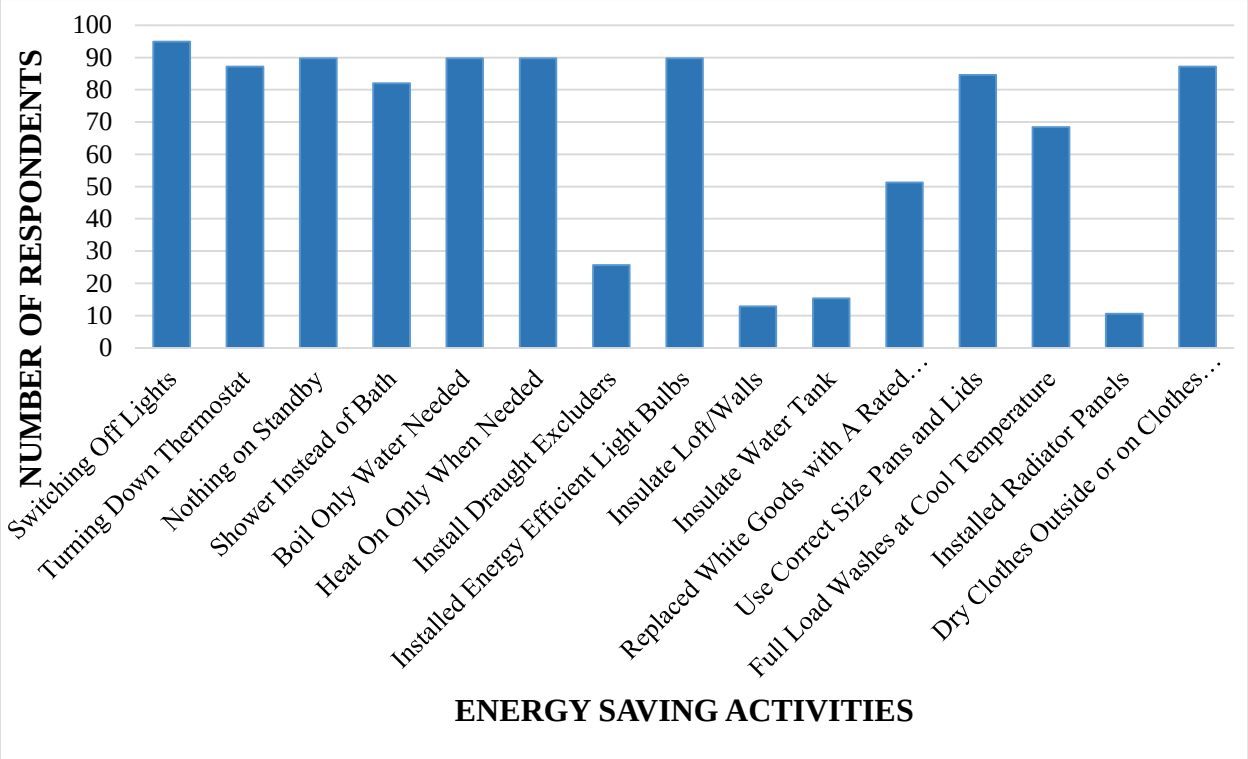


**Figure 8.16 Energy Conservation Efforts**

8.3.3.9 What Activities Could Octavia Housing Undertake to Help Support Tenants?

Participants were asked what actions they would like Octavia Housing to undertake to help support them more in their homes, the results of which are provided in Figure 8.17. Improve insulation, external walls, roof, draught proofing and windows, provide energy efficient lights and advise on energy and water (although less than 40% believed Octavia Housing should install water efficiency devises) efficiency were all chosen by 60-80% of the participants. Improving windows was chosen by over 80% of the participants and echoes comments made during the interview phase where landlords understood the importance placed on double glazing by their tenants in terms of (perceived) energy efficiency, noise reduction, aesthetics and prestige. These are all activities that have the potential to reduce household energy consumption and running costs, the number one priority for the tenants who attended the workshop.

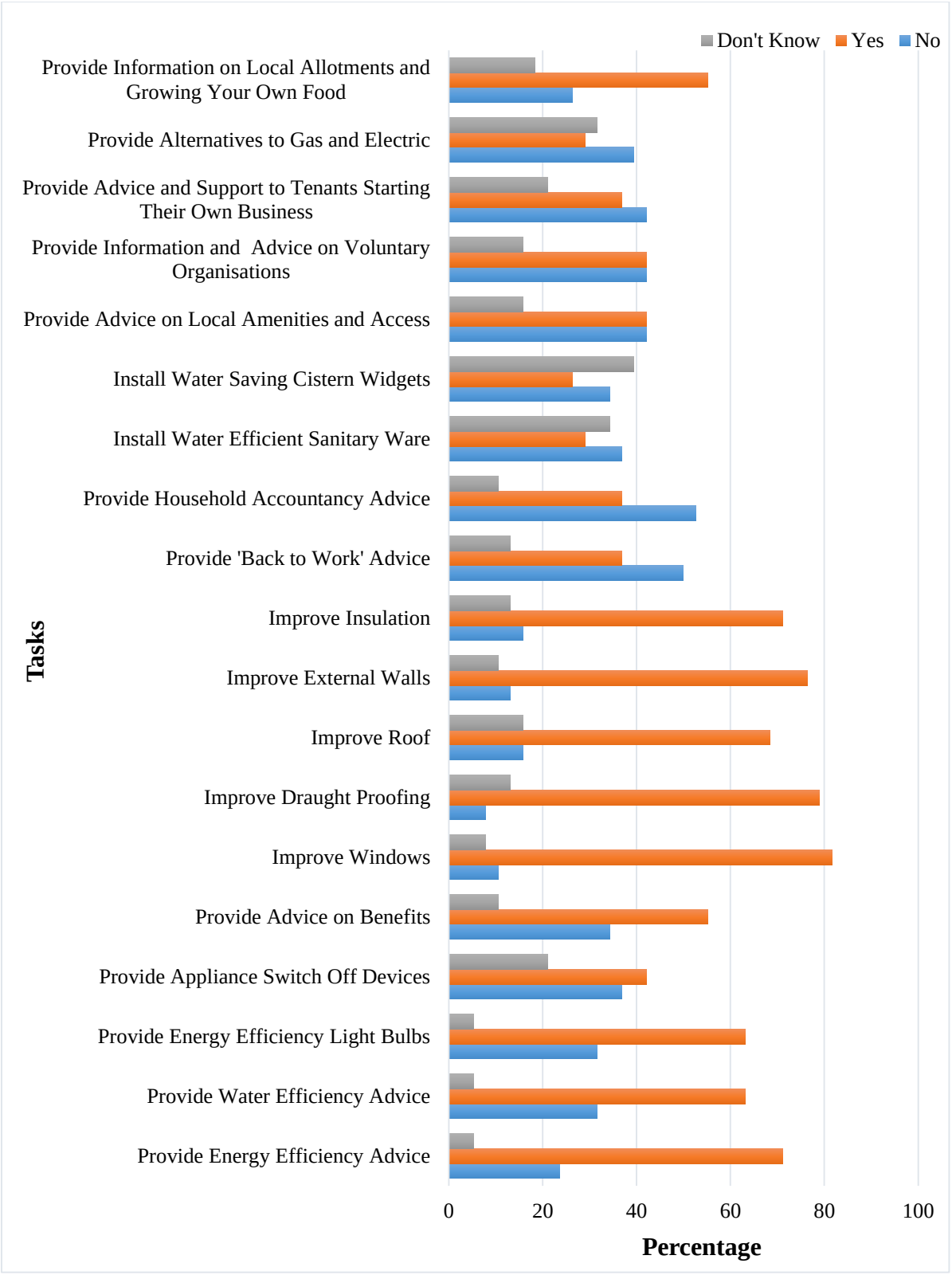


**Figure 8.17 Potential Octavia Housing Activities to Support Tenants**

8.3.3.10 Should Residents be rewarded for abiding by the terms of their tenancy agreement?

Sixty percent of participants believed tenants should be rewarded for abiding by the terms of their tenancy agreement. It was not possible to determine if those participants who felt good behaviour should be rewarded did comply with their tenancy agreement. Those participants who felt good behaviour should be rewarded were asked to suggest rewards Octavia Housing could offer, the results of which are shown in Figure 8.18 and indicate that not all suggestions had a direct financial burden on the housing association. For instance 16% believed some form of acknowledgement of the landlord's appreciation for the tenants good behaviour and 21% believed their good behaviour should be rewarded by an improved maintenance and service from the landlord (if tenants are to conform to their contractual agreements, so landlords should also conform to their contractual agreements.)

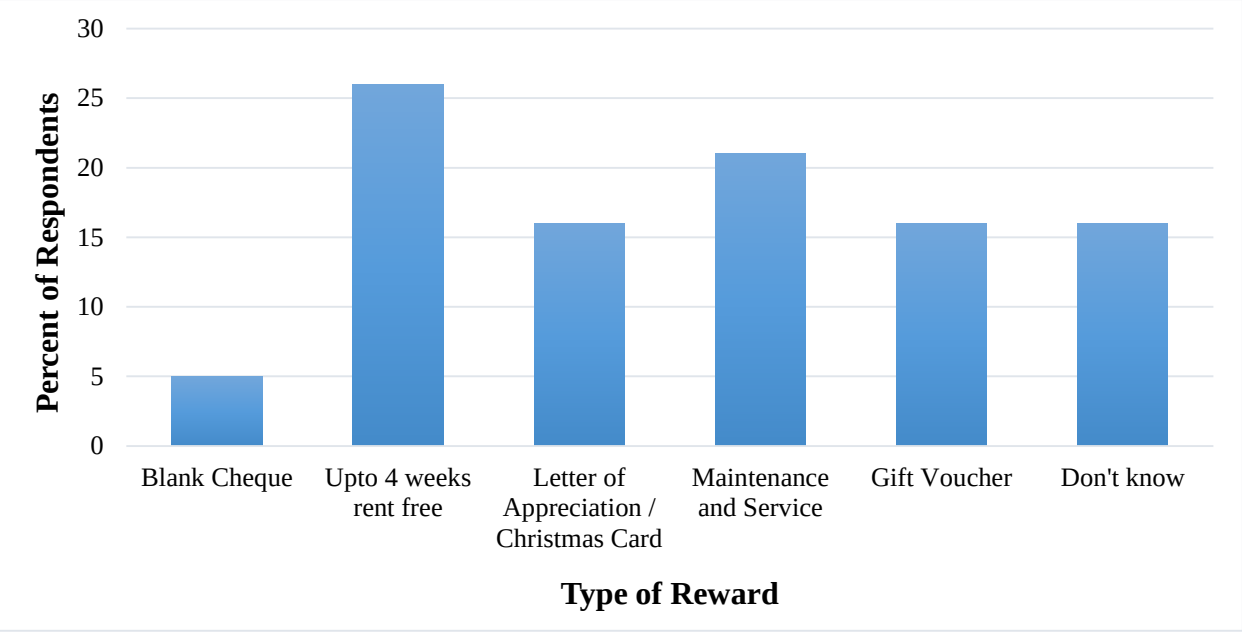


**Figure 8.18 Proposed Tenant Rewards**

8.3.3.11 Tenant Survey Summary

Quality of Life issues causing most concern were those associated with household running costs. Satisfaction regarding size and quality of the home and quality of the neighbourhood was high at over 70%; there was less satisfaction with modernisation. Dissatisfaction with the external environment of their homes was also low, appearance and cleanliness of communal areas scored the worst but still, less than 20% of participants were dissatisfied with those aspects.

Over 80% of participants felt safe within their home and local area, however crime against the person was the type of crime participants feared the most, however this doesn't measure how real a threat participants felt this was.

Health and Safety concerns were low. Approximately 50% of participants were concerned with damp and mould, but the items taken from the HHSRS received low levels of concern.

Tenants were undertaking the household energy reduction behavioural activities that were within their control and felt jointly responsible for energy conservation; their biggest aspiration was for Octavia Housing to help reduce energy consumption and running costs further by implementing works beyond their control, such as loft and wall insulation.

Octavia Housing's SCS identified these homes as being in 'maintenance need', however the results of this small survey did not necessarily agree with their supposition, it would appear that the area in most need of input from Octavia Housing was associated with energy consumption rather than DHS and HHSRS. Does this imply that the SCS data is erroneous or simply that the tools employed to determine maintenance need do not measure how the building performs as a home and doesn't reflect actual maintenance need, more likely maintenance need was politically driven by the DHS.

### 8.3.4 Octavia Housing Workshop 22nd November 2013 (Workshop 3)

The following results summarises the outputs from a ½ day workshop with Octavia Housing to identify the components of a good asset management strategy. The workshop was developed in response to the perception that Octavia's current asset management strategy was too operationally focused and as such didn't provide the strategic vision needed to develop long term asset management plans. The workshop addressed this perception by exploring the perceived requirements of Octavia's asset management strategy and identifying the practical steps needed to compile the strategy. The outcome from the workshop was an action plan for the development of a more strategically focused asset management strategy.

The methods employed were discussed in section 4.6.2.4 and are not repeated again in this chapter.

8.3.4.1 Octavia Housing's Current Approach to Asset Management.

Octavia Housing perceive their current asset management strategy as more of an action plan than a strategic document. Whilst this serves a purpose, it doesn't provide the basis for structured forward planning against Octavia Housing's strategic organisational goals. It also doesn't effectively integrate new build with ongoing maintenance and refurbishment of the existing stock. Octavia Housing wish to review their housing stock in light of changing business and market drivers. These drivers include, but were not limited to: the condition of the stock (in general terms); the make-up of the stock against changing tenant demographics; the location of the stock; the balance between stock acquisition (including new build) and disposal; and the impact of sustainable technologies. In addition to reviewing their stock profile Octavia Housing also wanted to review its management approach to built asset management over time. This said there are some guiding principles which any future asset management strategy must acknowledge;

- Octavia are committed to providing affordable housing in London and don't want to sell inner London properties to fund building projects outside London.
- Octavia are also committed to meeting the Octavia Housing Standard and have an aspiration of achieving SAP 75 rating across their stock.

Thus the workshop sought to answer three key questions:

1. Is the current approach to built asset management right, or should we change direction?
2. What type of assets do we want in the future?
3. What do we need to know about our stock in order to make informed built asset management decisions?

In addressing these questions the workshop aimed to:

1. Raise awareness of strategic built asset management amongst Octavia Housings's senior management team; and
2. Provide those responsible for developing the asset management strategy clear guidance on Octavia's priorities and future vision.

8.3.4.2 Results from Breakout Session 1

The organisational (business) drivers the group thought should inform Octavia Housing's asset management strategy and the attributes they would like Octavia Housing to exhibit. (The photographs provide demonstrations from the day, the content of which is captured in the text and tables below.)

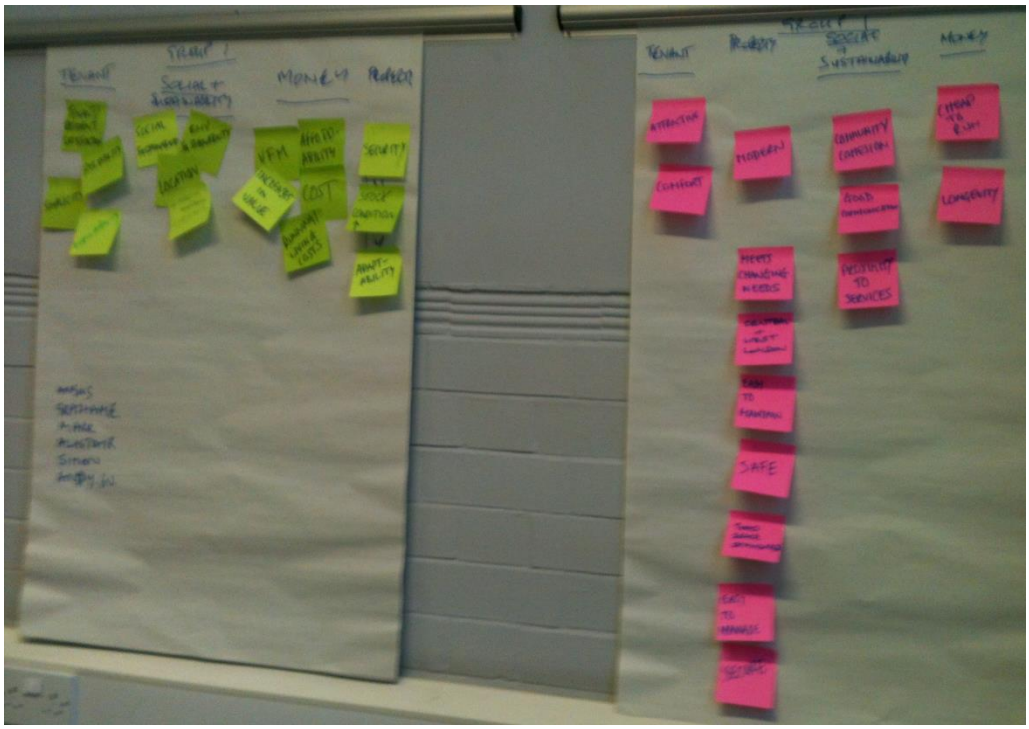


**Figure 8.19 Breakout Session 1 Group 1**

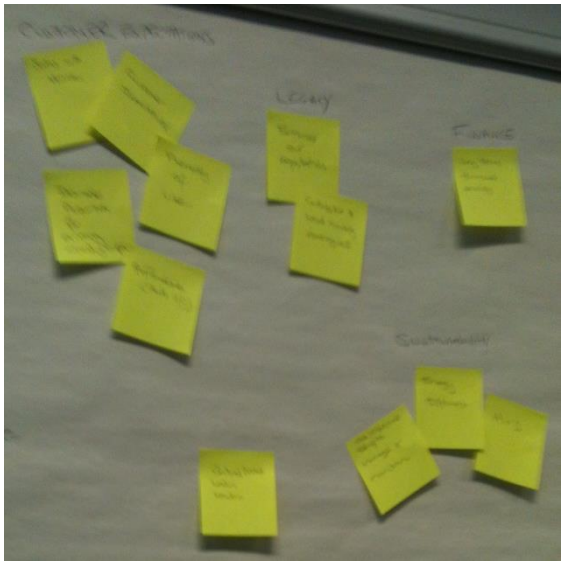


**Figure 8.20 Breakout Session 1 Group 2**

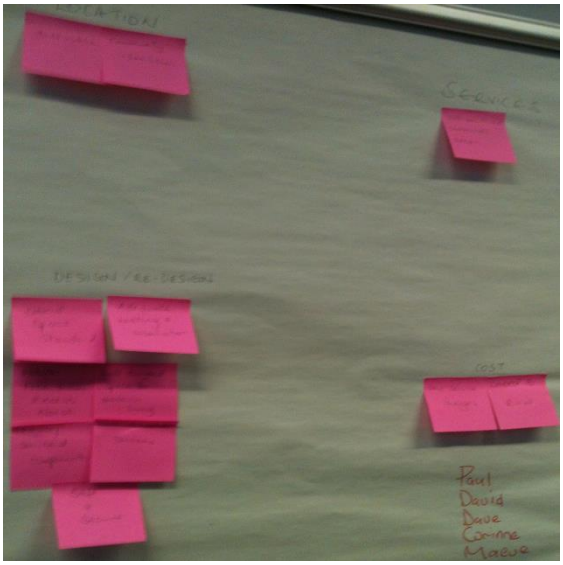


**Figure 8.21 Breakout Session 1 Group 2**

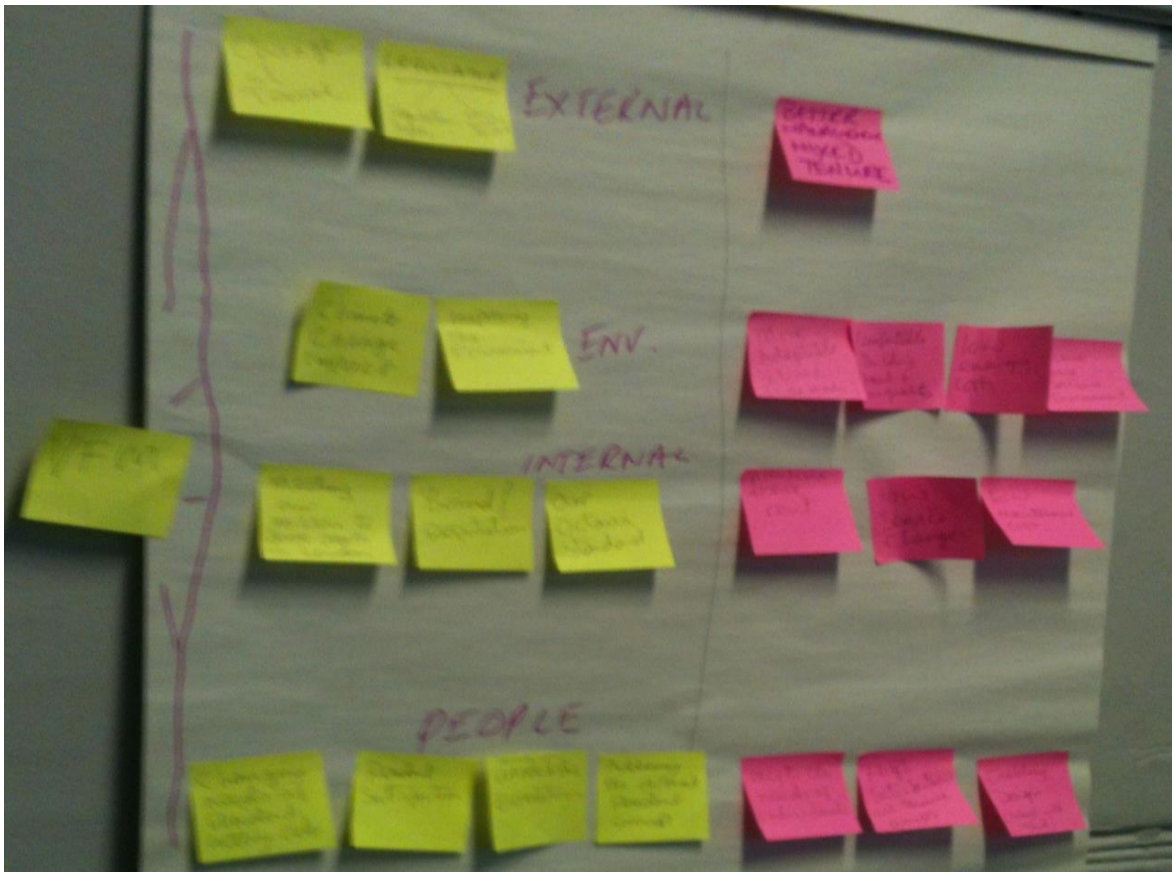


**Figure 8.22 Breakout Session 1 Group 3**

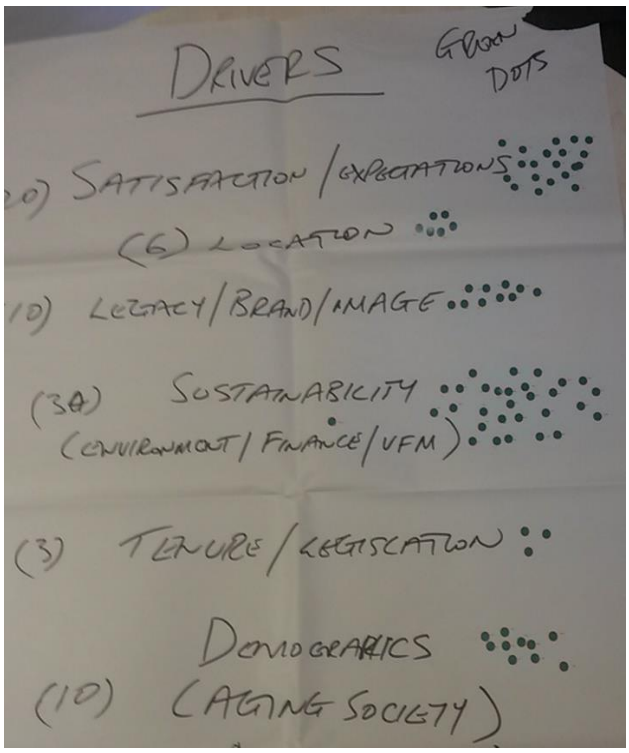


**Figure 8.23 Importance of Drivers**

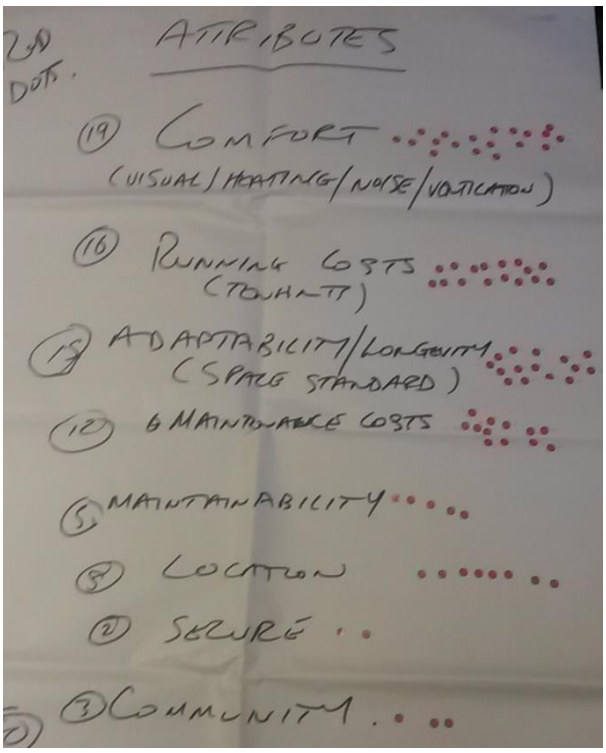


**Figure 8.24 Importance of Drivers**

8.3.4.3 Analysis of Breakout Session 1 - Key Drivers and Attributes

Breakout session 1 identified 39 potential drivers and 38 potential attributes which were grouped by the facilitators into the generic categories shown in tables 8.4 and 8.5.

**Table 8.4 Potential Drivers**

| Drivers | Ranking score |
|---|---|
| Sustainability | 30 |
| Tenant satisfaction/expectations | 20 |
| Demographics (e.g. an aging society) | 10 |
| Legacy/Brand/Image | 10 |
| Location | 6 |
| Legislation (including tenure) | 3 |
| | 79 votes |

The expected mean number of votes (assuming that all votes were equally distributed) per category was 13.33. As such, Sustainability and Tenant Satisfaction/Expectations both scored above the expected mean. All the other drivers scored below the expected mean. This does not imply that these drivers are unimportant, but does suggest that they were perceived as less important than Sustainability and Tenant satisfaction by Octavia's management team.

On closer examination of the post-its it could be argued that Location should have been included alongside Legacy/Brand/Image and that this may have raised the relative importance of this category above the expected mean threshold however it is not mathematically sound to make this assumption on the data that was collected.

**Table 8.5 Potential (Octavia Housing) Attributes**

| Attributes | Ranking score |
|---|---|
| Comfort (visual, thermal, noise, ventilation) | 19 |
| Running Costs (from the tenant's perspective) | 16 |
| Adaptability/Longevity/Space Standard | 15 |
| Maintenance costs | 12 |
| Location | 8 |
| Maintainability | 5 |
| Community | 3 |
| Security | 2 |
| | 80 votes |

The expected number of votes (assuming that all votes were equally distributed) per category was 10. As such, Comfort, Running Costs, Adaptability and Maintenance costs all scored above the expected mean. All the other attributes scored below the expected mean. Again, this does not

imply that these attributes are unimportant but does suggest that they were perceived to be less important by Octavia's management team. Note: location was identified as both a driver and an attribute.

The final activity in breakout session 1 was to map drivers to attributes. It is probably fair to say that this activity gave the delegates most problems. The results of the mapping exercise are shown in table 8.6.

**Table 8.6 Mapping (Business) Drivers and Potential (Octavia Housing) Attributes**

| Driver | Attribute |
|---|---|
| Sustainability | Community, Location, Comfort, Low running costs |
| Tenant satisfaction/expectations | Comfort, Adaptability/Longevity/Space Standard, |
| Demographics (e.g. an aging society) | Adaptability/ Longevity/Space Standard |
| Legacy/Brand/Image | Running costs, Maintenance costs, Location, |
| Location | Location |
| Legislation (including tenure) | Tenure* |

*Identified by one group but not included in the generic list of attributes

Exploring the relationships between the drivers and attributes and expressing these as a series of performance metrics was the next stage in developing the housing asset management strategy.

8.3.4.4 Results of Breakout Session 2 – Key Performance Indicators

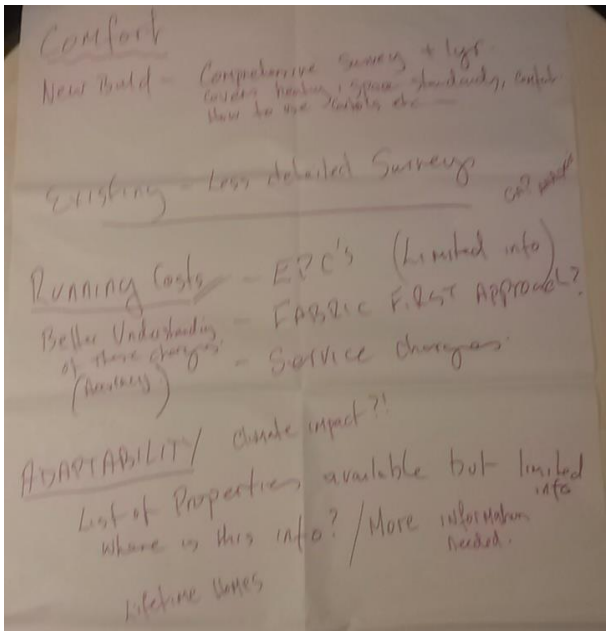


**Figure 8.25 KPIs (Part 1)**

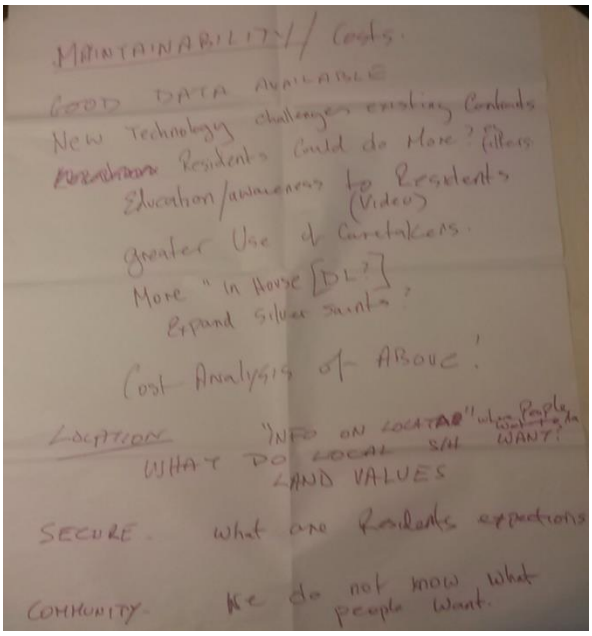


**Figure 8.26 KPIs (Part 2)**

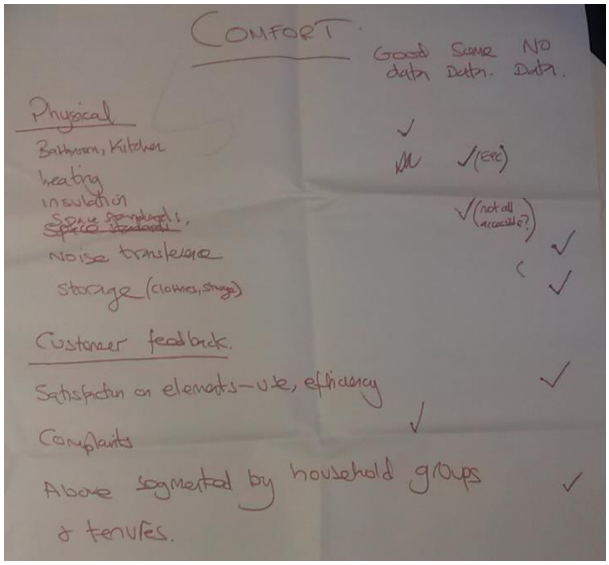


**Figure 8.27 KPIs (Part 3)**

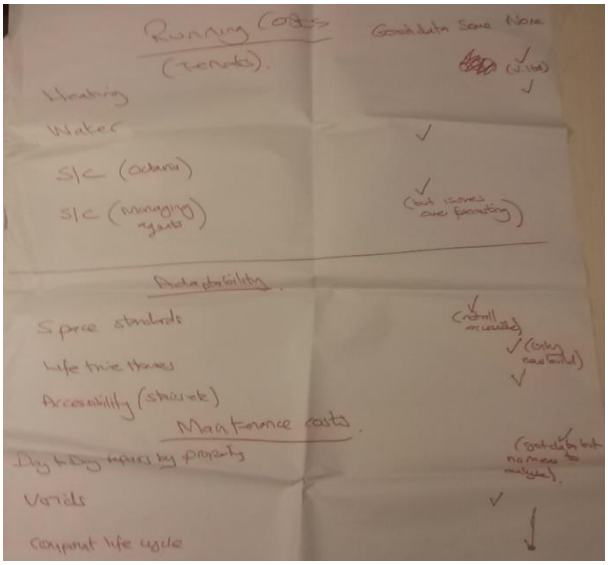


**Figure 8.28 KPIs (Part 4)**

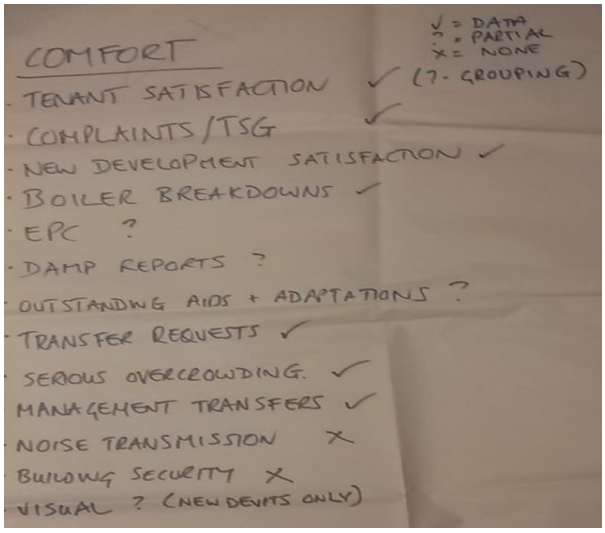


**Figure 8.29 KPIs (Part 5)**

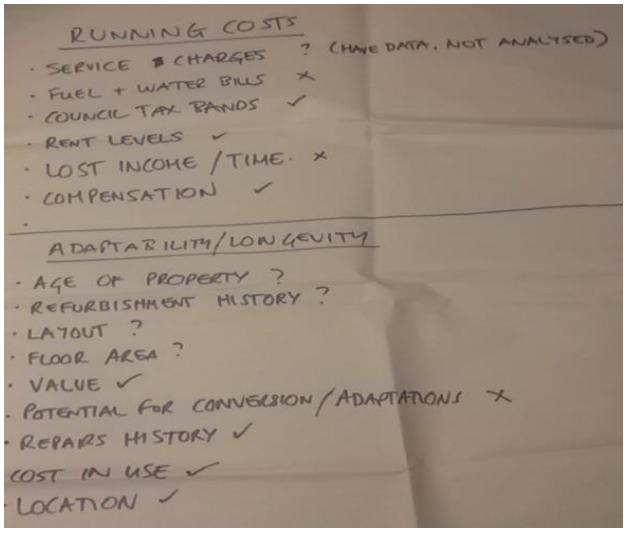


**Figure 8.30 KPIs (Part 6)**

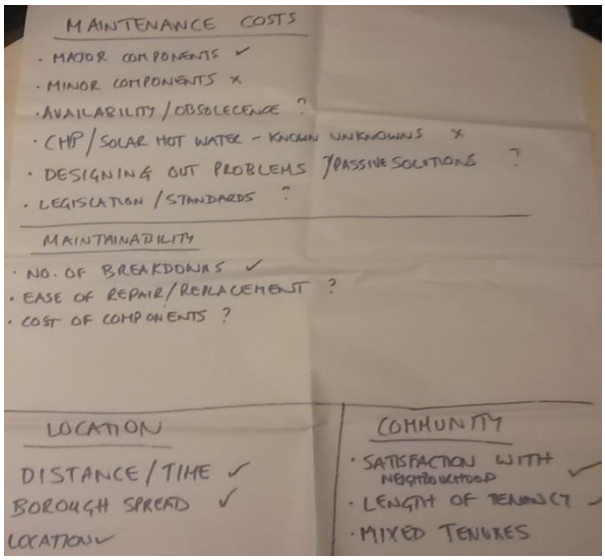


**Figure 8.31 KPIs (Part 7)**

Breakout session 2 examined each attribute identified in breakout session 1 and developed a series of indicators that could be used to measure the performance of a home against each one. The results from all three groups are combined in Table 8.7.

**Table 8.7 Attributes and Associated Indicators**

| Attribute | Indicator |
|---|---|
| Comfort (visual, thermal, noise, ventilation) | Heating, Space/Overcrowding, Noise, Layout, Fixtures & Fittings, Security |
| Running Costs (from the tenant's perspective) | Fuel Bills, Water Bills, Service Charges, Council Tax Bands |
| Adaptability/Longevity/Space Standard | Age of Property, Refurbishment History, Layout, Floor Area, Value, Potential for Conversion/Adaptation, Repairs History, Cost in Use, Location, Accessibility, |
| Maintenance costs | Major components, Minor Components, Obsolescence/Life Cycle Analysis, New Technologies, Changes to Legislation, Day-to-Day Repairs, Voids |
| Location | Distance/Travel Times, Borough Spread |
| Maintainability | Number of Breakdowns, Ease of Repair, Cost of Repair, |
| Community | Satisfaction with Neighbourhood, Length of Tenancy |
| Security | Covered under comfort |

In addition to identifying what could be measured, the breakout session also asked whether Octavia currently had the data to make the measurements. The results are shown in Table 8.8 and show Octavia did have the data to allow measurements to be made against most of the attributes that it would need to measure to evaluate the performance of its housing stock and the potential for improvements through its asset management programmes.

The indicators identified by the breakout groups are complex and inter-related and delegates found it difficult to separate out performance indicators from the factors that affect the indicators. This isn't a problem in its own right (as any benchmarking process needs eventually to drill down to underlying causes) but it does complicate the picture at the strategic level. Table 8.9 identifies those indicators that directly measure the performance of a home in-use; that directly relate back to the strategic drivers identified in Table 8.6; and can be changed through an intervention by Octavia.

**Table 8.8 Data Collected for Attributes and Indicators**

| Attribute | Indicator | Existing level of data |
|---|---|---|
| Comfort | Heating | Some |
| | Space | Some |
| | Noise | None |
| | Fixtures & Fittings | Good |
| | Security | None |
| Running Costs | Fuel Bills | None |
| | Water Bills | None |
| | Service Charges | Good (not analysed) |
| | Council Tax Bands | Good |
| Adaptability | Age of Property | Some |
| | Refurbishment History | Some |
| | Layout | Some |
| | Floor Area | Some |
| | Value | Good |
| | Potential for Conversion/Adaptation | None |
| | Repairs History | Good |
| | Cost in Use | Good |
| | Life Time Homes | Some (only new build) |
| | Accessibility | None |
| Maintenance Costs | Major Components | Good |
| | Minor Components | None |
| | Obsolescence/LCA | Some |
| | New Technologies | None |
| | Changes to Legislation | None |
| | Day-to-Day Repairs | Some (no way to analyse) |
| | Voids | Some |
| Location | Distance/Travel Times | Good |
| | Borough Spread | Good |
| Maintainability | Number of breakdowns | Good |
| | Ease of Repair | Some |
| | Cost of Repair | Some |
| Community | Satisfaction with Neighbourhood | Good |
| | Length of Tenancy | Good |

Assessing the existing stock against the 23 indicators given in Table 8.9 will allow the current level of performance to be assessed (the thesis proposes using AHP as a method for combining the indicators in a robust way). Furthermore, these indicators will also allow the potential impact of future interventions on the overall performance of a home to be assessed. This in turn will inform priority setting to ensure that those interventions that are implemented address Octavia's key strategic goals.

**Table 8.9 Quantitative Measures for Attributes and Indicators**

| Attribute | Indicator | Possible quantitative measures |
|---|---|---|
| Comfort | Heating | Tenant Satisfaction, Temperature |
| | Space | Tenant Satisfaction, $m^2$/occupant |
| | Noise | Tenant Satisfaction |
| | Fixtures & Fittings | Tenant Satisfaction |
| | Security | Tenant Perception, Crime Statistics |
| Running Costs | Fuel Bills | Tenant Bills |
| | Water Bills | Tenant Bills |
| | Service Charges | £, £/$m^2$ |
| | Council Tax Bands | £ |
| Adaptability | Layout | Unsure |
| | Floor Area | $m^2$, $m^2$/occupant |
| | Potential for Conversion/Adaptation | Unsure |
| | Cost in Use | £, £/occupant |
| | Life Time Homes | Unsure |
| | Accessibility | Unsure |
| Maintenance Costs | Major Components | £ |
| | Minor Components | £ |
| | Obsolescence/Life Cycle Analysis | % remaining life, Time to next action |
| | New Technologies | £ (futures scenarios) |
| | Day-to-Day Repairs | £ |
| | Voids | £ |
| Community | Satisfaction with Neighbourhood | Tenant Satisfaction |
| | Length of Tenancy | Years |

As indicated previously, delegates in break session 2 also identified potential underlying causes and solutions to the possible underperformance of some of Octavia's housing stock. Whilst this wasn't part of the workshop these comments are summarised in Table 8.10 and may provide guidance in interpreting the outputs from any KPIs that are developed.

**Table 8.10 Intervening Factors Affecting the Performance of Octavia's Stock**

| Attribute | Comment |
|---|---|
| Comfort | Need to understand comfort by household group and tenure.<br>Need to educate tenants in use of controls etc. |
| Running Costs | Need to better understand the charges especially their accuracy. |
| Adaptability | Need to understand impact of climate change.<br>Need more information [and better models]. |
| Maintenance Costs | Need to design out recurrent problems.<br>Residents could do more.<br>Need to educate residents (videos).<br>Greater use of caretakers.<br>More 'in-house DLs'.<br>Expand Silver Saints.<br>Better cost [benefit] analysis |

Note text in [] was added by the facilitator.

The key strategic drivers and performance metrics from workshop 3 are summarised in Figure 8.32.

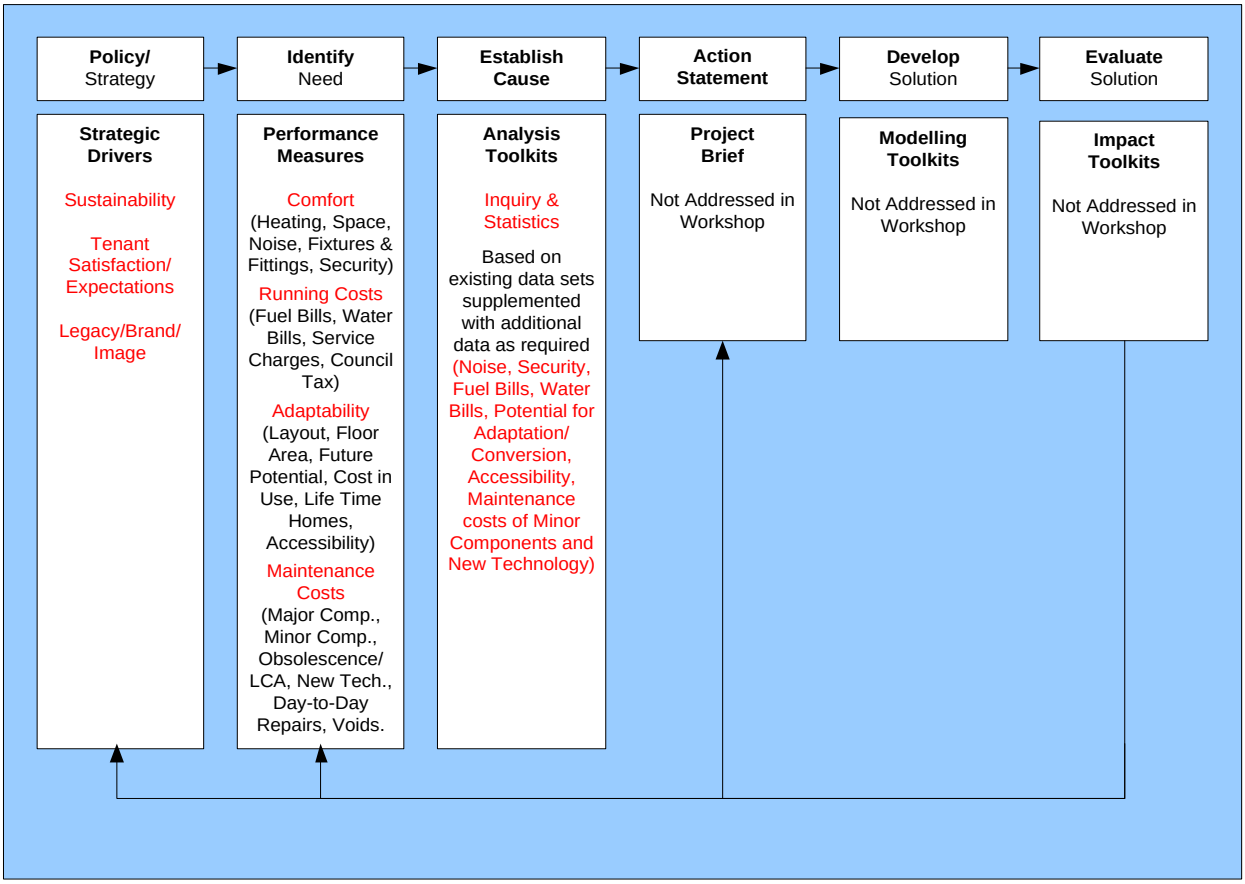


**Figure 8.32. The Performance Based Sustainable Social Housing Maintenance Model Incorporating Octavia Housing's Criteria Established During the Participatory Research**

### 8.3.5 Octavia Housing's Performance Based Sustainable Social Housing Maintenance Key Performance Indicators

The performance criteria established throughout the participatory research phase have been combined to produce the 'Octavia Housing's Performance Based Social Housing Maintenance Key Performance Indicators' as described in Table 8.11. Only KPIs have been considered that can be directly affected by maintenance work and which are measureable, linked to a process and independent of each other. The next stage would be to develop short and long-term targets for each of the headline KPIs which would measure how well the landlord was performing in terms of sustainable social housing maintenance, however this is beyond the scope of this current research.

**Table 8.11 Key Performance Indicators Established by Octavia Housing During the Participatory Research for Use Within the Performance Based Sustainable Social Housing Maintenance Model**

| KPI | Measure | Data Collected |
|---|---|---|
| Running Cost (Tenant) | **Combined measure** | |
| Fuel Bills | Fuel Bills / Smart Meters £, £/occupant | No |
| Water Bills | Water Bills / Smart Meters £, £/occupant | No |
| Service Charge | Service Charge £, £/$m^2$ | Yes (not analysed) |
| Council Tax | Council Tax £, £/$m^2$ | Yes (bands) |
| Energy | | |
| SAP | SAP Rating | Yes (Incomplete) |
| Tenant Feedback | Relationship between energy use / comfort | No |
| Energy Use | Energy Bills / Smart Meters, £, £/Occupant, £/$m^2$ | No |
| $CO_2$ | (Actual) $kgCO_{2e}/m^2/yr$ | No |
| Water Use | | |
| Consumption (construction) | $l/m^2$ (construction floor area) | No |
| Consumption (occupant) | $l/m^2/yr$ | No |
| Greywater | Potable water displaced ($l/m^2/yr$) No. installations | No |
| Rainwater harvesting | No. of installations | No |
| Maintenance Cost (Landlord) | | |
| Major Components Initial Cost | £ | Yes |
| Major Component Performance | No of calls to replace / repair / Cost to replace / repair, £ | Some |
| Minor Components Cost | No of calls to replace / repair | Some |
| Minor Component Performance | Cost to replace / repair, £ | Some |
| LCC | % of remaining life, time to next action | Some |
| Maintenance LCA | £/property, £/$m^2$ | Some |
| Void | £/property, £/$m^2$ | Some |
| Day-to-Day Repairs | £ (futures scenarios) | Yes (not analysed) |
| New Technologies | | No |

| | | |
|---|---|---|
| Maintainability (efficient programming) | | |
| Breakdowns | Number of breakdowns | Yes |
| Ease of repair | Time/repair | Some |
| Cost of repair | £ | Some |
| Waste Reduction | | |
| Recycle surplus building materials Construction Materials | % of total, volume | No |
| ASB | Number of reported incidents | Some |
| | Location of reported incidents | Some |
| Community Cohesion (neighbourhood sustainability) | | |
| Length of tenancy | Years | Yes |
| Satisfaction with neighbourhood | Tenant Satisfaction | Yes |
| Voids properties | Number of voids, No/yr | Yes |
| Level of Arrears | £ | Yes |
| Ave Re-let time | Days, months, years | Yes |
| Tenant Expectation | Tenant satisfaction | Some |
| Quality of Life | | |
| Property layout, | Tenant satisfaction | |
| Hard to treat houses | Tenant satisfaction, No refurbished, No. refurbished as a % of whole | |
| Mould | No. of complaints regarding mould – total, No. of complaints mould / property | |
| Reward system | Tenant satisfaction | |
| Comfort | | |
| Noise, | Tenant Satisfaction | No |
| Thermal | °C, Tenant Satisfaction | Some |
| Ventilation | Tenant Satisfaction | Some |
| Space, | $m^2$/occupant, tenant satisfaction | Some |
| Visual | Tenant Satisfaction | No |

| | | |
|---|---|---|
| Location | Tenant Satisfaction | No |
| Security | No of reported incidents, Tenant Satisfaction | No |
| Overcrowding | (regulation), tenant satisfaction | Some |
| Layout, | Tenant Satisfaction | No |
| Fixtures and Fittings, | Tenant Satisfaction | Yes |
| Location (Operation) | | |
| Distance | Miles | Yes |
| Travel times | Hours, minutes | Yes |
| Adaptability | | |
| Age of property | Age of property | Some |
| Space Standard, | $m^2$/occupant, Tenant Satisfaction | Some |
| Layout | Tenant Satisfaction | Some |
| Longevity | Tenancy Duration (years) | Yes |
| Refurbishment history | Refurbishment history | Some |
| Value | Value | Yes |
| Potential for Conversion / Adaptation | Potential for Conversion / Adaptation | No |
| Repairs history | Repairs history | Yes |
| Cost-in-use | Cost-in-use | Yes |
| Location | Location | Yes |
| Accessibility | Accessibility | No |
| Life Time Homes | Life Time Homes | Some (new build) |

### 8.3.6 Octavia Housing Sustainable Maintenance AHP

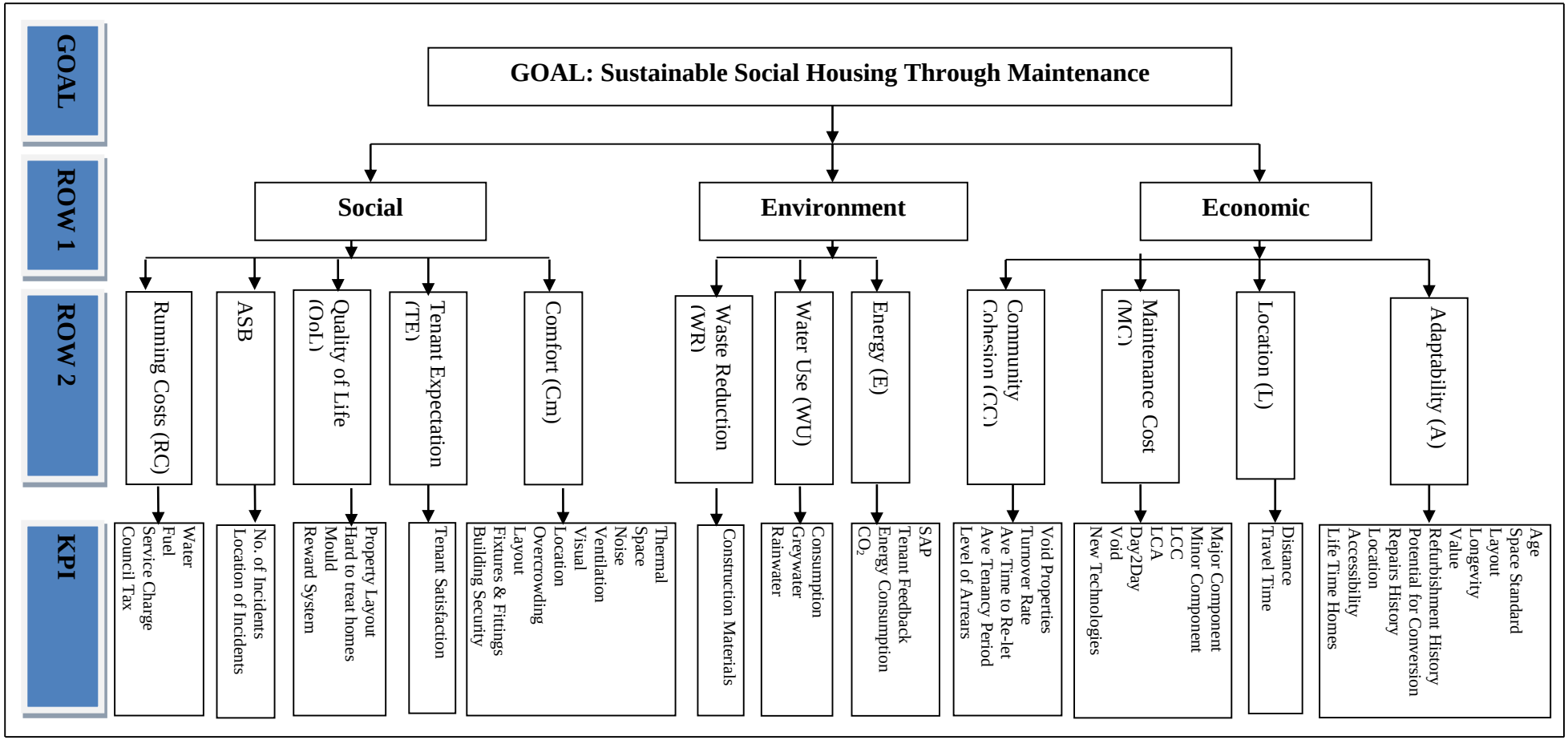


**Figure 8.33 Octavia Housing's AHP Hierarchy for Use Within the Performance Based Sustainable Social Housing Maintenance Model**

8.3.6.1 Octavia Housing's AHP Hierarchy and Pair-Wise Decision Model

This section presents the final item of work carried out with Octavia Housing, the prioritisation of criteria (objectives) identified in Figure 8.33 for use within the AHP model to help prioritise maintenance action and thus inform box 5 of the 'Octavia Housing Performance Based Sustainable Social Housing Model'. Figure 8.33 was presented to the Director of Asset Management and the Building Services and Energy Manager during a meeting at Octavia Housing's offices on the 8th April 2014 from which the criteria contained within was prioritised.

Chapter 3 (Theory) provided a review of AHP theory and the 5 stages (develop hierarchy, establish priorities, eigenvectors, synthesize and sensitivity) involved in the creation of an AHP model. The following paragraphs illustrate the application this theory within the context of Octavia Housing by completing stages 1 to 4 in the development of the AHP model. Stage 5 is presented in Chapter 9 - Discussion – Part 2.

Stage 1, the problem was broken down into its component parts and a hierarchy developed Figure 8.33. In this case the goal was conducting sustainable performance based social housing maintenance and included 3 rows of objectives; the alternatives have not been included but would consist of a list of typical maintenance actions.

Stage 2, priorities were established by determining the importance of the objective in achieving the goal through pair-wise comparisons. Each objective was compared against the other in relation to its importance in achieving the goal using the pair-wise comparison scale produced by Saaty (1990) described in Table 3.4. In this instance the Director of Asset Management and the Building Services and Energy Manager pair-wised the first row of objectives against the goal (to provide an indication as to the importance placed upon environmental, economic and social for comparison against the ratings established during the interview phase, and not for use within the final decision making process). The researcher (not Octavia Housing) used Environmental, Economic and Social to categorise the objectives (in rows 2 and 3) established throughout the participatory phase. Row 1 objectives were excluded from the main pair-wise activity to ensure independence between objectives in row 2, which is a requirement of AHP. It was felt that including row 1 objectives in the decision process would add unnecessary complexity due to the introduction of interdependence between objectives, for example running costs could be attributed to social and economic objectives. Therefore only row 2 objectives were considered in the example and the relative importance of each objective with respect to the goal was assessed.

The results are provided in Table 8.12 (figures in black are in favour of objectives in column 1 and figures in red are in favour of objectives in row 1). Row 3 objectives could be more accurately described as the measures used to evaluate objectives in terms of KPIs.

Stage 3, the pair-wise comparison information presented in the pair-wise comparison matrix in Table 8.12 and 8.13 was used to calculate eigenvectors and eigenvalues. The eigenvector provides the regional priority ordering whereas the eigenvalue measures the consistency of the pair-wise judgement.

Stage 4, synthesize the results to calculate the global priority order and global consistency. Building a choice model in expert choice based on the goal and objectives and inputting the pair-wise decisions from Octavia Housing combines steps 2, 3 and 4.

**Table 8.12 Pair-Wise Comparison Matrix for Top Tier Objectives**

| | Social | Environmental | Economic | Priority |
|---|---|---|---|---|
| Social | | 7 | 8 | 0.777 |
| Environmental | | | 3 | 0.153 |
| Economic | | | | 0.070 |
| Inconsistency | | | | 0.1 |

**Table 8.13 Pair-Wise Comparison Matrix for Second Tier Objectives**

| | Ad | Lo | MC | CC | En | WU | WR | Co | TE | QoL | ASB | RC | Priority |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ad | | 7 | 1 | 5 | 8 | 8 | 7 | 8 | 1 | 7 | 4 | 6 | 0.034 |
| Lo | | | 1 | 1 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 0.029 |
| MC | | | | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 0.019 |
| CC | | | | | 1 | 6 | 6 | 1 | 1 | 1 | 1 | 1 | 0.103 |
| En | | | | | | 7 | 1 | 1 | 1 | 1 | 1 | 1 | 0.106 |
| WU | | | | | | | 6 | 7 | 7 | 7 | 7 | 7 | 0.031 |
| WR | | | | | | | | 7 | 7 | 7 | 7 | 7 | 0.064 |
| Co | | | | | | | | | 1 | 1 | 1 | 1 | 0.129 |
| TE | | | | | | | | | | 1 | 1 | 1 | 0.115 |
| QoL | | | | | | | | | | | 1 | 1 | 0.127 |
| ASB | | | | | | | | | | | | 1 | 0.121 |
| RC | | | | | | | | | | | | | 0.125 |
| Inconsistency | | | | | | | | | | | | | 0.25 |

The pair-wise decision making process represented a new way for Octavia Housing to consider their sustainable maintenance criteria (objectives) and may explain why the inconsistency in Table 8.13 was 0.25 rather than the desired ≤1.0. In reality the pair-wise decisions process would

have been repeated until a more appropriate level of inconsistency was achieved, before moving to the next stage, however on this occasion that wasn't possible.

The assumptions made regarding the objectives were made explicit during the Octavia Housing workshops and the pair-wise process as recommended in Section 3.4.2.1 of the Theory Chapter. How these assumptions have evolved during the participatory process are not recorded here instead examples of assumptions made during the final meeting with Octavia Housing are in the following paragraph.

The asset management team consciously select social criteria in favour of the economic outcome and are able to reconcile tenant benefit against Octavia Housing financial input. This is partly due to their desire to continue the social legacy of their founder, Octavia Hill, but also because they understand the indirect economic benefits to Octavia Housing; greater tenant disposable income due to reduced household running costs (for instance) is more likely to result in less rent arrears, better (tenant) maintained homes and happier tenants (less likely to move). It is important to Octavia Housing that they improve the energy efficiency of their housing stock to reduce $CO_2$ emissions and running costs which their planned maintenance reflects. However, the condition based approach to maintenance and current toolkits rely on SAP/RdSAP as a proxy for energy performance. The SAP rating of a property prior to and following maintenance action can be calculated but this does not reflect reality in terms of $CO_2$ emissions, running costs and overall impact on the tenant as in some circumstances it is known that tenants do not use their central heating system. To address this imbalance planned maintenance focus' on improving the dwelling fabric, thus the tenant should feel the comfort benefits regardless of how they interact with the dwelling's building services.

Social criteria are given the top priority, secure in the knowledge that the environment will be improved as an indirect consequence of those decisions as Octavia Housing strive to provide homes that tenants are proud of and within which they want to live and this philosophy is what guides their maintenance planning.

Maintenance planning and prioritisation is subject to the cyclical nature of government policy and must adapt accordingly. As a result Octavia Housing are adapting from the DHS led approach to the value for money approach.

Octavia Housing has a lot of data on their stock but by their own admission, its maintenance and upkeep is poor. Octavia Housing need a more scientific approach to maintenance planning, SCS proved accurate for providing the 'big picture' and calculating the overall maintenance budget but the actual detail differs significantly.

The pair-wise decisions made above are those of the asset management team who by their own admission may not reflect those of other departments, especially those of finance.

### 8.3.7 Summary

This chapter has presented the findings from the participatory research phase with Octavia Housing. The findings from the three workshops and the tenant survey identified the economic, environmental and social criteria Octavia Housing would wish to use to assess the sustainability of their housing stock and planned maintenance priorities. Workshops one and two were also used to demonstrate how the performance based sustainable social housing maintenance model would be implemented in practice. This demonstration also confirmed the flexibility of the model. In its generic form it is capable of conceptualising the performance based maintenance model and in its applied form can represent the organisations interpretation of the sustainability agenda at their national and local level, the local needs of the housing stock and tenants and identify the appropriate performance and analysis toolkits. The final meeting with representatives of the Asset Management team determined the prioritisation of the sustainable housing maintenance criteria to populate the AHP model to demonstrate its use in practice.

# Chapter 9

# Reflection and Discussion – Part 2

## 9.1 Introduction to Part 2 of the Reflection and Discussion Chapter

The generic performance based sustainable social housing maintenance model was presented in Chapter 7. Chapter 9 builds upon chapter 7 by providing a summary of the participatory research conducted with Octavia Housing as a means of demonstrating how the model could be applied in practice. Section 9.2 compares Octavia Housing to the landlords discussed in Chapter 7, section 9.3 provides the participatory study discussion as a means of populating the model, section 9.4 explains how the AHP model could be used to measure the sustainability of the existing stock and prioritise maintenance action, the narrative of sustainable maintenance planning is presented in section 9.5 before providing a summary of the chapter in section 9.6.

## 9.2 How Does Octavia Housing Compare with Typical Landlords?

As discussed in Chapter 8, Octavia Housing was a small RSL based in inner London operating as a non-profit making organisation with 4088 properties in its portfolio and provided a range of services including below market rental property; sheltered accommodation and shared ownership properties.

### 9.2.1 Housing Maintenance and Impact of Sustainability on the Built Asset Maintenance Model.

Octavia Housing followed the traditional approach to maintaining their assets (condition based approach based upon the SCS), which in principle was followed by the questionnaire respondents (section 7.2.2, 7.3.2). They had no formal way of prioritising maintenance works other than to focus on H&S and no way of justifying budget and planning decisions. There was organisational and inter-department silo working, repair works (PPM and RM) were not integrated, the IT systems were not integrated and maintenance works were completed via a

fragmented list of contractors based on cost. Octavia Housing recognised these shortcomings and had a variety of plans in place to overcome them, such as moving towards a partnered arrangement with a greater emphasis on quality (60:40 quality:price). What wasn't clear following the questionnaire survey was to what extent (if any) the sustainability agenda had on that process (section 7.2.2). In the case of Octavia Housing, it would be fair to say that whilst their asset management strategic goals and targets were influenced by the sustainability agenda (e.g. desire to achieve Gold in the SHIFT rating), the process by which those properties were maintained wasn't. Condition based targets may lead to improvements in SAP (for instance) but say nothing for improvements in how the home is performing or in the tenants quality of life. Octavia Housing understood some tenants didn't operate their homes as intended for a number of reasons including, fuel poverty. Therefore the purpose of such a target is defeated; if improvements to SAP originate from a desire to improve the energy efficiency of the home and thus reduce emissions, running costs and improve the tenant's comfort but no data is collected to determine if this is actually taking place. In such circumstances it is possible that no social or environmental change has occurred for the financial outlay. The traditional approach thus makes it impossible to measure the impact of such improvement works and their value for money.

### 9.2.2 Policy

Octavia Housing's Environmental Strategy 2010-15 focused on energy and established targets but there was no integration of social and economic aspects. An aspiration of the environmental strategy was that the average SAP rating for their property portfolio should be 75. Octavia Housing concurred with the findings of the questionnaire (section 7.2.3) in that they believed sustainability to be important but it hadn't work been integrated into policy.

### 9.2.3 Information

Octavia Housing used traditional tools (SCS, repairs data, SAP, HHSRS and Fire and Risk Assessment) to collect building information and determine maintenance need and priority. This had proved successful in determining the overall 5 year budget (strategic) but not the maintenance action (operational) required. In such cases was spend being tailored to match the budget or were repairs actually reflecting the need of the stock. A lack of confidence within the SCS exacerbates the difficulty of justifying maintenance expenditure and decision making at all levels but especially at board level which includes non-technical members. The confidence in

Octavia Housing's SCS suffered due to surveyor subjectivity (sections 2.3.3 and 2.3.4.7). Lack of information regarding building and community performance meant Octavia Housing wasn't able to measure the impact of its regeneration schemes. At the outset of the research information was wholly fragmented, stock condition data quickly became outdated due to lack of integration with completed repairs and maintenance data and tenant feedback.

### 9.2.4 Modelling

The questionnaire concluded sustainability was not integrated into current maintenance practices (7.2.5) and that a new multiple criteria approach was required. Octavia Housing was sceptical of the AHP method because of the inter-relations between social, economic and environment. Octavia Housing didn't believe organisations operated in such a rational manner. Although sceptical, they recognised that by producing the sustainable housing maintenance hierarchy (workshop 1) they would better understand how the various departments interpret the sustainability agenda and identify inconsistency within the organisation or lack of understanding.

### 9.2.5 Planning

At the outset of this research, responsive repairs dominated Octavia Housing's asset management who had an aspiration to change their strategy to one based upon planned responsive maintenance. The reasons for this change included a need to address maintenance expenditure and to improve tenant satisfaction. It has also been noted above that Octavia Housing didn't have a scientific approach to prioritising maintenance other than to ensure H&S issues were addressed and nor did they have a standardised approach for involving tenants in decision making. They had no scientific approach to determining budgets; there was no methodology in place for moving the organisation from its current position to where it aspired to be in the future. Octavia Housing were bound by the same regulations as other landlords in that the target of 100% decent homes by 2010 applied and whilst they wished to achieve their DHS++ specification, the reality was that minimum standards only, were being achieved. The questions they asked of themselves were;

'What makes tenants happy?'

'How do we measure that?'

'How do we know we have met tenant aspirations?'

'How do we determine what tenants really want?'

## 9.3 Discussion from the Participatory Research Results: Populating the Performance Based Sustainable Social Housing Maintenance Model

Section 3.4.1 presented the generic performance based sustainable social housing maintenance model including a content description of each of its boxes (Policy, Need, Cause, Action Statement, Solution, and Evaluation). This section provides a summary of the participatory research conducted with Octavia Housing as a means of demonstrating how the model could be applied in practice.

The participatory research consisted of 3 workshops with Octavia Housing (staff and tenants), a tenant telephone survey and a meeting with representatives of the Asset Management team.

### 9.3.1 Workshops 1 and 2

The process incorporated commonly used facilitated workshop techniques, the questions raised however were critical to the successful application of the model in practice. Thus, the primary function of workshop 1 was to determine Octavia Housing's key strategic drivers, (as discussed in section 2.3.4.4, 2.3.3 and 7.2.2) and determine their importance to Octavia Housing and relevance to the maintenance process. The secondary function was to populate as many boxes in the model as possible (Figure 9.1, red text).

A significant omission from the drivers identified was customer satisfaction, at the time of the workshop participants couldn't determine if this omission was because customer satisfaction was intrinsically built-in into their work or because they didn't rank it highly as part of their work. This opinion (by the asset management department) was clarified over the course of the participatory phase and was quite clearly incorporated intrinsically.

The primary purpose of the second workshop was to build upon workshop 1; establish Octavia Housing's KPIs, determine the meaning of sustainability in terms of building performance and incorporate the views of tenants. The secondary purpose was to continue populating the model (Figure 9.1, purple text).


**Figure 9.1. The Performance Based Sustainable Social Housing Maintenance Model Incorporating Octavia Housing Criteria Established in Workshops 1 and 2**

9.3.1.1 KPIs

It was clear through discussions with the tenants that the number of KPIs of relevance to them was limited and focused on running costs, more so than anticipated from the interview process. (It was acknowledged that the interviews were conducted with landlords and not tenants, however the interviewees attempted to reflect upon their tenant's quality of life issues.) Running costs via reduced energy consumption were driven by economics rather than the environment and a desire to limit emissions.

The landlord representatives considered water and energy consumption the overriding KPIs with the acknowledgement that currently they were unable to monitor (in-use consumption of) either.

The tenants who took part in the workshop understood the 'bigger picture' and recognised the implications of maintenance process, policy (DHS), tenant behaviour and landlord expenditure on housing quality, rents and service charges. As a result they desired;

- A more planned approach to maintenance (greater cost efficiency should be reflected in service charges and greater programme efficiency should reduce maintenance completion period and number of visits with tenant),
- The maintenance standard to go beyond the requirements of the DHS so that performance / quality of the home was improved and not just its cosmetics,
- Tenants to take greater responsibility for their actions.
- A system to reward good (tenant and landlord) behaviour and penalise poor (tenant and landlord) behaviour to improve social housing performance (the physical asset, quality of life and economic performance).

9.3.1.2 The Meaning of Sustainability in Terms of Building Performance (Landlord Perspective)

Octavia Housing expressed a desire to profile (benchmark) tenants to develop an asset management strategy that better reflects their needs and behaviours. Olubodun (2011) determines this is critical to predicting maintenance need (discussed in section 2.3.4.5). Future maintenance prioritisation should integrate tenant and stock profiling.

Better understanding and management of tenant expectations is necessary. Octavia Housing must fulfill their obligations but both landlord and tenant must be realistic in what can be achieved through BAM within the organisations' constraints. Without this dialogue tenants may feel disillusioned and dissatisfied.

Octavia Housing need to better understand the aspirations of their tenants in terms of the sustainability agenda so that they can identify and promote commonalities between the tenants' aspirations and Octavia Housing's strategy, which will then be reflected in the BAM.

Life cycle costs should inform maintenance prioritisation and wellbeing discounts (payback) need taking account of during the development of a project brief. The latter reflects, to a degree, the tenants' desire for a reward system.

Upon completion of workshops 1 and 2 the performance based sustainable maintenance model was updated to reflect Octavia Housing's interpretation of the sustainability agenda, the local needs of their housing stock linked to the organisation's strategic goals as shown in figure 8.8 and reproduced in Figure 9.1. This process identified a (larger) number of toolkits Octavia Housing would require to measure the sustainability of their existing stock and prioritise maintenance to ensure the sustainable performance of that stock improved during the course of BAM. What was not identified was the level of improvement (performance of the home in-use, its sustainability rating) and the ease by which it would be achieved (accuracy, speed, transparency and cost) in comparison to the current approach.

### 9.3.2 The Tenant Survey

The purpose of the tenant survey was two-fold, firstly it provided criteria for Octavia Housing's performance based sustainable maintenance hierarchy (discussed in section 9.2.4), and secondly, it provided tenant insight to the performance of Octavia Housing housing stock and further detail of the potential (tenant) reward system.

#### 9.3.2.1 Performance of Octavia Housing Stock

This group of tenants wasn't explicitly asked to comment on the performance of Octavia Housing; however one quarter did confirm that maintenance negatively impacted their quality of life. Whilst the reasoning behind this response wasn't investigated, it may support the tenants of workshop 2 who desired a more planned approach to the maintenance process. As with workshop 2 tenants, the overriding quality of life issue was living costs.

Certainly in terms of energy conservation, this group of tenants felt they were taking responsibility for their actions.

- Octavia Housing seek a two-way relationship with their tenants
- This approach is supported by the co-regulation approach of the coalition government

- As such both parties to the relationship must be seen to be doing their bit. Thus Octavia Housing must take responsibility for the energy reduction actions that are beyond the control of tenants, especially where tenants feel they have done their bit.
- Supports awards and penalties approach?

There appeared to be some disagreement between the tenants and Octavia Housing regarding the maintenance need of the surveyed homes. Octavia Housing toolkits had identified them as being in 'maintenance need' whilst the tenants felt rather satisfied with their homes and would rather Octavia Housing concentrated their efforts on providing energy conservation works than the broader aspects of DHS and HHSRS.

- Does this imply that the SCS data is erroneous or simply that the tools employed to determine maintenance need do not measure how the building performs as a home and doesn't reflect actual maintenance need, more likely maintenance need was politically driven by the DHS.
- OR is this the gap between performance measure and condition measure?

9.3.2.2 Rewards System

Sixty percent of the tenants surveyed believed they should be rewarded for abiding by the terms of their tenancy agreement which builds upon the outcome of workshop 2. What will be interesting to landlords is that less than half (47%) of the proposed rewards had a direct monetary value (e.g. rent free period and gift vouchers), 37% of the proposed rewards sought appreciation for 'good' behaviour and an appropriate maintenance / service (recognition that all parties must fulfill their obligations) and 16% didn't know what kind of reward they wanted.

### 9.3.3 Workshop 3: Octavia Housing Sustainable Performance Criteria and KPIs

Since the inception of this PhD, professional bodies such as the Housing Forum have determined that social, environmental and economic factors need to be included in the building asset management models but hadn't suggested what these may be or what methods could be employed to establish them. The work presented in this thesis has taken that extra step by identifying the criteria and an approach all social landlords can take to establish it.

Workshop 3 contributed to the establishment of the final set of KPIs for Octavia Housing as shown in Table 8.11 which were translated into the performance based sustainable social housing maintenance hierarchy (Figure 8.34) for use within the AHP model. As expected this was a broader set of criteria than traditionally used in the determination of maintenance need and prioritisation of maintenance action.

## 9.4 Octavia Housing's AHP Model

Chapter 3 provided a review of AHP theory and introduced the 5 stages involved in the creation of an AHP model. Chapter 8.3 subsequently presented the results of the participatory research with Octavia Housing during which the KPIs were established and stages 1 to 4 were complete, ending with the calculation of global priority and consistency.

In 1998 Shen et al demonstrated how AHP could be used to prioritise maintenance actions against six criteria (Building Status, Physical Condition, Importance of Usage, Effects on Users, Effects on Fabric and Effects on Service Provision) and work items taken from the schedule of repairs (refer to section 2.5.4). In the Shen et al case, AHP was used to calculate the priority index of the work items. Completion of stage 5 (sensitivity) will demonstrate how the AHP model can be used to rate properties within the stock portfolio and prioritise maintenance action. Figure 9.2 demonstrates how the priority index (weight factor) for each of the 2$^{nd}$ row objectives/criteria based upon the pair-wise decisions of Octavia Housing can be combined with the 'property KPI score' to score a property.

Shen et al, 1998 (cited in Shen and Lo, 1999) identified subjectivity within the decision making process and (too) broad priority bands as particular issues with the traditional approach that could be overcome using AHP (refer to section 2.4.4 and 2.5.1). Thus in order to eliminate subjectivity (and ensure consistency) surveyors would need to be given very clear guidelines for assigning scores. An example of how the final stage of the AHP model may be applied, and the KPIs scored is provided below to demonstrate its practical application.

### 9.4.1 The Final Stage, Stage 5

As discussed in section 8.3.6 only row two objectives and their priority index figures have been considered henceforth. A rating for the performance of a home in-use was calculated using the

priority index figures calculated from Octavia Housing's pairwise decisions combined with an arbitrary KPI score (depicting a fictional property) as described below and demonstrated in Table 9.2 (the scoring process described is that used by EcoHome);

- Score each sub-KPI from 1 to 10 (1 = bottom end of the scale). An example of how the Energy Headline KPI could be scored is presented in Table 9.1.
- Calculate the sub-total for the headline KPI
- Using the headline KPI sub-total and the total number of credits available for the headline KPI in question, calculate the percentage of credits actually achieved
- Multiply the percent of credits actually achieved with the headline KPI weighting factor (this is the priority index calculated from Octavia Housing pair-wise decisions) to calculate the credit score for each headline KPI
- Add the credit scores together to calculate the total performance in-use credit score for the property.
- Repeat the above process for each property within the portfolio.

The baseline performance in-use score for the fictional Octavia Housing property was 50.15. For ease of demonstration all KPIs were given an average score of 5 out of 10.

#### 9.4.1.1 Scoring

The sub-KPIs included both objective and subjective criteria which is acceptable with AHP. However, surveyor subjectivity isn't acceptable, so to limit surveyor error the measuring system proposed uses a 10 point scale based upon objective measures wherever possible. The proposed scoring guideline was not developed during the participatory research and would need further development as described in section 10.5.2.

Once the baseline performance in-use score has been calculated for a property or portfolio of properties, planned maintenance scenarios can be applied to determine how the performance score will be impacted (test the sensitivity of the model).

Table 9.3 demonstrates how the scores may change if new uPVC double glazed windows were installed to replace single glazed timber-framed windows in an occupied property. The fictional property isn't listed nor is it located within a conservation area. The anticipated changes to the performance in-use score this could result in are highlighted in yellow in Table 9.3 and the

assumptions made are described in Table 9.4. This example illustrates how a maintenance action can have a positive (increase the score) and negative (decrease the score) effect on the KPI scores.

**Table 9.1 Example of KPI Scoring Guidelines**

| **Headline KPI** | **Sub-KPI** | **Scoring Guideline** |
|---|---|---|
| Energy | SAP | Based on Energy Rating System<br>10 credits = 92+ (A rated)<br>5 credits = 55 - 68 (D rated)<br>1 credit = 1 – 20 (G rated) |
| | Tenant Feedback | Based on 'how comfortable are you in your home?'<br>10 credits = Very Comfortable<br>5 credits = Mixed<br>1 credit = Very Uncomfortable |
| | Energy Consumption | Actual annual gas and electricity consumption from tenant readings / smart meters based on typical consumption values from Ofgem, 2011<br>10 credits ≤11,000kWh gas and ≤2,100kWh electricity<br>5 credits = 16,500kWh gas and 3,300kWh electricity<br>1 credit ≥23,000kWh gas and ≥5,100kWh electricity<br>Note. The preferred scale kWh/$m^2$/yr would be based on actual consumption of Octavia Housing stock rather than national averages such as those provided by Ofgem and would need to account for electric only properties |
| | $CO_2$ | Based on typical $CO_2$ emissions expressed by TSB Retrofit for the Future (www.retrofitanalysis.org)<br>10 credits ≤ 20kg$CO_2$/$m^2$/yr<br>5 credits = 85kg$CO_2$/$m^2$/yr (typical 1990 data)<br>1 credit ≥ 115kg$CO_2$/$m^2$/yr |

## Table 9.2 Performance of Home In-Use (Baseline Example)

| Headline KPI | Sub KPIs | Score | Credits Available | Sub-Total | Credits Available | % Achieved | Weight Factor | Credit Score |
|---|---|---|---|---|---|---|---|---|
| Running Costs | Water | 5 | 10 | 20 | 40 | 50 | 0.125 | 6.25 |
| | Fuel | 5 | 10 | | | | | |
| | Service Charge | 5 | 10 | | | | | |
| | Council Tax | 5 | 10 | | | | | |
| ASB | Incidents | 5 | 10 | 10 | 20 | 50 | 0.121 | 6.05 |
| | Location | 5 | 10 | | | | | |
| QoL | Layout | 5 | 10 | 20 | 40 | 50 | 0.127 | 6.35 |
| | Hard to Treat | 5 | 10 | | | | | |
| | Mold | 5 | 10 | | | | | |
| | Reward System | 5 | 10 | | | | | |
| Tenant Expectations | Tenant Satisfaction | 5 | 10 | 5 | 50 | 50 | 0.115 | 5.75 |
| Comfort | Thermal | 5 | 10 | 50 | 100 | 50 | 0.129 | 6.45 |
| | Space | 5 | 10 | | | | | |
| | Noise | 5 | 10 | | | | | |
| | Ventilation | 5 | 10 | | | | | |
| | Visual | 5 | 10 | | | | | |
| | Location | 5 | 10 | | | | | |
| | Overcrowding | 5 | 10 | | | | | |
| | Layout | 5 | 10 | | | | | |
| | Fixtures & Fittings | 5 | 10 | | | | | |
| | Security | 5 | 10 | | | | | |
| Waste Reduction | Construction Materials | 5 | 10 | 5 | 10 | 50 | 0.064 | 3.2 |
| Water Use | Consumption (Tenant) | 5 | 10 | 20 | 40 | 50 | 0.031 | 1.55 |
| | Consumption (Construc) | 5 | 10 | | | | | |
| | Greywater | 5 | 10 | | | | | |
| | Rainwater Harvesting | 5 | 10 | | | | | |
| Energy | SAP | 5 | 10 | 20 | 40 | 50 | 0.106 | 5.3 |
| | Tenant Feedback | 5 | 10 | | | | | |
| | Energy Use | 5 | 10 | | | | | |
| | $CO_2$ | 5 | 10 | | | | | |
| Community Cohesion | Void Properties | 5 | 10 | 25 | 50 | 50 | 0.103 | 5.15 |
| | Turnover Rate | 5 | 10 | | | | | |
| | Ave. Re-let Period | 5 | 10 | | | | | |
| | Ave. Tenancy Period | 5 | 10 | | | | | |
| | Arrears | 5 | 10 | | | | | |
| Maintenance Cost | Minor Component | 5 | 10 | 35 | 70 | 50 | 0.019 | 0.95 |
| | Major Component | 5 | 10 | | | | | |
| | LCC | 5 | 10 | | | | | |
| | LCA | 5 | 10 | | | | | |
| | Day2Day | 5 | 10 | | | | | |
| | Void | 5 | 10 | | | | | |
| | New Technologies | 5 | 10 | | | | | |
| Location | Distance | 5 | 10 | 10 | 20 | 50 | 0.029 | 1.45 |
| | Travel Time | 5 | 10 | | | | | |
| Adaptability | Age | 5 | 10 | 60 | 120 | 50 | 0.034 | 1.7 |
| | Space Standard | 5 | 10 | | | | | |
| | Layout | 5 | 10 | | | | | |
| | Longevity | 5 | 10 | | | | | |
| | Refurb History | 5 | 10 | | | | | |
| | Value | 5 | 10 | | | | | |
| | Potential | 5 | 10 | | | | | |
| | Repairs History | 5 | 10 | | | | | |
| | Cost-in-Use | 5 | 10 | | | | | |
| | Location | 5 | 10 | | | | | |
| | Accessibility | 5 | 10 | | | | | |
| | Life Time Homes | 5 | 10 | | | | | |
| | | | | Total | 560 | | | 50.15 |

## Table 9.3 Performance of Home In-Use (Installation of uPVC Double Glazing Example)

| Headline KPI | Sub KPIs | Score | Credits Available | Sub-Total | Credits Available | % Achieved | Weight Factor | Credit Score |
|---|---|---|---|---|---|---|---|---|
| Running Costs | Water | 5 | 10 | 21 | 40 | 52.5 | 0.125 | 6.56 |
| | Fuel | 6 | 10 | | | | | |
| | Service Charge | 5 | 10 | | | | | |
| | Council Tax | 5 | 10 | | | | | |
| ASB | Incidents | 5 | 10 | 10 | 20 | 50 | 0.121 | 6.05 |
| | Location | 5 | 10 | | | | | |
| QoL | Layout | 5 | 10 | 21 | 40 | 52.5 | 0.127 | 6.67 |
| | Hard to Treat | 5 | 10 | | | | | |
| | Mould | 6 | 10 | | | | | |
| | Reward System | 5 | 10 | | | | | |
| Tenant Expectations | Tenant Satisfaction | 7 | 10 | 7 | 50 | 70 | 0.115 | 8.06 |
| Comfort | Thermal | 6 | 10 | 53 | 100 | 53 | 0.129 | 6.84 |
| | Space | 5 | 10 | | | | | |
| | Noise | 6 | 10 | | | | | |
| | Ventilation | 5 | 10 | | | | | |
| | Visual | 5 | 10 | | | | | |
| | Location | 5 | 10 | | | | | |
| | Overcrowding | 5 | 10 | | | | | |
| | Layout | 5 | 10 | | | | | |
| | Fixtures & Fittings | 5 | 10 | | | | | |
| | Security | 6 | 10 | | | | | |
| Waste Reduction | Construction Materials | 5 | 10 | 5 | 10 | 50 | 0.064 | 3.2 |
| Water Use | Consumption (Tenant) | 5 | 10 | 20 | 40 | 50 | 0.031 | 1.55 |
| | Consumption (Construc) | 5 | 10 | | | | | |
| | Greywater | 5 | 10 | | | | | |
| | Rainwater Harvesting | 5 | 10 | | | | | |
| Energy | SAP | 6 | 10 | 24 | 40 | 60 | 0.106 | 6.36 |
| | Tenant Feedback | 6 | 10 | | | | | |
| | Energy Use | 6 | 10 | | | | | |
| | $CO_2$ | 6 | 10 | | | | | |
| Community Cohesion | Void Properties | 6 | 10 | 30 | 50 | 60 | 0.103 | 6.18 |
| | Turnover Rate | 6 | 10 | | | | | |
| | Ave. Re-let Period | 6 | 10 | | | | | |
| | Ave. Tenancy Period | 6 | 10 | | | | | |
| | Arrears | 6 | 10 | | | | | |
| Maintenance Cost | Minor Component | 5 | 10 | 33 | 70 | 47.14 | 0.019 | 0.90 |
| | Major Component | 4 | 10 | | | | | |
| | LCC | 4 | 10 | | | | | |
| | LCA | 4 | 10 | | | | | |
| | Day2Day | 6 | 10 | | | | | |
| | Void | 5 | 10 | | | | | |
| | New Technologies | 5 | 10 | | | | | |
| Location | Distance | 5 | 10 | 10 | 20 | 50 | 0.029 | 1.45 |
| | Travel Time | 5 | 10 | | | | | |
| Adaptability | Age | 5 | 10 | 61 | 120 | 50.83 | 0.034 | 1.73 |
| | Space Standard | 5 | 10 | | | | | |
| | Layout | 5 | 10 | | | | | |
| | Longevity | 5 | 10 | | | | | |
| | Refurb History | 5 | 10 | | | | | |
| | Value | 5 | 10 | | | | | |
| | Potential | 5 | 10 | | | | | |
| | Repairs History | 5 | 10 | | | | | |
| | Cost-in-Use | 6 | 10 | | | | | |
| | Location | 5 | 10 | | | | | |
| | Accessibility | 5 | 10 | | | | | |
| | Life Time Homes | 5 | 10 | | | | | |
| | | | | Total | 560 | | | 55.53 |

**Table 9.4 Assumptions Made for uPVC Double Glazed Window Installation**

| Headline KPI | Sub-KPI | Score | Explanation |
|---|---|---|---|
| Running Costs | Fuel | Increased | Improved U-value and draught proofing as a result of the new windows improves thermal efficiency and reduces energy demand for equivalent level of comfort. |
| QoL | Mould | Increased | Internal surface temperatures are raised resulting in reduced condensation and mould growth. |
| Tenant Expectations | Tenant Satisfaction | Increased | Tenant satisfaction increases due to decreased running costs, lower external noise nuisance, and aesthetics. However if the replacement windows didn't meet tenant expectations then satisfaction could decrease and reduce the score |
| Comfort | Thermal | Increased | Improved window U-value and draught proofing improve thermal comfort |
| | Noise | Increased | Improved windows reduce noise nuisance |
| | Security | Increased | Improved windows permit greater security to be built-in |
| Energy | SAP | Increased | Improved window U-values improve SAP rating |
| | Tenant Feedback | Increased | Positive, however if expectations were not met feedback could become negative and reduce the score |
| | Energy | Increased | Improvements to the building fabric reduce energy consumption (this ignores issues associated with fuel poverty and changes in comfort requirements of the tenant) |
| | | | Decreased energy consumption results in less carbon emissions |
| | $CO_2$ | Increased | |
| Community Cohesion | Void Properties | Increased | Greater tenant satisfaction means less properties become void |
| | | | If less voids become available the turnover rate will reduce |
| | Turnover Rate | Increased | Greater tenant satisfaction means voids properties are re-let quicker |
| | Ave Re-let Period | Increased | Greater tenant satisfaction results in tenants wishing to remain in their home and thus average tenancy periods are extended |
| | Tenancy Period | Increased | Greater disposable income due to reduced running costs means tenants are better able to pay rent on time |
| | Arrears | Increased | |
| Maintenance Cost | Major Components | Decreased | Replacement uPVC windows are more expensive |
| | LCC | Decreased | Based on shorter life expectancy |
| | LCA | Decreased | Oil extraction, toxins used during manufacture etc |
| | Day2Day Repairs | Increased | Less need for responsive repairs with new windows |
| Adaptability | Cost-In-Use | Increased | Reduced running costs |

## 9.5 Sustainable Maintenance Planning

This penultimate section provides a brief recapitulation of the common maintenance planning deficiencies displayed by Octavia Housing and many other landlords (previously discussed in chapters 2, 3, 9 and section 9.3.1), before demonstrating how these deficiencies could be addressed through the application of the performance based sustainable social housing maintenance model.

- Organisational policies were not linked to the maintenance planning process – making it difficult to justify maintenance expenditure and decision making
- The business case was not fully understood – approval of maintenance work that results in long term (horizon), improved sustainable housing requires a business case that balances non-financial benefits, financial benefits received by the tenant and the landlord's financial benefits. Social and environmental metrics were not commonly integrated.
- The information collected was wasteful - Surveys were limited and subjective. Whilst the SCS had proved effective at determining the 5 year maintenance budget it wasn't effective at planning maintenance action. Thus was the maintenance plan adjusted to fit the budget or did the budget reflect needs of the stock? Lack of confidence in the SCS exacerbates difficulties in making the business case.
- Information wasn't collected – where baseline performance of stock and neighbourhoods is missing it's impossible to determine the impacts of the improvements made and justify expenditure (value for money) which could jeopardise future projects.
- Priority setting didn't support corporate function –No clear links between maintenance spend and organisational performance. No scientific approach to priority setting.
- Implementation required duplication of data - Re-survey - Evaluation and feedback rarely inform the ongoing process - The same mistakes keep on being made.

To overcome these issues and integrate the sustainability agenda into housing asset management it was recommended that Octavia Housing move from the traditional condition based approach to social housing maintenance to a performance based approach (outlined in section 3.4), consequently moving from a single criteria to a multiple-criteria approach, described over the next paragraphs.

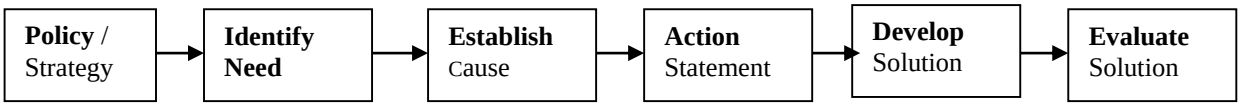


**Figure 9.2 Simplified Performance Based Built Asset Maintenance Process**

### 9.5.1 Organisational Context – Policy / Strategy

The November 2013 workshop held with Octavia Housing established their organisational key strategic drivers and their relation to maintenance planning and operation. All workshops helped them to interpret and understand what the sustainability agenda meant to them and how it could be addressed through maintenance planning and operation. Formally linking organisational key strategic drivers with asset management ensures efficient use of resource so that operations portray strategic aspirations. The top ranked strategic drivers (Table 8.4) were;

- Sustainability
- Tenant Satisfaction / Expectation
- Demographics
- Legacy / Brand / Image

This step in the process allowed Octavia Housing to input its (local) interpretation of the housing and sustainability agendas to inform the development of their own performance toolkits.

### 9.5.2 Identify Need - Performance Toolkits

Workshops 2 and 3 identified the sustainable maintenance criteria (qualitative and quantitative indicators) Octavia Housing wished to assess the performance of their housing stock against and in doing so identified a range of toolkits required (Table 9.5).

**Table 9.5 Octavia Housing Performance Toolkits**

| Physical Performance | Social Performance | Environmental Performance | Economic Performance |
|---|---|---|---|
| Health & Safety<br>Statutory Requirements | Tenant Expectations, satisfaction<br>Comfort<br>Quality of Life<br>ASB<br>Household Running Costs | Water Consumption<br>$CO_2$ Emissions<br>Waste | Asset Value<br>Whole Life Costing<br>Maintenance Cost<br>Maintenance / Refurbishment History |

To ensure success, these toolkits must be quick and easy to use and cost effective. The final selection of toolkits will be determined over an extended period of time and may go through a number of iterations. An issue that was raised by Octavia Housing but thus far not integrated was tenant profiling, this approach is supported by Olubodun (2001) who believe maintenance budget allocation will be more efficient if tenant attributes are incorporated.

### 9.5.3 Establish Cause - Analysis Toolkits

Workshops 2 and 3 identified the analysis toolkits Octavia Housing would need (Table 9.6), this is not considered an exhaustive list in its current state and would need verifying over an extended period of time. The text in red refers to toolkits Octavia Housing may wish to consider in the future.

**Table 9.6. Octavia Housing Analysis Toolkits**

| Inquiry | Design | Statistics | Experimental |
|---|---|---|---|
| Questionnaire Surveys<br>Property Surveys<br>Case Study Reports | Root Cause Analysis<br>Failure Mode Effects Analysis | Repairs Analysis<br>Whole Life Costing<br>Portfolio Analysis<br>Benchmarks | |

### 9.5.4 Action Statement – Project Brief

Once Octavia Housing have identified the properties / components underperforming and the reasons for that underperformance, they would prepare a project brief that communicates the problem and the expected improvements necessary so that solutions can be proposed.

The Action Statement should be used to incorporate the non-financial benefits of a particular cause of action as a means of addressing some of the current shortfalls of whole life cycle costing by way of addressing the triple bottom line of sustainability.

### 9.5.5 Develop Solution – Modelling Toolkits

Octavia Housing have a particular problem with prioritising maintenance actions, having no scientific approach in place and struggle to justify maintenance planning and budgets to their board. This approach not only allows them to incorporate a wider range of criteria (explicitly environmental and social metrics including non-financial benefits of maintenance action) but using AHP will model objective and subjective data in a way that is transparent and repeatable. Table 9.7 identifies the modelling toolkits used during the participatory research and the toolkits in red refer to those Octavia Housing may wish to consider in the future.

The approach described in 9.4.1 would not only allow alternative solution scenarios to be assessed against a range of sustainability criteria reflecting the strategic objectives of the social landlord but could also consider the consequences of inaction to ensure that the most appropriate maintenance strategy is identified.

**Table 9.7 Octavia Housing Modelling Toolkits**

| Scenarios | Prioritisation | Maintenance Models |
|---|---|---|
| Climate Change<br>Population Trends | AHP<br>KPI | Maintenance Strategies, Impact Models (which consider the consequences of inaction) |

### 9.5.6 Evaluate Solution – Impact Toolkits

The final problem with the traditional approach to social housing maintenance is the lack of maintenance results feeding back into the maintenance planning process. Therefore via workshops 2, 3 and the process detailed in section 9.3.1 Octavia Housing identified a set of toolkits that could compare actual improvements in performance (that result from the maintenance intervention) against the improvement requirements contained in the action statement. The results of the feedback will inform future problem identification and ultimately future housing design. Examples of Impact Toolkits are;

- Performance Indicators – Contractor Performance as well as Physical, Social, Economic and Environment performance
- Tenant Feedback – Questionnaires Surveys, Workshops etc

### 9.5.7 Octavia Housing Performance Based Sustainable Social Housing Maintenance Model

Thus Octavia Housing have established a series of indicators (toolkits) to assess the physical, social, environmental and economic performance of a 'home in-use' against government agendas, their local priorities and their interpretation of the sustainability agenda. When used, if these indicator toolkits identify properties or components that are underperforming, analysis toolkits will be used to establish the underlying cause(s) and a project brief will be developed that describes the problem to be solved and specifies the required improvements to performance. The modelling toolkits then prioritise the actions required and assess the most appropriate strategy for action. Finally the performance indicators assess the impact of the interventions against the required improvements specified in the project brief and feeds this information back into the process for future reference.

## 9.6 Summary

This chapter provided a discussion on the results of the participatory research with Octavia Housing and provided a worked example of how AHP could firstly be used to rate the performance in-use of a property and secondly be used to determine the improvements to performance as a means of prioritising maintenance actions.

Octavia Housing used the traditional condition based approach to social housing maintenance but struggled with a number of issues including maintenance prioritisation (having no formal approach in place) and lack of confidence in the SCS meant budgets and maintenance plans were hard to justify to their board. They had clear sustainable development aspirations (SHIFT and their Environmental Strategy) but social and environmental metrics were excluded from their maintenance planning approach.

The participatory research sought to introduce Octavia Housing to the performance based approach to social housing maintenance and demonstrate how AHP could be used to measure the performance in-use of a property (and stock portfolio) as well as prioritise maintenance action. Thus the workshops were used to populate the boxes of the performance based sustainable social housing maintenance model and demonstrate how the generic model could be applied in practice.

Specifically, workshop 1 and 3 showed the evolution of Octavia Housing's key strategic goals whilst workshops 2 and 3 identified the criteria against which they would measure the in-use performance of their properties (breaking down the problem of sustainable social housing maintenance into a hierarchy for AHP) and started to identify the toolkits they would need as a result. As expected, Octavia Housing identified a far wider range of criteria than they were currently using. It is however doubtful that the KPIs established as a result the workshops will be the final set, and may change as other stakeholders are included in the process. The process of identifying appropriate performance, analysis, modelling and impact toolkits was started during the participatory process but as maintenance planning is conducted over a long period of time, how these models can be integrated and which will be the most appropriate (other models were suggested by the research that Octavia Housing hadn't considered) should form part of future research.

The example of how AHP could be used to measure the in-use performance of a property was for demonstration purposes only as it was based partially on data collected through the participatory research and partly fictional data. AHP provides decision analysis in a transparent format and thus used in this way would help the Octavia Housing Asset Management team present maintenance budgets and plans to their board. Perhaps more importantly, it could be used to demonstrate the non-financial benefits of schemes which is crucial when making the business case for projects based on the sustainability agenda.

The co-regulatory approach to social housing management will inevitably mean greater tenant input is required during the decision making process, to which AHP can support. What will need to be verified over time is how tenants are brought into the AHP process in a meaningful way without overburdening the landlord (or tenant).

Using AHP in this way could help landlords' measure existing in-use performance of housing and prioritise maintenance actions but it doesn't address any of the fundamental problems associated with AHP such as rank reversal which wasn't the purpose of this research.

# Chapter 10

# Conclusion

## 10.1 Introduction to the Conclusion

This chapter provides a summary of the main research findings (10.2), how these findings contribute to new knowledge (10.3) and a discussion on the work which could follow from this thesis (10.4).

## 10.2 Research Findings

This research sought to develop a new social housing maintenance model based upon the performance of a house in-use rather than on its condition, that provides a transparent and robust system for prioritising maintenance works which integrates social, environmental and economic criteria to improve the overall sustainability of existing housing stock through planned maintenance.

The aim was achieved by answering the research questions that follow.

### 10.2.1 Research Question 1. Has the sustainability agenda influenced the way that social housing maintenance is perceived, planned and implemented in England?

The findings indicate that the sustainability agenda had started to impact the way housing maintenance managers perceived the performance of their social housing but that the current approach did not fully address the social, environmental and economic aspects of sustainability. So, whilst sustainability was considered by the vast majority of respondents to be an important issue for maintenance departments, it hadn't yet had a major impact on the social housing maintenance process. In the small number of organisations that had adopted a 'sustainable maintenance policy' there was:

- A clear link between the interpretation of the organisation's strategic sustainability agenda and the information collected for maintenance decision making, a one size fits all approach doesn't work;
- An acceptance that a wider range of information needs to be collected than was associated with the stock condition survey;
- Evidence that the information collected was analysed in a way that supported a multi-criteria decision making process in which the relative importance of the different factors (e.g. economic, environmental, social) could be balanced;
- An acceptance that sustainability required a much wider range of analytical approaches, including the use of whole life performance models, to plan interventions over a long-term and to measure the impacts and pay-back.;
- An acceptance that tenants feedback was critical to setting sustainability targets and agendas.

### 10.2.2 Research Question 2. Are the current practices/toolkits used by maintenance managers conducive to improving the sustainability of the existing social housing stock?

In the few cases where sustainability was measured, most landlords had developed their own metrics and toolkits to reflect their specific interpretation of the sustainability agenda rather than using the standard toolkits promoted by third parties (e.g. EcoHomeXB). The main reason for this appeared to be a perceived lack of fit between the standard toolkits and the specific interpretation of the sustainability agenda by individual organisations. Where sustainability was measured it tended to be as a consequence of legislation (e.g. requirement for SAP ratings) rather than a pro-active decision to translate the sustainability agenda into maintenance action plans.

Thus, traditional toolkits such as HHSRS and SAP were commonly used to maintain existing social housing but this meant that a very narrow approach to sustainability was taken, SAP for instance could inform energy use (economic), thermal comfort (social) and GHG emissions (environmental) but care must be taken when applying this toolkit as it is a compliance rather than a performance in-use tool and as such does not adequately account for occupant behaviour, the results of which can be misleading.

In a small number of cases these traditional toolkits were supplemented with the Ecohome principles. The SCS identified the needs of the building and Ecohome helped determine the most

sustainable approach to address that need. At the time the research was conducted repairs and maintenance focused on improving the thermal comfort of the dwelling, which was unsurprising as there was pressure from government and tenants to eradicate fuel poverty. However, it demonstrates that such a concept can be applied to incorporate the wider sustainability agenda, although the extension of its application may need to be externally driven by government and tenants.

### 10.2.3 Research Question 3. What is the range of criteria social housing maintenance managers believe they need to address when assessing the sustainability of their existing social housing?

The findings demonstrated that landlords wished to consider a wider range of criteria than was being used to plan maintenance works via the DHS. Landlords remained focused on achieving their regulatory obligations but wished to exceed the requirements of the DHS. Whilst an extensive list of desirable social, environmental and economic criteria was established during the research it was clear that landlords were unique in terms of the demands of their stock and tenants and as such a definitive list of criteria that all landlords should use to improve the sustainability of their housing stock does not and should not be provided. Instead landlords should develop and define their own criteria that best reflects their national and local requirements. This research provided a mechanism for determining the criteria which best reflected the organisations strategic goals, needs of the housing stock and tenants and which could be directly influenced by maintenance actions.

The Performance Based Sustainable Housing Maintenance Model determines that the sustainability agenda should be integral to the decision making process and not an extra/over to be applied if spare resources allow. This approach was evident in the more innovative landlords, those that had moved away from the traditional ‘silo’ approach to working and were integrating the broader sustainability agenda into their maintenance strategies resulting in maintenance plans which were more holistic and had a long-term approach. Unlike their traditional counterparts, these landlords applied the sustainability agenda inherently and attributed their success to the assimilation of tangible and non-tangible benefits, recognition of long term benefits over short term and acknowledged the contribution of tenants.

### 10.2.4 Research Question 4. How these criteria can be integrated into a decision making model that is robust and defendable?

The Performance Based Sustainable Social Housing Maintenance Model was introduced by this research and its application to social housing building asset management tested with Octavia Housing. This model represents a new approach to maintenance planning based upon the performance on a home in-use rather than the traditional condition approach and would require a fundamental change in the approach to maintenance incorporating the use of a more varied set of performance and analysis toolkits. The toolkits in themselves will not be new to landlords, however the integrated inclusion of them into maintenance planning will be. This will inevitably require the collection of data other than that currently collected via the SCS and HHSRS which can have resource implications which was identified as a disadvantage of EcohomeXB (refer to section 2.2.3.6). Greater data collection will be necessary but it will be in a familiar format, collected by the same people, used in conjunction with existing databases and by triangulating data will create more robust and appropriate maintenance actions (based on cause rather than symptom). This research demonstrates that AHP modelling can be used to integrate a large volume of (objective and subjective) criteria and overcome the problems associated with traditional maintenance prioritisation. The use of AHP software such as Expert Choice permits the sensitivity and consistency of the decision to be tested and representatives from all stakeholder groups to be (simultaneously) included, thus the decision making process becomes more robust and transparent. A particular concern of Octavia Housing staff was that maintenance prioritisation within the organisation wasn't scientific which could make it difficult justifying decisions to the board.

### 10.2.5 How can the new model be applied practically?

How the Performance Based Sustainable Housing Maintenance Model could be applied practically was determined as far as possible during the participatory phase of the research. Four stakeholder groups were represented during this process; Chief Executive, Asset Management, New Development and tenants during which the model was populated and the criteria (used in the development of the AHP model) required of Octavia Housing in the sustainable assessment of their housing stock and prioritisation of maintenance need was developed. The approach taken (a series of workshops with stakeholders during which a series of questions were posed) during this development phase could easily be replicated for any landlord, however having senior management buy-in was a vital part of the process. Thus the content of the performance based

model and the AHP sustainable maintenance hierarchy reflected the needs of Octavia Housing's housing stock and tenants, and strategic goals.

The practicality of the AHP model was determined as far as possible via the development of the sustainable maintenance hierarchy (criteria collected via the participatory phase), pair-wise decisions (via Octavia Housing asset management team) and the worked example. The validation process would have been tested further by involving a broader set of stakeholders and over a much extended time period to apply live maintenance planning and execution, but this was not possible.

### 10.3 Contribution to Knowledge

The primary contributions to knowledge of this thesis comes from the presentation of the new social housing maintenance model, the 'Performance Based Sustainable Social Housing Maintenance Model'. Figure 10.1 presents the generic model and Figure 10.2 presents the model adapted for use by Octavia Housing. As stated in section 3.4.1, the key difference between the new "sustainable" maintenance model and the traditional model is a shift in thinking from 'condition measurement', where maintenance actions are based upon a prediction of the remaining life of a building component/element/system, to 'performance measurement' where maintenance actions are determined by user-expectation. In developing a performance based model maintenance managers will need to move away from the use of a (predominantly) single, subjective criteria model to a multi-criteria model supported by a new range of toolkits that: allows need to be identified against a range of sustainability drivers; takes a holistic, long-term view of the underlying cause behind poor performance (in essence maintenance moves from a repair/replace paradigm to an improve/enhance paradigm); prioritises maintenance actions against the broad sustainability agenda, including the impact that changing demands may have on long-term need (e.g. climate change); measure the performance of the maintenance action against pre-set targets; and be flexible enough to incorporate individual Landlord requirements that reflect their interpretation of the sustainability agenda.

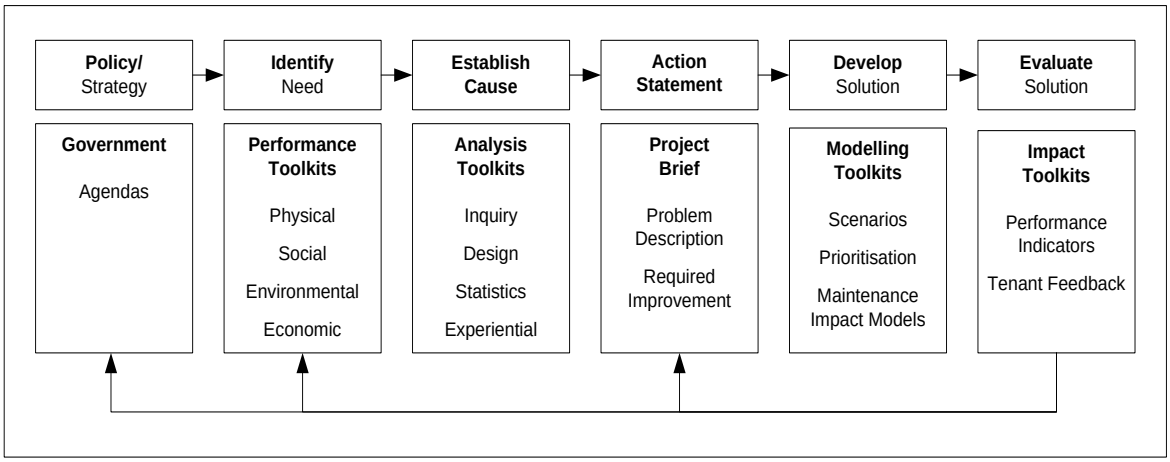


**Figure 10.1 Performance Based Sustainable Social Housing Maintenance Model**

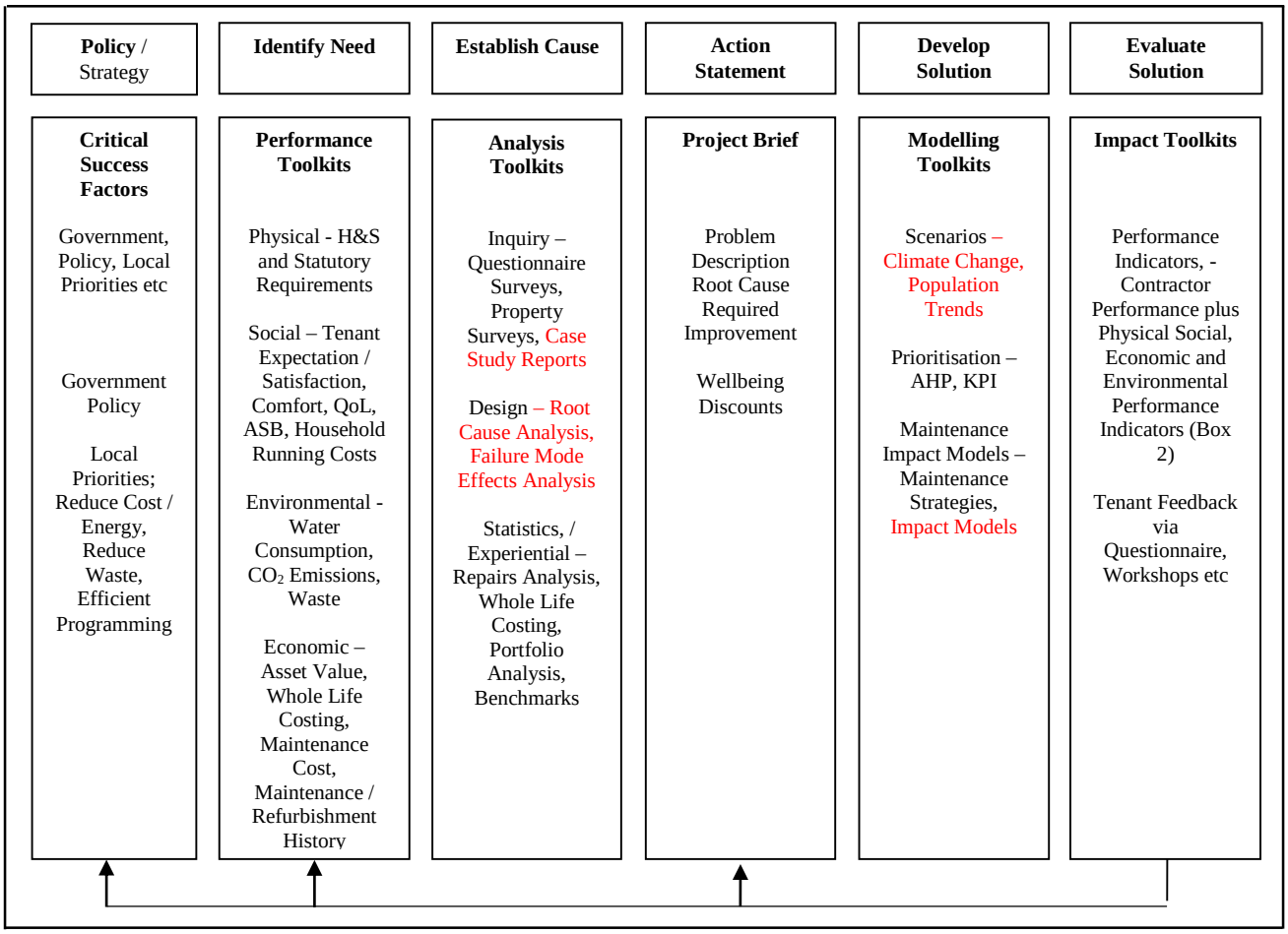


**Figure 10.2 Performance Based Sustainable Social Housing Maintenance Model Adapted for Octavia Housing** (The black text was determined by Octavia Housing during the participatory research and the red text represents toolkits they may wish to consider in the future.)

The second primary contribution to knowledge of this thesis comes from the identification of what needs to be considered in order to make a multi-criteria assessment of the sustainability of a building in-use and how different interventions can be prioritised to improve it. This in turn will

help landlords make the shift from the traditional condition based approach to maintenance decision making to the performance based approach.

Thus the findings relating to the criteria Octavia Housing wish to assess the sustainability of their housing stock against represents an original contribution to knowledge with regard to the participatory study. The realisation that such criterion is unique to individual landlords represents an original contribution to knowledge with regard to the wider social housing sector.

Whilst more progressive landlords have recognised the need to incorporate social, environmental and economic measures, their approach continues to be based on the building's condition and traditional toolkits remain (e.g. SCS), the shortcomings of which were documented in chapter 2. Thus, the methodology development to populate the performance based model and generate the sustainable maintenance criterion can be considered as a new contribution to knowledge to both Octavia Housing and the wider social housing sector as traditional workshop techniques were used which any landlord can replicate, however identifying the questions to ask and the stakeholders to contribute is new.

The new methodological approach to measuring the sustainability of housing and maintenance prioritisation using AHP represents the final contribution to new knowledge. AHP has been used in both the private and public sector to aid decision making in diverse areas such as, resource allocation, strategic planning; to rank, select, evaluate and benchmark alternatives. However, to date it hasn't been used to measure the sustainability of social housing stock nor has it been used to integrate sustainability into maintenance planning, which the thesis model proposes.

### 10.4 Limitations

The limitations of the research have been discussed throughout the thesis, the over-riding limitation was that the performance based sustainable social housing maintenance model, including the AHP model was not tested in practice. More specifically this included;

- A range of performance, analysis, modelling and impact toolkits were identified during the development of the performance based sustainable social housing maintenance model but how appropriate they were (in terms of ease and cost of use, robustness and reliability as discussed in section 3.4.1.2) was not tested.

- Targets were not established for the KPIs
- Stakeholder involvement was limited to the Asset Management and New Development Departments, the Senior Management team and a selection of tenants from Octavia Housing
- The inconsistency rating for the second tier pair-wise comparison (Table 8.13) exceeded 10% thus in reality the pair-wise exercise would have been repeated until a more appropriate level was achieved, as discussed in section 8.3.6.1.
- The scoring guideline based on Octavia Housing's KPIs (section 9.4.1.1) was incomplete, created by the researcher and untested.
- The calculation of the baseline performance in-use of a property was hypothetical.

However by their very nature maintenance and refurbishment are long-term activities and a new maintenance model within the constraints of a PhD cannot be tested due to this longevity. These limitations do however present the main opportunity for future research work with Octavia Housing discussed in section 10.4.2.

Furthermore the aim of the participatory research was to populate the theoretical performance based sustainable social housing maintenance model proposed by the researcher to demonstrate its use in practice and to demonstrate the use of AHP in maintenance decision making that would improve the sustainability of social housing. Whilst the participatory research was not expected to produce results which could be generalised across the broader social housing sector, it did seek to comment on the application of the performance based sustainable social housing maintenance model and supporting methodological approach more generally (section 4.3.5), which could have been better supported by a larger number of participatory partners but was beyond the scale and scope of this thesis. This limitation presents an opportunity for future research work with the wider social housing sector (section 10.5.3)

## 10.5 Future Research

Future work is discussed in terms of how the research findings will be disseminated (10.5.1), how this work can be taken further forward with Octavia Housing (10.5.2) and more generally with the social housing sector (10.5.3).

### 10.5.1 Dissemination

This research seeks a change in the approach to planned maintenance (and refurbishment) of social housing to improve the sustainability of the existing housing stock and as such it is important to disseminate the findings of this research to the social housing sector and beyond. To date the results of the research have been disseminated to the UK social housing sector through the publication of two reports based upon the questionnaire (Cooper and Jones, 2008) and interview (Cooper and Jones 2009) phases. Results have been disseminated amongst the international academic and professional communities through the production and presentation of conference papers at the International Council for Research and Innovation in Building and Construction: Working Commission for Facilities Management and Maintenance, Edinburgh (2008), the Royal Institute of Chartered Surveyors World FM Congress (COBRA), Dublin (2008) and Cape Town (2009).

It is intended that future dissemination based upon this thesis will involve the production of international journal papers for the likes of Housing Studies and Building Research and Information.

### 10.5.2 Future Research with Octavia Housing

Maintenance is conducted over a long period of time and as such it was not possible to design and test either the Performance Based Sustainable Social Housing Maintenance model or the AHP model which is the proposed modelling toolkit for the prioritisation of maintenance actions. Thus, future work with Octavia Housing could include a longitudinal test (minimum 12 months) of the Performance Based Sustainable Social Housing Maintenance model against their entire stock portfolio; this would help address a number of issues;

- The range of toolkits to be integrated into the performance based sustainable social housing maintenance model exceeds those currently used. The research identified a number of performance and analysis toolkits (based upon existing toolkits) which the longitudinal test could test to identify which are the most appropriate, in terms of ease of use, cost effectiveness, and effectiveness at identify and measuring social, environmental and economic impact,
- The longitudinal test would allow targets to be set against each of the KPIs identified and for the KPIs themselves to be tested,

- It would provide an opportunity for other stakeholders (internal stakeholders would include tenants, asset management, new development, housing care and support services departments and the chief executive, external stakeholders could include partner contractors, NHF, HCA), to be involved in the AHP decision making process,
- Real time data would determine the ease by which the entire stock portfolio could be measured for sustainability using the AHP model and how reliable that measure was at prioritising planned maintenance. The longitudinal aspect would then permit the actual improvement in sustainability of the stock to be determined as maintenance works are completed and the properties effectively 're-scored' using the AHP model.
- It would provide an opportunity to conduct sensitivity tests on the AHP model
- The scoring guidelines proposed could be tested.
- Tenant attributes could be incorporated into the model to better allocate maintenance action and determine the level of savings to the maintenance budget.

### 10.5.3 Future Research with Social Housing Sector

A number of gaps in knowledge and shortcomings with the traditional approach to social housing maintenance and data collection have been identified which could be a source of future work for the broader social housing sector.

- Performance in-use data isn't collected by landlords. One example is energy performance. SAP is used to measure a buildings energy performance (as discussed in section 2.2.2, 2.2.3.10) but this is a compliance toolkit, not a performance toolkit and as such doesn't accurately represent occupant behaviour. The issue here is twofold, firstly it means that assumptions made regarding housing stock carbon emissions is unsafe, and secondly, assumptions made regarding actual energy cost for the tenant is inaccurate which impacts fuel poverty. The collection of actual energy consumption across the social housing sector would be hugely beneficial, it would increase knowledge of actual energy consumption and emissions and better inform maintenance actions for reducing energy consumption and emission.

Once the longitudinal test with Octavia Housing is complete (section 10.4.2) the application of the performance based sustainable social housing maintenance model could be tested against the full housing portfolio of a broader selection of the social housing sector consisting of RSLs, LAs and ALMOs.

## 10.6 Recommendations

From the research conducted a number of recommendations for the social housing sector (10.6.1) and policy makers (10.6.2) can be made.

### 10.6.1 Recommendations for the Social Housing Sector

- Implement the performance based sustainable social housing maintenance model and thus base housing asset management planning on the performance of a home in-use rather than on its condition, incorporating the social landlords' interpretation of the sustainability agenda, housing stock and tenant profile.
    - Through landlord workshop identify (and rank) organisational business strategic drivers and their attributes and populate box 1 (Policy / Strategy) of the performance based sustainable social housing maintenance model (this ensures housing asset management strategy is clearly linked to organisational strategy goals, allows for local interpretation of sustainability agenda, and interpretation of national and local policy)
    - Express the above as a series of (qualitative and quantitative) performance metrics and populate box 2 (Identify Need)
    - Through landlord workshop, review current data collected and toolkits used, identify gaps and identify new data and (performance, analysis, modelling and impact) toolkits to populate box 3 (Establish Cause)
    - Once properties / components have been identified as underperforming and the reasons for that underperformance have been established landlords should produce a project brief (box 4) that communicates the problem and the expected improvements necessary so that solutions can be produced
    - Develop AHP hierarchy using attributes identified in step 1 and pair-wise to determine attribute weight, calculate performance of existing stock and run scenarios to improve the sustainability of the stock through routine maintenance to populate box 5 (develop solution).
    - Using the impact toolkits identified during the landlord workshop evaluate the solution implemented by comparing the actual improvement in (house in-use) performance against the improvement requirements contained within the action statement (box 6 – evaluate solution).

    - Invite a variety of stakeholders to participate in the above steps, particularly tenants, representatives of all internal departments and contractors.
    - Incorporate tenant profiles within housing asset management (section 2.4.5 and 8.3.2)
- The research findings could be converted into a series of training sessions (or bespoke) for social housing landlords to support their implementation of the performance based sustainable social housing maintenance model. Depending on the starting position of the landlord, training may need to start with the identification of the landlord's organisational strategic goals and their interpretation of the sustainability agenda and how it can be addressed through housing asset management.

### 10.6.2 Recommendations for Policy Makers

- Promote a multi-criteria housing asset management framework based upon the performance of a building in-use, rather than on its condition, which improves the sustainability of existing social housing
- Regulate for the inclusion within the housing asset management plan of both climate change adaptation and mitigation measures
- Promote the inclusion of financial and non-financial measures and rewards in 'value for money' calculations

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# APPENDIX A

## Questionnaire Survey Templates and Sample Returns

## Sustainability and Social Housing Maintenance *the* University *of* Greenwich

### 1.0 ORGANISATION DETAILS

1.1 What is the name of your organisation?.....

1.2 Is one of the primary activities of your department the repair and/or maintenance of dwellings? Yes ☐ No ☐

(If no, please pass the questionnaire to the appropriate individual within your organisation.)

1.3 Are you responsible for the management of maintenance and/or repair of your organisation property portfolio? Yes ☐ No ☐

(If no, please pass the questionnaire to the appropriate individual within your organisation.)

### 2.0 Stock Profile

2.1 What number of dwellings do you currently have in your property portfolio? *(please tick the appropriate box)*
0 - 500 ☐ 0 - 1000 ☐ 1001 – 5000 ☐ 5001 – 10,000 ☐ 10,001 – 15,000 ☐ 15,001 – 20,000 ☐ > 20,000 ☐

2.2 Please provide a breakdown (by approximate percentage) of your total housing stock;

| **Dwelling Type** | **Approx %** |
|---|---|
| Flats – converted | |
| Purpose built flats – high rise | |
| Purpose built flats – low rise | |
| Terraced House | |
| Semi-detached House | |
| Detached House | |
| Bungalow | |

| **Age of Dwellings** | **Approx %** |
|---|---|
| Pre 1919 | |
| 1919 to 1944 | |
| 1945 to 1964 | |
| 1965 to 1980 | |
| Post 1980 | |

| **Location of dwelling** | **Approx %** |
|---|---|
| Inner city | |
| Suburban | |
| Rural | |

| **Occupancy of dwelling** | **Approx %** |
|---|---|
| Vacant | |
| Occupied | |

### 3.0 Housing Maintenance

3.1 What is the approximate annual value of maintenance works for which your organisation is responsible? *(m = million)*
Under one Million £'s ☐ between 1 and 5m ☐ between 5 and 10m ☐ Over 10m ☐

3.2 Are budgets for maintenance works normally based upon:
A Previous years budget allocation ☐ C Property inspections of condition ☐
B Previous years spend ☐ D Others, *please specify*……

3.3 What approximate percentage of maintenance work, in terms of cost have been carried out on the following basis:
A Planned Preventative Maintenance ……
B Responsive Maintenance ……

3.4 Are property inspections for maintenance purposes carried out:
A Annually ☐ D 6 – 10 years ☐
B 1 – 3 years ☐ E Greater than 10 years ☐
C 4 – 5 years ☐ F As and when defects are reported ☐

3.5 Please rate in order of importance (1= most important, items can be of equal importance and NI = not important) the following factors for prioritising maintenance works:
A Priority of need ……. C Political criteria …….
B Budgetary constraints ……. D Others, *please specify* ……

3.6 Do you use historical data to identify maintenance trends? Yes ☐ No ☐

3.6a If you answered yes to 3.6 please give examples of what historical data is used ……
……..
……..
……..

3.7 What differentiates works carried out as planned preventive maintenance to that of a refurbishment action?

A Funding ☐ Please state how ……
B Scale of Project ☐ Please state how ……
C Other ☐ *please specify*, ……

3.8 Please state the information collected for maintenance decision making and rate its importance to the process (1 = most important, items can be of equal importance and NI = not important)

| **Type of Data** | **Data collected (***tick)* | **Importance** *(rate)* |
|---|---|---|
| SAP 2001 | | |
| SAP 2005 | | |
| Energy usage figures | | |
| EcoHome XB | | |
| HQI | | |
| Stock Condition Survey | | |
| Housing Health and Safety Rating System | | |
| Others, *please specify* | | |

3.8a Are stock condition surveys carried out by in-house surveyors? Yes ☐ No ☐

3.9 On what basis is work procured? *Please tick as appropriate*

| **Planned Preventative Maintenance** | | **Responsive Maintenance** | |
|---|---|---|---|
| Preferred Contractor List | | Preferred Contractor List | |
| Competitive Bidding | | Competitive Bidding | |
| Selective Tendering | | Selective Tendering | |
| Partnering | | Partnering | |
| Sealed Bid | | Sealed Bid | |
| PFI | | PFI | |
| Negotiation | | Negotiation | |
| In-house labour | | In-house labour | |
| Other, *please specify* | | Other, *please specify* | |

3.10 What are the major sources of maintenance related complaints? *Please tick as many as apply*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cleaning | ☐ | Indoor Air Quality | ☐ | Plumbing | ☐ | Choice of Materials | ☐ |
| Repair/Replace | ☐ | Heat Loss/Gain | ☐ | Storage | ☐ | Equipment | ☐ |
| Waste Disposal | ☐ | Fire Protection | ☐ | Sound Penetration | ☐ | Design | ☐ |
| Water Supply | ☐ | Telecommunications | ☐ | Lighting | ☐ | | |

Other, please specify ……..

3.11 Are the EcoHome principles taken into consideration during the development of your maintenance schemes? Yes ☐ No ☐

3.12 Does EcoHome have any importance in your maintenance strategy? Yes ☐ No ☐

3.12a If you answered yes to 3.12, please give further details ……
……..
……..
……..

3.13 What do you believe are the problems your organisation faces in terms of building maintenance? *(Please tick as many as appropriate*)

| | | | |
|---|---|---|---|
| Not enough staff | | Building design inefficiencies | |
| Too many calls for service | | Service administration inefficiencies | |
| Not enough money | | Poor construction quality | |
| Poor contractor performance | | Other, *please state* | |

## 4.0 Quality

4.1 Does the Decent Homes Standard have an impact on your maintenance strategy? Yes ☐ No ☐

4.1a If you answered yes to 4.1 please provide your reasons why ……..
……...
……...
……...

4.2 What is the approximate percentage of dwellings which **ACHIEVE** Decent Homes Standard? …….

4.3 Of the dwellings that are failing DHS please provide approximate percentage of dwellings failing on the following criteria *(the total may be more than 100% as some dwellings may fail on more than one criteria)*

| **Criteria** | **%** | **Criteria** | **%** |
|---|---|---|---|
| Thermal Comfort | | Fitness | |
| Repair | | Modernisation | |

4.4 Generally, do you believe the Decent Home Strategy will improve the sustainability of the existing housing stock

Strongly Agree | Neither / Nor | Strongly Disagree

4.4a Please provide your reasons for your answer to 4.4 ……
……..
……...
……...

4.5 Do you allow for incremental upgrades to the quality of your stock within your maintenance programmes? Yes ☐ No ☐

4.5a If you answered yes to 4.5, please provide examples; ……
……..
……...
……...

4.6 Are the incremental upgrades above and beyond those identified in DHS? Yes ☐ No ☐

4.7 Is the Housing Health and Safety Rating System incorporated into your Stock Condition Survey? Yes ☐ No ☐

4.7a If you answered yes to 4.7, does the Housing Health and Safety Rating System have an impact on the maintenance strategy? Yes ☐ No ☐

4.7b If you answered yes to 4.7a, please give examples ……
……..
……...
……...

## 5.0 Sustainability Strategy

5.1 Is there an organisational sustainability policy currently in place? Yes ☐ No ☐ Don't Know ☐

5.1a If you answered yes to 5.1, what aspects of sustainability does it cover? ……
……..
……...
……...

5.1b To what extent has sustainability affected your maintenance practices?

Not At all | Slightly | Moderately | Significantly | A Very Lot

5.2 Is there tenant engagement to raise awareness of energy use and other sustainability issues? Yes ☐ No ☐

5.2a If you answered yes to 5.2, please give examples ……
……...
……...
……...

5.3 How relevant do you think the sustainability debate is to your work as a maintenance manager within social housing?

| Not At all | Slightly | Moderately | Significantly | Very |
|---|---|---|---|---|

5.4 Do you currently measure the sustainability of your housing stock? Yes ☐ No ☐

5.4a If you answered yes to 5.4, please give examples of how this rating is achieved, ……..
……
……...
……...

5.4c If you answered yes to 5.4, does this rating have an impact on your maintenance strategy? Yes ☐ No ☐

5.5 Do you believe your organisational maintenance strategy could be improved in terms of sustainability? Yes ☐ No ☐

5.5a If you answered yes to 5.5, please give examples, ……..
……...
……...
……...

5.6 How sustainable do you rate your current maintenance practices?

| Very sustainable | Moderately | Slightly | Neither / Nor | Slightly Unsustainable | Moderately | V. Unsustainable |
|---|---|---|---|---|---|---|

5.7a Which sustainable technologies have you **INCORPORATED** in your refurbishment projects ……..
……...
……...
……...

5.7b Which sustainable technologies have you **CONSIDERED** incorporating in your refurbishment projects …….
……...
……...
……...

5.8 Do you consider the sustainability strategies / policies of your contractors? Yes ☐ No ☐

5.8a If you answered yes to 5.8, please specify how ……
……..
……...
……...

| 5.9 Which of the following do you believe **should** inform a **sustainable** maintenance strategy? | Strongly Agree | Agree | Neither / Nor | Disagree | Strongly Disagree |
|---|---|---|---|---|---|
| Improvements are incorporated into the maintenance programme to upgrade the buildings overall performance | | | | | |
| 'E' technology used | | | | | |
| Material is sourced locally | | | | | |
| Primary aggregates are used | | | | | |
| Plant is sourced locally | | | | | |
| Labour is sourced locally | | | | | |
| Recycled / reclaimed materials are used | | | | | |
| Materials with a low impact on the Environment are used | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Low toxicity paints / varnishes etc used | | | | | | |
| Planned maintenance system used | | | | | | |
| Responsive maintenance system used | | | | | | |
| Waste reduction procedures are in place during ordering process | | | | | | |
| Monitor and reduce construction waste | | | | | | |
| Install materials with high ODP and GWP | | | | | | |
| Quality system in place | | | | | | |
| Uncertified timber used | | | | | | |
| Energy consumption monitored and targets set to reduce use during occupation | | | | | | |
| Energy from renewable sources used during maintenance work | | | | | | |
| Monitor and report transport use to calculate $CO_2$ emissions | | | | | | |
| Supply chain established | | | | | | |
| Monitor and set targets to reduce water consumption during maintenance work | | | | | | |
| Monitor and set targets to reduce water use during occupation | | | | | | |
| Boilers are replaced with high NOx emitting boilers | | | | | | |
| Renewable technologies considered as replacements for existing components | | | | | | |
| Existing ecological features are protected during maintenance work | | | | | | |
| Enhancement of the site ecology is considered during maintenance planning | | | | | | |
| Home user guides are provided | | | | | | |
| Considerate Constructors aims and objectives are applied to maintenance work | | | | | | |
| Best practice policy is adopted in respect of air and water pollution | | | | | | |
| Household security is considered during product procurement | | | | | | |
| Energy consumption monitored and targets set to reduce use during maintenance work | | | | | | |

5.10 What other activities do you think could be undertaken within the maintenance programme that would improve the sustainability of your existing stock? ……
……
……
……
……

5.11 What barriers do you face in making your maintenance practices more sustainable?

| **Internal to Organisation** | **Yes** | **No** | **External to Organisation** | **Yes** | **No** |
|---|---|---|---|---|---|
| Cost | ☐ | ☐ | Lack of Government Leadership | ☐ | ☐ |
| Bureaucracy | ☐ | ☐ | Lack of Joined up Legislation | ☐ | ☐ |
| Culture | ☐ | ☐ | No Incentive | ☐ | ☐ |
| Lack of Leadership | ☐ | ☐ | No Commercial Imperative | ☐ | ☐ |
| Lack of information | ☐ | ☐ | Lack of Technology | ☐ | ☐ |
| Lack of resources | ☐ | ☐ | Legislation | ☐ | ☐ |

5.12 Do you think adopting more sustainable solutions will cost your organisation more money? Yes ☐ No ☐

5.12a If you answered yes to 5.12, how much more do you think you could justify?
1 – 2% ☐ 3 – 5% ☐ 6 – 10% ☐ 11 – 20% ☐ more than 20% ☐ please provide reasons ……
……
……
……
……

## 6.0 Any Other Comments

6.1 Please make any other comments you feel may be relevant? ……

……
……
……
……
……
……
……
……
……

**7.0 Personal Details**

Please be assured that all information related to your organisation will be treated in the strictest confidence. Should you wish to receive a summary of our results upon completion of our study then please supply your name and contact email. Results will only be presented in a collated and unattributable form.

7.1 Name ……

7.2 Address ……
……
……
……
……

7.3 Email ……

**8.0 Return Details**

Please return your completed questionnaire to, **Dr. Keith Jones / Justine Cooper, University of Greenwich, School of Architecture and Construction, Avery Hill Campus, Mansion Site, Bexley Road, Eltham, London, SE9 2PQ**

## Sustainability and Social Housing Maintenance *the* University *of* Greenwich

### 1.0 ORGANISATION DETAILS

1.1 What is the name of your organisation?.....

1.2 Is one of the primary activities of your department the repair and/or maintenance of dwellings? Yes ☐ No ☐

(If no, please pass the questionnaire to the appropriate individual within your organisation.)

1.4 Are you responsible for the management of maintenance and/or repair of your organisation property portfolio? Yes ☐ No ☐

(If no, please pass the questionnaire to the appropriate individual within your organisation.)

### 2.0 Stock Profile

2.1 What number of dwellings do you currently have in your property portfolio? *(please tick the appropriate box)*
0 - 1000 ☐ 1001 – 5000 ☐ 5001 – 10,000 ☐ 10,001 – 15,000 ☐ 15,001 – 20,000 ☐ > 20,000 ☐

2.2 Please provide a breakdown (by approximate percentage) of your total housing stock;

| **Dwelling Type** | **Approx %** |
|---|---|
| Flats – converted | |
| Purpose built flats – high rise | |
| Purpose built flats – low rise | |
| Terraced House | |
| Semi-detached House | |
| Detached House | |
| Bungalow | |

| **Age of Dwellings** | **Approx %** |
|---|---|
| Pre 1919 | |
| 1919 to 1944 | |
| 1945 to 1964 | |
| 1965 to 1980 | |
| Post 1980 | |

| **Location of dwelling** | **Approx %** |
|---|---|
| Inner city | |
| Suburban | |
| Rural | |

| **Occupancy of dwelling** | **Approx %** |
|---|---|
| Vacant | |
| Occupied | |

### 3.0 Housing Maintenance

3.1 What is the approximate annual value of maintenance works for which your organisation is responsible? *(m = million)*
Under one Million £'s ☐ between 1 and 5m ☐ between 5 and 10m ☐ Over 10m ☐

3.2 Are budgets for maintenance works normally based upon:
A Previous years budget allocation ☐ C Property inspections of condition ☐
B Previous years spend ☐ D Others, *please specify*……

3.4 What approximate percentage of maintenance work, in terms of cost have been carried out on the following basis:
A Planned Preventative Maintenance ……
B Responsive Maintenance ……

3.4 Are property inspections for maintenance purposes carried out:
A Annually ☐ D 6 – 10 years ☐
B 1 – 3 years ☐ E Greater than 10 years ☐
C 4 – 5 years ☐ F As and when defects are reported ☐

3.5 Please rate in order of importance (1= most important, items can be of equal importance and NI = not important) the following factors for prioritising maintenance works:
A Priority of need ……. C Political criteria …….
B Budgetary constraints ……. D Others, *please specify* ……

3.6 Do you use historical data to identify maintenance trends? Yes ☐ No ☐

3.7 What differentiates works carried out as planned preventive maintenance to that of a refurbishment action?
A Funding ☐ Please state how ……
B Scale of Project ☐ Please state how ……
C Other ☐ *please specify,* ……

3.10 Please state the information collected for maintenance decision making and rate its importance to the process (1 = most important, items can be of equal importance and NI = not important)

| **Type of Data** | **Data collected (***tick)* | **Importance** *(rate)* |
|---|---|---|
| SAP 2001 | | |
| SAP 2005 | | |
| Energy usage figures | | |
| EcoHome XB | | |
| HQI | | |
| Stock Condition Survey | | |
| Housing Health and Safety Rating System | | |
| Others, *please specify* | | |

3.11 On what basis is work procured? *Please tick as appropriate*

| **Planned Preventative Maintenance** | | **Responsive Maintenance** | |
|---|---|---|---|
| Preferred Contractor List | | Preferred Contractor List | |
| Competitive Bidding | | Competitive Bidding | |
| Selective Tendering | | Selective Tendering | |
| Partnering | | Partnering | |
| Sealed Bid | | Sealed Bid | |
| PFI | | PFI | |
| Negotiation | | Negotiation | |
| Other, *please specify* | | Other, *please specify* | |

3.10 What are the major sources of maintenance related complaints? *Please tick as many as apply*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cleaning | ☐ | Indoor Air Quality | ☐ | Plumbing | ☐ | Choice of Materials | ☐ |
| Repair/Replace | ☐ | Heat Loss/Gain | ☐ | Storage | ☐ | Equipment | ☐ |
| Waste Disposal | ☐ | Fire Protection | ☐ | Sound Penetration | ☐ | Design | ☐ |
| Water Supply | ☐ | Telecommunications | ☐ | Lighting | ☐ | | |

Other, please specify ……..

3.11 Are the EcoHome principles taken into consideration during the development of your maintenance schemes? Yes ☐ No ☐

3.12 Does EcoHome have any importance in your maintenance strategy? Yes ☐ No ☐

3.12a If you answered yes to 3.12, please give further details …….
……..
……..
……..

3.13 What do you believe are the problems your organisation faces in terms of building maintenance? *(Please tick as many as appropriate*)

| | | | |
|---|---|---|---|
| Not enough staff | | Building design inefficiencies | |
| Too many calls for service | | Service administration inefficiencies | |
| Not enough money | | Poor construction quality | |
| Poor contractor performance | | Other, *please state* | |

## 4.0 Quality

4.1 Does the Decent Homes Standard have an impact on your maintenance strategy? Yes ☐ No ☐

4.1a If you answered yes to 4.1 please provide your reasons why ……..
……..
……..

4.2 What is the approximate percentage of dwellings which **ACHIEVE** Decent Homes Standard? …….

4.3 Of the dwellings that are failing DHS please provide approximate percentage of dwellings failing on the following criteria *(the total may be more than 100% as some dwellings may fail on more than one criteria)*

| **Criteria** | **%** | **Criteria** | **%** |
|---|---|---|---|
| Thermal Comfort | | Fitness | |
| Repair | | Modernisation | |

4.5 Generally, do you believe the Decent Home Strategy will improve the sustainability of the existing housing stock

Strongly Agree | Neither / Nor | Strongly Disagree

4.4a Please provide your reasons for your answer to 4.4 ……
……..
……...

4.5 Do you allow for incremental upgrades to the quality of your stock within your maintenance programmes? Yes ☐ No ☐
4.5a If you answered yes to 4.5, please provide examples; ……
……..
……...
……...

4.6 Are the incremental upgrades above and beyond those identified in DHS? Yes ☐ No ☐

4.7 Is the Housing Health and Safety Rating System incorporated into your Stock Condition Survey? Yes ☐ No ☐

4.7a If you answered yes to 4.7, does the Housing Health and Safety Rating System have an impact on the maintenance strategy?
Yes ☐ No ☐

4.7b If you answered yes to 4.7a, please give examples ……
……..
……...
……...

## 5.0 Sustainability Strategy

5.1 Is there an organisational sustainability policy currently in place? Yes ☐ No ☐ Don't Know ☐

5.1a If you answered yes to 5.1, what aspects of sustainability does it cover? ……
……..
……...
……...

5.1b How has sustainability affected your maintenance practices?
Not At all | Slightly | Moderately | Significantly | A Very Lot

5.2 Is there tenant engagement to raise awareness of energy use and other sustainability issues? Yes ☐ No ☐

5.3 How relevant do you think the sustainability debate is to your work as a maintenance manager within social housing?
Not At all | Slightly | Moderately | Significantly | Very

5.4 Do you currently measure the sustainability of your housing stock? Yes ☐ No ☐

5.4a If you answered yes to 5.4, please give examples of how this rating is achieved, ……..
……..
……...
……...

5.4c If you answered yes to 5.4, does this rating have an impact on your maintenance strategy? Yes ☐ No ☐

5.5 Do you believe your organisational maintenance strategy could be improved in terms of sustainability? Yes ☐ No ☐

5.5a If you answered yes to 5.5, please give examples, ……..
……...
……...
……...

5.6 How sustainable do you rate your current maintenance practices?
Very sustainable | Moderately | Slightly | Neither / Nor | Slightly Unsustainable | Moderately | V. Unsustainable

5.7a Which sustainable technologies have you **INCORPORATED** in your refurbishment projects ……..
……...

……
……

5.7b Which sustainable technologies have you **CONSIDERED** incorporating in your refurbishment projects …….
……
……

5.8 Do you consider the sustainability strategies / policies of your contractors? Yes ☐ No ☐

5.8a If you answered yes to 5.8, please specify how …….
……
……
……

| 5.9 Which of the following do you believe should inform a **sustainable** maintenance strategy? | Strongly Agree | Agree | Neither / Nor | Disagree | Strongly Disagree |
|---|---|---|---|---|---|
| Improvements are incorporated into the maintenance programme to upgrade the buildings overall performance | | | | | |
| 'E' technology used | | | | | |
| Material is sourced locally | | | | | |
| Primary aggregates are used | | | | | |
| Plant is sourced locally | | | | | |
| Labour is sourced locally | | | | | |
| Recycled / reclaimed materials are used | | | | | |
| Materials with a low impact on the Environment are used | | | | | |
| Low toxicity paints / varnishes etc used | | | | | |
| Planned maintenance system used | | | | | |
| Responsive maintenance system used | | | | | |
| Waste reduction procedures are in place during ordering process | | | | | |
| Monitor and reduce construction waste | | | | | |
| Install materials with high ODP and GWP | | | | | |
| Quality system in place | | | | | |
| Uncertified timber used | | | | | |
| Energy consumption monitored and targets set to reduce use during occupation | | | | | |
| Energy from renewable sources used during maintenance work | | | | | |
| Monitor and report transport use to calculate $CO_2$ emissions | | | | | |
| Supply chain established | | | | | |
| Monitor and set targets to reduce water consumption during maintenance work | | | | | |
| Monitor and set targets to reduce water use during occupation | | | | | |
| Boilers are replaced with high NOx emitting boilers | | | | | |
| Renewable technologies considered as replacements for existing components | | | | | |
| Existing ecological features are protected during maintenance work | | | | | |
| Enhancement of the site ecology is considered during maintenance planning | | | | | |
| Home user guides are provided | | | | | |
| Considerate Constructors aims and objectives are applied to maintenance work | | | | | |
| Best practice policy is adopted in respect of air and water pollution | | | | | |
| Household security is considered during product procurement | | | | | |
| Energy consumption monitored and targets set to reduce use during maintenance work | | | | | |

5.12 What other activities do you think could be undertaken within the maintenance programme that would improve the sustainability of your existing stock? …….
……

……...

5.13 What barriers do you face in making your maintenance practices more sustainable?

| Internal to Organisation | Yes | No | External to Organisation | Yes | No |
|---|---|---|---|---|---|
| Cost | ☐ | ☐ | Lack of Government Leadership | ☐ | ☐ |
| Bureaucracy | ☐ | ☐ | Lack of Joined up Legislation | ☐ | ☐ |
| Culture | ☐ | ☐ | No Incentive | ☐ | ☐ |
| Lack of Leadership | ☐ | ☐ | No Commercial Imperative | ☐ | ☐ |
| Lack of information | ☐ | ☐ | Lack of Technology | ☐ | ☐ |
| Lack of resources | ☐ | ☐ | Legislation | ☐ | ☐ |

5.12 Do you think adopting more sustainable solutions will cost your organisation more money? Yes ☐ No ☐

5.12a If you answered yes to 5.12, how much more do you think you could justify?
1 – 2% ☐ 3 – 5% ☐ 6 – 10% ☐ 11 – 20% ☐ more than 20% ☐ please provide reasons ……..
……...
……...

## 6.0 Any Other Comments

6.1 Please make any other comments you feel may be relevant? ……
……...
……...
……...
……...
……...
……...
……...

## 7.0 Personal Details

Please be assured that all information related to your organisation will be treated in the strictest confidence. Should you wish to receive a summary of our results upon completion of our study then please supply your name and contact email. Results will only be presented in a collated and unattributable form.

7.1 Name ……..

7.2 Address ……...
……...
……...

7.3 Email ……..

## Sustainability and Social Housing Maintenance *the* University *of* Greenwich

### 1.0 ORGANISATION DETAILS

1.1 What is the name of your organisation London Borough Of Barking & Dagenham.....

1.2 Is one of the primary activities of your department the repair and/or maintenance of dwellings? Yes

(If no, please pass the questionnaire to the appropriate individual within your organisation.)

1.5 Are you responsible for the management of maintenance and/or repair of your organisation property portfolio? Yes

(If no, please pass the questionnaire to the appropriate individual within your organisation.)

### 2.0 Stock Profile

2.1 What number of dwellings do you currently have in your property portfolio? *(please tick the appropriate box)*
0 - 500 ☐ 0 - 1000 ☐ 1001 – 5000 ☐ 5001 – 10,000 ☐ 10,001 – 15,000 ☐ 15,001 – 20,000 ☐ > 20,000 ☐

2.2 Please provide a breakdown (by approximate percentage) of your total housing stock;

| **Dwelling Type** | **Approx %** |
|---|---|
| Flats – converted | 0 |
| Purpose built flats – high rise | 8.8 |
| Purpose built flats – low rise | 34.4 |
| Terraced House | 46.9 |
| Semi-detached House | 8.7 |
| Detached House | 0 |
| Bungalow | 1 |

| **Age of Dwellings** | **Approx %** |
|---|---|
| Pre 1919 | |
| 1919 to 1944 | |
| 1945 to 1964 | |
| 1965 to 1980 | |
| Post 1980 | |

| **Location of dwelling** | **Approx %** |
|---|---|
| Inner city | 100 |
| Suburban | 0 |
| Rural | 0 |

| **Occupancy of dwelling** | **Approx %** |
|---|---|
| Vacant | 2% |
| Occupied | 98% |

### 3.0 Housing Maintenance

3.1 What is the approximate annual value of maintenance works for which your organisation is responsible? *(m = million)*
Over 10m

3.2 Are budgets for maintenance works normally based upon:
A Previous years budget allocation and B Previous years spend

3.5 What approximate percentage of maintenance work, in terms of cost have been carried out on the following basis:
A Planned Preventative Maintenance ……60…….....
B Responsive Maintenance ……40……

3.4 Are property inspections for maintenance purposes carried out: C 4 – 5 years

3.5 Please rate in order of importance (1= most important, items can be of equal importance and NI = not important) the following factors for prioritising maintenance works:
A Priority of need ……1……. C Political criteria …3…….
B Budgetary constraints ……2……. D Others, *please specify* ……NI……

3.6 Do you use historical data to identify maintenance trends? Yes

3.6a If you answered yes to 3.6 please give examples of what historical data is used …Elemental costs, costs per property and aggregations of these - costs per block, estate, roofing etc……

3.7 What differentiates works carried out as planned preventive maintenance to that of a refurbishment action?
A Funding ☐ Please state how - Government Regulation
B Scale of Project ☐ Please state how - Projects over £20,000 are
C Other ☐ *please specify*, …….....
3.12 Please state the information collected for maintenance decision making and rate its importance to the process (1 = most important, items can

be of equal importance and NI = not important)

| **Type of Data** | **Data collected (***tick)* | **Importance** *(rate)* |
|---|---|---|
| SAP 2001 | NI | |
| SAP 2005 | 3 | |
| Energy usage figures | NI | |
| EcoHome XB | NI | |
| HQI | NI | |
| Stock Condition Survey | 1 | |
| Housing Health and Safety Rating System | 2 | |
| Others, *please specify* | - | |

3.8a Are stock condition surveys carried out by in-house surveyors? Yes

3.13 On what basis is work procured? *Please tick as appropriate*

| **Planned Preventative Maintenance** | | **Responsive Maintenance** | |
|---|---|---|---|
| Preferred Contractor List | | Preferred Contractor List | |
| Competitive Bidding | | Competitive Bidding | |
| Selective Tendering | | Selective Tendering | |
| Partnering | **YES** | Partnering | YES |
| Sealed Bid | | Sealed Bid | |
| PFI | | PFI | |
| Negotiation | | Negotiation | |
| In-house labour | | In-house labour | |
| Other, *please specify* | | Other, *please specify* | |

3.10 What are the major sources of maintenance related complaints? *Please tick as many as apply*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cleaning | ☐ | Indoor Air Quality | ☐ | Plumbing | ☐ | Choice of Materials | ☐ |
| Repair/Replace | ☐ | Heat Loss/Gain | ☐ | Storage | ☐ | Equipment | ☐ |
| Waste Disposal | ☐ | Fire Protection | ☐ | Sound Penetration | ☐ | Design | ☐ |
| Water Supply | ☐ | Telecommunications | ☐ | Lighting | ☐ | | |

Other, please specify ……..

3.11 Are the EcoHome principles taken into consideration during the development of your maintenance schemes? No

3.12 Does EcoHome have any importance in your maintenance strategy? No

3.12a If you answered yes to 3.12, please give further details
……N/A…….
……..

3.13 What do you believe are the problems your organisation faces in terms of building maintenance? *(Please tick as many as appropriate*)

| | | | |
|---|---|---|---|
| Not enough staff | | Building design inefficiencies | X |
| Too many calls for service | X | Service administration inefficiencies | X |
| Not enough money | X | Poor construction quality | X |
| Poor contractor performance | | Other, *please state* | |

## 4.0 Quality

4.1 Does the Decent Homes Standard have an impact on your maintenance strategy? Yes

4.1a If you answered yes to 4.1 please provide your reasons why …Decent Homes works is addressing many maintenance items which had not been addressed over previous 10-20 years……..
……...
……...
……...

4.2 What is the approximate percentage of dwellings which **ACHIEVE** Decent Homes Standard? …60…….

4.3 Of the dwellings that are failing DHS please provide approximate percentage of dwellings failing on the following criteria *(the total may be more than 100% as some dwellings may fail on more than one criteria)*

| **Criteria** | **%** | **Criteria** | **%** |
|---|---|---|---|
| Thermal Comfort | 4.6 | Fitness | 3.9 |
| Repair | 36.3 | Modernisation | 1.3 |

4.6 Generally, do you believe the Decent Home Strategy will improve the sustainability of the existing housing stock

Strongly Agree | Neither / Nor | Strongly Disagree

4.4a Please provide your reasons for your answer to 4.4 …I tend to agree with the statement but not strongly. DHS has given objective asset management a boost but, as the government has now recognised , the parameters are too narrowly drawn……

4.5 Do you allow for incremental upgrades to the quality of your stock within your maintenance programmes? No

4.5a If you answered yes to 4.5, please provide examples; ……
……..
……...
……...

4.6 Are the incremental upgrades above and beyond those identified in DHS? No - at least not before 2010/11

4.7 Is the Housing Health and Safety Rating System incorporated into your Stock Condition Survey? Yes from this year

4.7a If you answered yes to 4.7, does the Housing Health and Safety Rating System have an impact on the maintenance strategy? No at least not yet

4.7b If you answered yes to 4.7a, please give examples ……
……..
……...
……...

## 5.0 Sustainability Strategy

5.1 Is there an organisational sustainability policy currently in place? Yes ☐

5.1a If you answered yes to 5.1, what aspects of sustainability does it cover? ……It is very broadly drawn . The main items which relate to us are improving SAP ratings and Minimising waste……
……..
……...
……...

5.1b To what extent has sustainability affected your maintenance practices? Slightly

Not At all | Slightly | Moderately | Significantly | A Very Lot

5.2 Is there tenant engagement to raise awareness of energy use and other sustainability issues? Yes

5.2a If you answered yes to 5.2, please give examples …through Warm Front and EST……
……...
……...
……...

5.3 How relevant do you think the sustainability debate is to your work as a maintenance manager within social housing? Moderately

Not At all | Slightly | Moderately | Significantly | Very

5.4 Do you currently measure the sustainability of your housing stock? No

5.4a If you answered yes to 5.4, please give examples of how this rating is achieved, ……..
……..
……...
……...

5.4c If you answered yes to 5.4, does this rating have an impact on your maintenance strategy? N/A

5.5 Do you believe your organisational maintenance strategy could be improved in terms of sustainability? Yes

5.5a If you answered yes to 5.5, please give examples, ……either by increasing its priority or by increasing funds so that they extend to cover its current priority……..
……...
……...
……...

5.6 How sustainable do you rate your current maintenance practices? Neither/Nor

Very sustainable Moderately Slightly Neither / Nor Slightly Unsustainable Moderately V. Unsustainable
|----------|----------|----------|----------|----------|----------|

5.7a Which sustainable technologies have you **INCORPORATED** in your refurbishment projects …Recycling of materials- especially roofing and …improveds heating controls more insulation work……..
……...
……...
……...

5.7b Which sustainable technologies have you **CONSIDERED** incorporating in your refurbishment projects …….
……...
……...
……...

5.8 Do you consider the sustainability strategies / policies of your contractors? Yes

5.8a If you answered yes to 5.8, please specify how …as part of the overall evaluation process of bids/tenders. Generally we use a 70% quality and 30% price basis for our evaluation and Sustainability issues account for around 5- 10% of the quality element……
……..
……...
……...

| 5.9 Which of the following do you believe **should** inform a **sustainable** maintenance strategy? | Strongly Agree | Agree | Neither / Nor | Disagree | Strongly Disagree |
|---|---|---|---|---|---|
| Improvements are incorporated into the maintenance programme to upgrade the buildings overall performance | | X | | | |
| 'E' technology used | | | X | | |
| Material is sourced locally | | X | | | |
| Primary aggregates are used | | | X | | |
| Plant is sourced locally | | X | | | |
| Labour is sourced locally | | X | | | |
| Recycled / reclaimed materials are used | | X | | | |
| Materials with a low impact on the Environment are used | | X | | | |
| Low toxicity paints / varnishes etc used | | X- | | | |
| Planned maintenance system used | | X | | | |
| Responsive maintenance system used | | | X | | |
| Waste reduction procedures are in place during ordering process | | X | | | |
| Monitor and reduce construction waste | | X | | | |
| Install materials with high ODP and GWP ????? | | | | | |
| Quality system in place | | X | | | |
| Uncertified timber used | | | | X | |
| Energy consumption monitored and targets set to reduce use during occupation | | X | | | |
| Energy from renewable sources used during maintenance work | | | X | | |
| Monitor and report transport use to calculate $CO_2$ emissions | | X | | | |
| Supply chain established | | X | | | |
| Monitor and set targets to reduce water consumption during maintenance work | | | X | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Monitor and set targets to reduce water use during occupation | | | | X | | |
| Boilers are replaced with high NOx emitting boilers | | | | X | | |
| Renewable technologies considered as replacements for existing components | | | X | | | |
| Existing ecological features are protected during maintenance work | | | X | | | |
| Enhancement of the site ecology is considered during maintenance planning | | | | X | | |
| Home user guides are provided | | X | | | | |
| Considerate Constructors aims and objectives are applied to maintenance work | | | X | | | |
| Best practice policy is adopted in respect of air and water pollution | | | X | | | |
| Household security is considered during product procurement | | | X | | | |
| Energy consumption monitored and targets set to reduce use during maintenance work | | | X | | | |

5.14 What other activities do you think could be undertaken within the maintenance programme that would improve the sustainability of your existing stock? ……..
……
……..
……..
……..

5.15 What barriers do you face in making your maintenance practices more sustainable?

| **Internal to Organisation** | **Yes** | **No** | **External to Organisation** | **Yes** | **No** |
|---|---|---|---|---|---|
| Cost | ☐ | | Lack of Government Leadership | ☐ | |
| Bureaucracy | ☐ | | Lack of Joined up Legislation | ☐ | |
| Culture | ☐ | | No Incentive | ☐ | |
| Lack of Leadership | ☐ | | No Commercial Imperative | ☐ | |
| Lack of information | | ☐ | Lack of Technology | | ☐ |
| Lack of resources | ☐ | | Legislation | ☐ | |

5.12 Do you think adopting more sustainable solutions will cost your organisation more money? Yes

5.12a If you answered yes to 5.12, how much more do you think you could justify? 3 – 5% ……..
……..
……..
……..
……..

## 6.0 Any Other Comments

6.1 Please make any other comments you feel may be relevant? ……
……..
……It would have been good to have a questionnaire which could easily have been completed electronically. To be completed easily this one seems to need to be printed off which given the purpose seems a little contrary
……..
……..
……..
……..
……..
……..
……..

## 7.0 Personal Details

Please be assured that all information related to your organisation will be treated in the strictest confidence. Should you wish to receive a summary of our results upon completion of our study then please supply your name and contact email. Results will only be presented in a collated and unattributable form.

7.1 Name ……Paul Fordyce …Stock Investment Manager

7.2 Address Roycraft House, 15 Linton Road, Barking , London, IG11

8HE……...
……...
……...
……...
……...

7.3 Email
…paul.fordyce@lbbd.gov.uk……..

**8.0 Return Details**

Please return your completed questionnaire to, **Dr. Keith Jones / Justine Cooper, University of Greenwich, School of Architecture and Construction, Avery Hill Campus, Mansion Site, Bexley Road, Eltham, London, SE9 2PQ**

## Sustainability and Social Housing Maintenance *the* University *of* Greenwich

### 1.0 ORGANISATION DETAILS

1.1 What is the name of your organisation?.....Waveney District Council.....

1.2 Is one of the primary activities of your department the repair and/or maintenance of dwellings? Yes ✓ No ☐

(If no, please pass the questionnaire to the appropriate individual within your organisation.)

1.6 Are you responsible for the management of maintenance and/or repair of your organisation property portfolio? Yes ✓ No ☐

(If no, please pass the questionnaire to the appropriate individual within your organisation.)

### 2.0 Stock Profile

2.1 What number of dwellings do you currently have in your property portfolio? *(please tick the appropriate box)*

0 - 500 ☐ 0 - 1000 ☐ 1001 – 5000 ✓ 5001 – 10,000 ☐ 10,001 – 15,000 ☐ 15,001 – 20,000 ☐ > 20,000 ☐

2.2 Please provide a breakdown (by approximate percentage) of your total housing stock;

| **Dwelling Type** | **Approx %** |
|---|---|
| Flats – converted | |
| Purpose built flats – high rise | |
| Purpose built flats – low rise | |
| Terraced House | |
| Semi-detached House | |
| Detached House | |
| Bungalow | |

| **Age of Dwellings** | **Approx %** |
|---|---|
| Pre 1919 | |
| 1919 to 1944 | |
| 1945 to 1964 | |
| 1965 to 1980 | |
| Post 1980 | |

| **Location of dwelling** | **Approx %** |
|---|---|
| Inner city | |
| Suburban | 75 |
| Rural | 25 |

| **Occupancy of dwelling** | **Approx %** |
|---|---|
| Vacant | |
| Occupied | |

### 3.0 Housing Maintenance

3.1 What is the approximate annual value of maintenance works for which your organisation is responsible? *(m = million)*

Under one Million £'s ☐ between 1 and 5m ☐ between 5 and 10m ✓ Over 10m ☐

3.2 Are budgets for maintenance works normally based upon:

A Previous years budget allocation ☐ C Property inspections of condition ✓

B Previous years spend ☐ D Others, *please specify*……

3.6 What approximate percentage of maintenance work, in terms of cost have been carried out on the following basis:

A Planned Preventative Maintenance **83%**

B Responsive Maintenance **27%**

3.4 Are property inspections for maintenance purposes carried out:

A Annually ☐ D 6 – 10 years ☐

B 1 – 3 years ☐ E Greater than 10 years ☐

C 4 – 5 years ✓ F As and when defects are reported ☐

3.5 Please rate in order of importance (1= most important, items can be of equal importance and NI = not important) the following factors for prioritising maintenance works:

A Priority of need **1**……. C Political criteria **3** ……

B Budgetary constraints **2** ……. D Others, *please specify* ……

3.6 Do you use historical data to identify maintenance trends? Yes ✓ No ☐

3.6a If you answered yes to 3.6 please give examples of what historical data is used ……

High levels of component breakdowns will feed into replacement programme.

……

……

3.7 What differentiates works carried out as planned preventive maintenance to that of a refurbishment action?

A Funding ☐ Please state how ……

B Scale of Project ✓ Please state how ……

C Other ☐ *please specify*, ……

3.14 Please state the information collected for maintenance decision making and rate its importance to the process (1 = most important, items can be of equal importance and NI = not important)

| **Type of Data** | **Data collected (***tick)* | **Importance** *(rate)* |
|---|---|---|
| SAP 2001 | | |
| SAP 2005 | | |
| Energy usage figures | | |
| EcoHome XB | | |
| HQI | | |
| Stock Condition Survey | | |
| Housing Health and Safety Rating System | | |
| Others, *please specify* | | |

3.8a Are stock condition surveys carried out by in-house surveyors? Yes ✓ No ☐

3.15 On what basis is work procured? *Please tick as appropriate*

| **Planned Preventative Maintenance** | | **Responsive Maintenance** | |
|---|---|---|---|
| Preferred Contractor List | | Preferred Contractor List | |
| Competitive Bidding | | Competitive Bidding | |
| Selective Tendering | ✓ | Selective Tendering | ✓ |
| Partnering | | Partnering | |
| Sealed Bid | | Sealed Bid | |
| PFI | | PFI | |
| Negotiation | | Negotiation | |
| In-house labour | ✓ | In-house labour | ✓ |
| Other, *please specify* | | Other, *please specify* | |

3.10 What are the major sources of maintenance related complaints? *Please tick as many as apply*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cleaning | ☐ | Indoor Air Quality | ☐ | Plumbing | ☐ | Choice of Materials | ✓ |
| Repair/Replace | ☐ | Heat Loss/Gain | ✓ | Storage | ☐ | Equipment | ✓ |
| Waste Disposal | ☐ | Fire Protection | ☐ | Sound Penetration | ☐ | Design | ☐ |
| Water Supply | ☐ | Telecommunications | ☐ | Lighting | ☐ | | |

Other, please specify ……

3.11 Are the EcoHome principles taken into consideration during the development of your maintenance schemes? Yes ✓ No ☐

3.12 Does EcoHome have any importance in your maintenance strategy? Yes ✓ No ☐

3.12a If you answered yes to 3.12, please give further details ……

Affordable warmth/energy efficiency considerations……

……

……

3.13 What do you believe are the problems your organisation faces in terms of building maintenance? *(Please tick as many as appropriate*)

| | | | |
|---|---|---|---|
| Not enough staff | ✓ | Building design inefficiencies | |
| Too many calls for service | | Service administration inefficiencies | |
| Not enough money | ✓ | Poor construction quality | |
| Poor contractor performance | ✓ | Other, *please state* | |

## 4.0 Quality

4.1 Does the Decent Homes Standard have an impact on your maintenance strategy? Yes ✓ No ☐

4.1a If you answered yes to 4.1 please provide your reasons why ……..
Our business plan identifies how we deal with non-decent homes and preventative measures to be taken in future
……...
……...

4.2 What is the approximate percentage of dwellings which **ACHIEVE** Decent Homes Standard? **83%….**

4.3 Of the dwellings that are failing DHS please provide approximate percentage of dwellings failing on the following criteria *(the total may be more than 100% as some dwellings may fail on more than one criteria)*

| **Criteria** | **%** | **Criteria** | **%** |
|---|---|---|---|
| Thermal Comfort | | Fitness | |
| Repair | | Modernisation | |

4.7 Generally, do you believe the Decent Home Strategy will improve the sustainability of the existing housing stock

Strongly Agree [ ] Strongly Disagree|

4.4a Please provide your reasons for your answer to 4.4 ……
Improvement programmes are and have been ongoing to our stock for a No of years Decent homes has only set a mark in time for some failing properties to be dealt with……...
……...

4.5 Do you allow for incremental upgrades to the quality of your stock within your maintenance programmes? Yes ✓ No ☐

4.5a If you answered yes to 4.5, please provide examples; ……
Bathroom replacements will include changing the general layout to improve the dwelling as opposed to straight forward replacements.……

4.6 Are the incremental upgrades above and beyond those identified in DHS? Yes ✓ No ☐

4.7 Is the Housing Health and Safety Rating System incorporated into your Stock Condition Survey? Yes ✓ No ☐

4.7a If you answered yes to 4.7, does the Housing Health and Safety Rating System have an impact on the maintenance strategy?
Yes ☐ No ✓

4.7b If you answered yes to 4.7a, please give examples ……
……..
……...
……...

## 5.0 Sustainability Strategy

5.1 Is there an organisational sustainability policy currently in place? Yes ☐ No ✓ Don't Know ☐

5.1a If you answered yes to 5.1, what aspects of sustainability does it cover? ……
……..
……...
……...

5.1b To what extent has sustainability affected your maintenance practices?

Not At all | **Slightly** | Moderately | Significantly | A Very Lot

5.2 Is there tenant engagement to raise awareness of energy use and other sustainability issues? Yes ☐ No ✓

5.2a If you answered yes to 5.2, please give examples ……
……

5.3 How relevant do you think the sustainability debate is to your work as a maintenance manager within social housing?

Not At all | Slightly | Moderately | Significantl | Very

5.4 Do you currently measure the sustainability of your housing stock? Yes ☐ No ✓

5.4a If you answered yes to 5.4, please give examples of how this rating is achieved, ……
……

5.4c If you answered yes to 5.4, does this rating have an impact on your maintenance strategy? Yes ☐ No ☐

5.5 Do you believe your organisational maintenance strategy could be improved in terms of sustainability? Yes ✓ No ☐

5.5a If you answered yes to 5.5, please give examples, ……
Sustainability can have cost implications which can be difficult when attempting to prove Value For Money when benchmarking
……

5.6 How sustainable do you rate your current maintenance practices?

Very sustainable | Moderately | **Slightly** | Neither / Nor | Slightly Unsustainable | Moderately | V. Unsustainable

.

5.7a Which sustainable technologies have you **INCORPORATED** in your refurbishment projects ……
Energy efficiency measures when upgrading heating, loft insulations, the use of pvcu external products has reduced the need for maintenance, painting programmes etc
……

5.7b Which sustainable technologies have you **CONSIDERED** incorporating in your refurbishment projects ……
Now considering renewable energy issues for forthcoming heating replacement programmes for grouped schemes……

5.8 Do you consider the sustainability strategies / policies of your contractors? Yes ✓ No ☐

5.8a If you answered yes to 5.8, please specify how ……
……
……
……

| 5.9 Which of the following do you believe **should** inform a **sustainable** maintenance strategy? | Strongly Agree | Agree | Neither / Nor | Disagree | Strongly Disagree |
|---|---|---|---|---|---|
| Improvements are incorporated into the maintenance programme to upgrade the buildings overall performance | | ✓ | | | |
| 'E' technology used | | ✓ | | | |
| Material is sourced locally | | ✓ | | | |
| Primary aggregates are used | | ✓ | | | |
| Plant is sourced locally | | ✓ | | | |
| Labour is sourced locally | | ✓ | | | |
| Recycled / reclaimed materials are used | | ✓ | | | |
| Materials with a low impact on the Environment are used | | ✓ | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Low toxicity paints / varnishes etc used | | ✓ | | | | |
| Planned maintenance system used | | | ✓ | | | |
| Responsive maintenance system used | | | | | | |
| Waste reduction procedures are in place during ordering process | | | | | | |
| Monitor and reduce construction waste | | | ✓ | | | |
| Install materials with high ODP and GWP | | | ✓ | | | |
| Quality system in place | | ✓ | | | | |
| Uncertified timber used | | | ✓ | | | |
| Energy consumption monitored and targets set to reduce use during occupation | | ✓ | | | | |
| Energy from renewable sources used during maintenance work | | ✓ | | | | |
| Monitor and report transport use to calculate $CO_2$ emissions | | | ✓ | | | |
| Supply chain established | | | ✓ | | | |
| Monitor and set targets to reduce water consumption during maintenance work | | | ✓ | | | |
| Monitor and set targets to reduce water use during occupation | | | ✓ | | | |
| Boilers are replaced with high NOx emitting boilers | | ✓ | | | | |
| Renewable technologies considered as replacements for existing components | | ✓ | | | | |
| Existing ecological features are protected during maintenance work | | | ✓ | | | |
| Enhancement of the site ecology is considered during maintenance planning | | | ✓ | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Home user guides are provided | | | ✓ | | | |
| Considerate Constructors aims and objectives are applied to maintenance work | | | ✓ | | | |
| Best practice policy is adopted in respect of air and water pollution | | | ✓ | | | |
| Household security is considered during product procurement | | ✓ | | | | |
| Energy consumption monitored and targets set to reduce use during maintenance work | | | ✓ | | | |

5.16 What other activities do you think could be undertaken within the maintenance programme that would improve the sustainability of your existing stock? ……..
……..
……...
……...
……...

5.17 What barriers do you face in making your maintenance practices more sustainable?

| **Internal to Organisation** | **Yes** | **No** | **External to Organisation** | **Yes** | **No** |
|---|---|---|---|---|---|
| Cost | ✓ | ☐ | Lack of Government Leadership | ✓ | ☐ |
| Bureaucracy | ✓ | ☐ | Lack of Joined up Legislation | ✓ | ☐ |
| Culture | ✓ | ☐ | No Incentive | ☐ | ☐ |
| Lack of Leadership | ✓ | ☐ | No Commercial Imperative | ☐ | ☐ |
| Lack of information | ✓ | ☐ | Lack of Technology | ☐ | ☐ |

Lack of resources ✓ ☐ Legislation ☐ ☐

5.12 Do you think adopting more sustainable solutions will cost your organisation more money? Yes ✓ No ☐

5.12a If you answered yes to 5.12, how much more do you think you could justify?
1 – 2% ☐ 3 – 5% ☐ 6 – 10% ✓ 11 – 20% ☐ more than 20% ☐ please provide reasons ……..
……...
……...
……...
……...

**6.0 Any Other Comments**

6.1 Please make any other comments you feel may be relevant? ……
……...
……...
……...
……...
……...
……...
……...
……...
……...

**7.0 Personal Details**

Please be assured that all information related to your organisation will be treated in the strictest confidence. Should you wish to receive a summary of our results upon completion of our study then please supply your name and contact email. Results will only be presented in a collated and unattributable form.

7.1 Name ……..

7.2 Address ……...
……...
……...
……...
……...

7.3 Email ……..

**8.0 Return Details**

Please return your completed questionnaire to, **Dr. Keith Jones / Justine Cooper, University of Greenwich, School of Architecture and Construction, Avery Hill Campus, Mansion Site, Bexley Road, Eltham, London, SE9 2PQ**

# APPENDIX B

## Interview Protocol and Selection of Transcriptions

**Interview topics / question types**

**Housing Maintenance**

- Discussion on the kind of data collected for maintenance purposes, how it is collected and how is it integrated within the decision making process (including historical data)
- Discussion on differentiation between PPM and refurbishment, have you noticed a change in emphasis from accounting? If so why do you think this has happened?
- In terms of sources of maintenance related complaints, is there a conflict between what the Government has said is wrong with dwellings (heat loss) and what tenants perceive to be wrong with their homes. If so, how can this be resolved, how does this impair your maintenance works? What do you mean by repair / replace?
- Discussion regarding the age and location of a property in terms of construction quality and building design inefficiencies. Do different ages have different problems associated with them, what impact does this have on your maintenance planning?
- Is there a difference in PPM and RM in terms of level of sustainability?
- Is DHS seen as political criteria?

**Quality**

- Are incremental upgrades carried out with sustainability in mind?

**Sustainability Strategy**

- How do you engage with your tenants and on what subjects
- There is an indication that although the sustainability debate is important to the work of a social housing maintenance manager it appears that it has not penetrated operations yet – do you agree with this statement? If so what do they feel should be done to overcome it?
- How is the housing stock sustainability rating used to inform your maintenance strategy?
- Discussion regarding improvements to existing organisational maintenance strategy, why do you think improvements are required and what is needed to make these happen?
- How did you evaluate your maintenance practices
- Discussion regarding the items to be included in a sustainable maintenance strategy
- Discussion on internal and external barriers to more sustainable practices, why do they exist, how can they be overcome
- Qualification regarding additional justifiable spend on more sustainable solutions

**General**

- Discussion regarding the current (condition based) maintenance model, including possible inefficiencies, feelings towards inclusion of building performance and its importance within the decision making process
- Discussion regarding post 2010
- Quality of Life indicators, what do you think will improve the quality of life of your tenants?

7/6/2007 @ 2pm

**Q. PPM and RM, do you think one is more sustainable than the other?**

A. Well they both equally important in terms of sustainability, in one sense its easier to think about sustainability with planned because you have that element where you have time to think about what needs doing etc, etc. With responsive, very often you've just got to get on and do it and actually taking the time to think what are we doing, is it sustainable sometimes gets lost in the whole process basically.

**Q. You have quite a high rate of responsive maintenance compared to your planned maintenance work, what are the issues behind that?**

A. In terms of spend is it?

(JC) Yes

A. I'm sorry I can't actually comment on that because I didn't fill in that part of the questionnaire, I could find out.

**Q. Considering the impact DH has had on the works being carried out we're interested to know why political criteria has been voted least important in terms of prioritising maintenance work.**

A. I don't know there were a few people who inputted to the questionnaire.

**Q. Did you do any of the maintenance bits, then I can ask you questions around those?**

**A. I answered this question, this looks like my handwriting, what's the differential between PPM and refurbishment work.**

(JC) Yes, what we'd found with this question, we were expecting it to be on an accountancy basis, PPM out of revenue and refurbishment work comes out of capital and generally with the ALMOs and LAs it did follow that patter but the RSLs had moved considerably away from accountancy as a way of differentiating between those two types of work so that's just an interesting fact that we've noted.

A. Well I would never think about it on an accountancy basis, because that isn't my background, what we have found is the difference between, for me, the difference between PPM and a refurbishment would be where you might have something where you can do something innovative, so many there is funding available to do certain things, you might then decide well, that could fit in to that estate where we're actually going to be doing x, y and z and that would lend itself to doing a little bit extra. Most of the DH work is basically PPM, the way I would see it as run of the mill work. OK does that make sense?

**Q. You said that you** collect SAP 2001, 2005, SCS and other; could you tell me what the other is or was?

A. Oh no that's not a tick.

(JC) Oh ok then, can you tell me why you use those items to aid your maintenance decision making?

A. we do need to do the SAP because its one of our Best Value Performance Indicators we need to measure the SAP improvement on an annual basis, so we do collect that sort of data. At the moment, I did tick SAP 2005 but we haven't actually moved over to that just yet.

**Q. The SCS can be seen as being quite a subjective document, do you have any such issues in terms of the SCS?**

A. We actually got outside consultants to do our SCS because of the subjectivity of it, it is basically a problem because people get confused about what is poor and what's fair and what's ok, even within one organisation. So we used consultants to try and eliminate that to a certain extent but at the moment the way we collect our data is done in-house, cost is always an issue, there are limited budgets to pay somebody from outside. Does that answer the question?

(JC) Yes that's fine, so you do it in-house now?

A. We do but the original SCS was carried out by an outside consultant

(JC) So you're just updating the original survey

A. Yes

**Q. And in the SCS you're using the HHSRS, how are finding working with that, what kind of impact has it had on your finances and your surveys and the maintenance?**

A. I don't know to be honest because I haven't been involved in it at all.

**Q. How do you integrate the SCS and the SAP, does it just go into a database and analysed?**

A. Yes we've got a bespoke database that's called ?? which was actually designed by the company that undertook the survey and then it was adapted to do the SAP calculations. So I think basically what they do is they use NHER auto-evaluator, I don't know how familiar you are with, they just tagged that onto the back of it and it generates a result for us.

**Q. And when you're running this analysis, your main focus has been on DH**

A. Yes

**Q. Procurement, I understand you use partnering for both your PPM and your RM, we're interested in the decision making process, so we're interested in why partnering was chosen.**

A. I think our actual partnering contract we actually use, particularly for the RM contract we used a number of contractors on a rotational basis, this was deemed a very costly way of doing it so we decided to go down the partnering route because you could develop a relationship with contractors who were guaranteed work and with that in mind, their prices took that into consideration so you ended up paying less for your repairs than you would normally have been the case. With our PPM our capital programme basically, we used to tender in the traditional way and we tendered to between 4 and 6 contractors and generally the lowest tenderer was accepted as the contractor. Again this is a fairly costly way of doing things particularly as a lot of our work was very, very similar and you were preparing documents each time and having to tender for each and every job that you were doing. Because the programme from 2001 grew to

such a scale it was deemed that the best way forward was to set up a partnering contract and that has been in place since the beginning of this financial year, since April. We'd used partnering as well for one of our regeneration projects, that's completed now but that was a very successful way of doing things.

**Q. Did you do the question about problems being faced by the organisation?**

A. Yes

**Q. I was just wondering why you selected those and how they can be overcome really.**

A. I think that's always a problem with LA I'd be surprised if other LA didn't say the same thing, there is never enough money to do everything that is needed and for whatever reason there never seems to be enough staff either particularly in the RM area I think very often a high turnover there

**Q. You talk about not having enough money and this might not be an issue at the moment because of the DH but, you do your analysis and you put in your SCS data and you put in your SAP data and you do your analysis and out pops a programme of work that needs to be done, what happens if the work needed is bigger than your budget? How do you prioritise those projects?**

A. I'm not sure what happens with our responsive maintenance to be honest because I have very little to do with that side of things, I just think that, there is a priority system with responsive repairs, there are certain repairs that have to be carried out no matter what, anything to do with H&S you would have to carry those repairs out. Some repairs may be seen as not very urgent may be put on the back burner, I don't know.

**Q. Would you not know for planned either?**

A. I would imagine that something that's not seen as an urgent repair it might be pushed onto a different department to deal with. For instance we have a great turnover of void properties where we have tenants coming and going and sometimes when people leave the void property is in such

state that it costs too much money get it to a standard to re-let again, that would be passed onto another department for them to deal with and the budget found.

**Q. Did you answer the question about incremental upgrades?**

A. Yes, I mean what I took this to understand was, if you've got a block of flats and properties to be honest that needed a number of different things to be done to it and you didn't have enough money you might decide to just do the work first and come back and do the others later. That's particularly the case prior to DH with DH we have to do everything that's needed to bring the property up to par. But for instance if the property is, we're looking at one particular estate over near Lewisham, we've actually got 4 tower blocks are actually suffering from water ingress, so we're looking at overcladding the block, its seems to be the only way to sort the problem out and we're looking as well at not only overcladding the block but also maybe super insulate the block and also maybe looking at installing some renewable energy or some sustainable energy system within the block. At the moment that's the way we would like to go but budgets and what have you we probably won't be able to do that all in one go because we need to overclad the block, we need to meet DH by a certain date, we might say ok lets do the super insulation at the moment and leave the sustainable energy system for 3 or 4 years down the line. So that's the sort of thing I was thinking about when I answered. Was that what you had in mind?

(JC). That would cover it, what I was thinking of, if people are incrementally upgrading do they take sustainability into account, so if you're doing responsive repairs and you need to replace a tap, does the tap get replaced like for like or can you take that opportunity to put in a flow regulator type tap to reduce the amount of water and things like that?

A. at the moment with the responsive repairs contract we would just change like for like. With the capital works programme or the DH programme we are looking more at, 'what if we replaced this with something more sustainable?' Because of budgets we can't always look at it like that

but for instance those 4 tower blocks we're actually looking at, 'right the heating needs upgrading', its an electrically heated block and we can't install gas because it's a pre roman point construction so we can't install gas and we can't install individual gas boilers so we're looking at, what we're looking at is super-insulating the property so that don't, almost don't need it and put in a very efficient electrical heating system which later on you can install CHP and run from CHP. Or you might go down the route of using CHP to, as a communal system to heat the properties because you've got, with CHP you've got all this heat to get rid of anyway, so there's always, am I going off the point there?

**Q. Did you fill in the sustainability questions?**

A. Yes I did.

**Q. Can you tell me what instigated the production of your sustainability policy?**

A. I think really, its not legislation but it's the way things are going really sort of thing, its something that councils are expected to have, certain sustainability policies. It isn't called a sustainability strategy its called an environmental strategy and that, its just good practice really.

**Q. You put on the questionnaire that sustainability has moderately affected your maintenance practices, I was just wondering how practices have changed in light of sustainability?**

A. I think as a result of the sustainability policy and as well as the sustainability policy / environmental policy we also have a borough wide energy policy and a housing energy policy. As a result of our housing energy policy it's a pretty important aspect of our maintenance we haven't really progressed further than energy efficiency, we've done some renewable energy projects, we've done one green roof project and we're hoping to do more, we're also looking at instead of using UPVc for our windows looking at other more sustainable windows so while its not mainstream just yet, we're getting to a stage where people are actually thinking 'we need to think about these things'.

**Q. And why is the sustainability debate so important to your work?**

A. Well there's more and more coming from government and more and more the government is looking at LA to take the lead in that we're expected to raise awareness about the issues and we are already raising awareness, we can't expect them to take action if we're not taking action ourselves.

**Q. I know we've just touched on sustainable technologies and I noticed in the questionnaire you put down technologies that have been incorporated as CHP, solar thermal, PV and the green roof. I'm interested in the decision making process behind these choices so why were those particular technologies chosen?**

A. CHP and the solar these were seen as, basically there were programmes available, funding was available to do something innovative and we thought that CHP was the leader, back in 1994 which at the time was bloody good and as well as installing the CHP we also installed GSHP in a block of flats so we actually drew in quite a lot of funding as a result of that. With the solar we installed the hot water system to our miscellaneous property which are basically properties that are dotted around the borough, we got quite a lot of funding as well to enable us to do that in fact we nearly got 100% funding in the end. The PV, we've installed two 5kW peak systems and on 2 or of our sheltered housing blocks and basically this is a pilot scheme to see how much energy PV generates and if it is actually worth our while to install them. Green roofs, again basically it's a pilot scheme to look at how popular it would be with, it was something that the residents of, possibly quite interested in, we looked into the technicalities, it sounded like a good idea.

**Q. How is that working do you know?**

A. Its just recently been installed I don't think it's even out of defects yet so I'm not sure if they've had any problems as such.

**Q. Wind and biomass were considered but not installed, again why have then been considered but not installed?**

A. Well we would actually like to install them but with wind, that's a planning issue to start with, we also are given to understand that some of the turbines don't actually perform as well as manufacturers claim, so we're a little bit sceptical because, what's coming out basically is that wind in an urban location isn't as productive as claims, there are issues with turbulence and that sort of thing. With biomass, we're not yet convinced that there is a good supply of biomass within a local area to be sure of a regular supply. I'm sure that will change in years and we will certainly want to look at installing something like that.

**Q. You put down that you consider your maintenance practices to be slightly unsustainable; I was just wondering how you evaluated the organisation practices in that way.**

A. Well we're installing a lot of UPVc windows and there is some, we have conflicting views as to whether UPVc is recyclable or not, some people say 'yes it is recyclable', some say 'yes it is but its not that useful', I'm thinking we're installing millions and millions of pounds worth of UPVc windows, we're not sure how long they will last, there's going to come a time when they'll all need to be replaced and we'll be left with a mountain of UPVc which may or may not be very sustainable. That was my thinking behind that. Somebody might have judged that as being more than slightly but I think we're trying to do other things that counteract that.

**Q. There's a section on internal barriers to more sustainable practices, you put cost, bureaucracy, culture and lack of resources, I'm interested in why those items were selected and what you think needs to happen to break those barriers down.**

A. Well I think cost, the cost of being sustainable at the moment, there is an extra over cost to being sustainable at the moment, sustainable materials tend to be a bit more expensive at the moment, arguably they tend to last longer, however that's never put into the equation, we don't look at things on a long term basis, we don't look at the whole life cycle cost analysis and while you might do one its often disregarded as being very useful. Within LA there, such organisations

tend to be bureaucratic anyway, you normally have to tick boxes before you can move onto the next stage, very often when you get funding in you've got very little time to spend it, and in terms of culture, its linked with culture as well, you will get some people who are very enthusiastic about putting something new and different in and then you have others who want to think 'who else has done this and does it work and its all this money and it might not work' a bit dinosaurish in their views, so in a way those three are linked, 4 things, lack of resources, again lack of resources, either relating to staff to be able to do the actual extra over work. Sometimes when you're doing something innovative, you've got to do it and do your normal work.

**Q. And a resource is a money issue again?**

A. Also a money issue yes.

**Q. External barriers, the same again really, why lack of government leadership, lack of joined up legislation, no incentive, no commercial imperative, why those have been chosen and what needs to happen to break them down**

A. Lack of government leadership? Government are very good at coming up and saying you should be doing this and you should be doing that, you should be installing renewable energy systems and you should be energy efficient and you walk into their building and you don't see any of it and you think 'well how do you expect us to do it if you're not doing it'. We've lots and lots of legislation which conflicts with each other, so for instance the idea of, not only legislation but also new policies coming in or the idea of affordable warmth, there are conflicts there and very often to thread, pull together. No incentive, well that's not as strong as it used to be, now if you're seen as a green council you get more funds than you used to, but sometimes you think 'well what have I gained more than say a council that was doing absolutely nothing?' and sometimes, it's a difficult to have that argument with senior management that you should be going down this route because they think 'well why? What's the incentive?' No commercial imperative, well you don't have to do it, there's no argument there, as opposed to lack of

technology, there's plenty of technology there, the solutions are there and on the other hand there is legislation to try and push that through sometimes though I think people don't know the power of the legislation. For instance planner wont often insist on renewable systems being installed because they're not sure they would win their case if it came up in court, that's the sort of thing I was thinking about.

**Q. 6-10% additional cost you think is justifiable** for more sustainable solutions; I was just wondering why you selected that.

A. I think I selected that as being something that our members could easily swallow, above 10% I think they'd be questioning. The problem is you're always dealing with public money and you'll always have to justify why you spent something and I think, I could be totally wrong with this, if you ask the members they might say absolutely nothing at all but I feel that if I wanted to spend 10% more over that I would have a good chance of getting that through.

**Q. And is that on a budget, on a scheme, on an element, how would you see that additional cost being apportioned?**

A. I don't know, I think on a project overall.

**Q. Climate change its in the news a lot at the moment and its had good and bad press depending on who you listen to and what you read. What's your level of confidence in the CC subject?**

A. I find both scientific arguments convincing I think we don't know enough about our weather systems to really say 'yes CC is because of our carbon dioxide emissions', particularly if you look at the levels of carbon dioxide there is in the atmosphere to begin with. However my view is, I do believe in the precautionary rule and I also think that we need to, its not only about what CC can do as a result of our $CO_2$ emissions but we need to be thinking about our impact on the environment generally, so while you're driving to work, you're not only emitting $CO_2$ emissions but also CO and lots of other things that are harmful to the environment, so using the car less, its

not contributing to CC its contributing to the environment, but that's the way I think about it really.

**Q. So do you think within the organisation that you work for there is scope to mitigate or even reduce the impacts of CC?**

A. Well we're just looking to right our CC strategy, I think we will be looking at mitigation as well as adaptation.

**Q. When we talk about sustainability we talk about the triple bottom line, economic, environmental and social and one of the things I'm trying to do as part of this research is develop a decision aiding tool which integrates sustainability into the maintenance model. The model I'm using is a hierarchical model with the top line of the model being the triple bottom line of sustainability, which I will build up. So I'm trying to get a feel for how organisations like yours would balance that triple bottom line.**

A. At the moment I would say economic and social take more precedent that environmental but increasingly the environmental side of things are being considered, particularly, we've got quite a lot of interest from our members, the councillors about progressing the green agenda our leader is very much behind it so can see in the future years the environmental will be comparable in importance as the economic and the social. The social is important because we're living in a borough where we've got people living in what are seen as deprived areas and so we're all about eliminating poverty, improving the lot of our more vulnerable residents so the social is quite strong I feel in Greenwich but the economics will always be strong because we're dealing with public money and of the justification of every penny we spend.

**Q. So from a tenant's perspective what do you think is important of sustainability?** I'm trying to build up a picture of the social section of sustainability

A. I think from a tenants point of view it needs to be affordable, its all very well being green but if you can't afford to be green then you can't afford it, it's as simple as that. It needs to be

affordable, however from tenants meetings that I have attended, there is an enthusiasm for the environmental as well and they do want to see the council moving in that direction and they are very aware of the economic impact and we do need to consider ?? as well.

**Q. You mentioned earlier, you're obviously doing a lot on energy efficiency and affordable warmth are tenants coming to with issues of affordable warmth?**

A. We do have occasions where we have tenants saying they're living in a cold, draughty house and when are their windows being completed. When I started in the council 13 years ago I would say, our SAP rating was way down below 40 and now its in the late 60s so we've done quite a lot of work to improve that side of things, having said that there are properties that are way below, the latest is something like 69.5, just under 70, there are lots of properties that are probably way down in their 30s still which we're tackling but it's a huge improvement since I started.

**Q. As an organisation what do you see as being important in terms of social sustainability? We touched on deprivation and improving**

A. I think it's very important to get the basics right. So for instance making our affordable to live in is the basic thing for us to be able to move onto the next level as it were and I think really that's why you'll probably see that's why tenants are more interested in green issues and that sort of thing because they're living in houses that are warmer than they used to be, they've got more money, so they're able to hopefully eat better, so once those needs are satisfied you're able to move onto the next level, which is what I feel we're seeing when we go to meetings now.

**Q. From an environmental perspective what do you think is important in terms of sustainability?**

A. For tenants or me from my point of view

**Q. From you**

A. Well we're getting there with the energy so that's helping to reduce carbon emissions, I think from my point of view probably traffic is the next biggest thing that needs to be tackled because

in Greenwich the transport links aren't as good as they could be, they will improve with the new transport that's coming into play but, people can be very car dependent in this borough. There is also the need to raise awareness, continue to raise awareness, things have been done about using the car less, people are scared to use bicycles.

**Q. Environmental schemes, I know we've talked about the sustainable technologies you've introduced and piloted, but specifically environmental schemes have there been any good or bad experiences?**

A. All of them have their issues, the PV and green roof I can't speak for, well the PV I can and we haven't had any problems with that so far with the solar hot water we've had a number of problems with that. Installing solar hot water in existing properties isn't as straight forward as you're led to believe, I'm sure its straight forward in new build, I haven't a background in that, I'm assuming it is obviously more straight forward than putting it in something in-situ and particularly with tenants that are living within the property. So we've had a number of problems of them breaking down and not working and so on and so forth, there are on-going issues and at some stage we're going to have to take stock and look at why we're having these issues. Having said that the tenants that have systems that are working well they are very happy with them because they're providing them with free hot water, particularly between June and September. The CHP and I think its technically its worked well but it hasn't turned out to be as cost effective as, in terms of the running costs, the maintenance costs are particularly high, it might be and I haven't been party to any of this but I think a lot of it might be that we didn't get a very good deal, it could be that and plus the fact that you don't get a lot of money for the electricity that you put into the grid. And I think installing renewable energy or sustainable energy I think you're better off installing and use all of the power you produce rather than trying, its not worth doing it if you're going to be putting most of it back into the grid.

**Q. So from an economic perspective what do you think is important in terms of sustainability?**

A. I guess that the systems last as long as they're meant to last. We've been led to believe that PV systems and solar hot water systems can last as long as 25 years if not longer, there's a long payback for these systems anyway so if they break down before their time then that's an issue economically.

**Q. One of the things we're looking at, at the university as a means of improving the overall sustainability of the existing housing stock is to concentrate more on the performance of a building rather than its condition. Do you think that's a step in the right direction?**

A. I think the problem with using tools like SAP, they are still very theoretical. For instance on paper you might do a SAP calculation of a property and you might find that its ok SAP wise but you still might end up with a draughty house because of, if you haven't done an air pressure test or something like that. So whilst SAP, there are some floors in this system I think and I'm not sure it will be any better than looking at the condition itself. It certainly is a good way of measuring where you're at perhaps but what would be more useful is to look at the SAP again once you've installed a system and particularly if you do a SAP calculation in a block of flats because they are more energy efficient having less exposed walls and so on and so forth but if that window system hasn't been installed properly your tenant might not feel anymore comfortable than they did previously yet the SAP has improved by several points.

**Q. Do you think there is something else that we should be measuring that we're not at the moment that would help us discover how are buildings are actually performing?**

A. I don't know really to be honest. I don't know enough about these background calculations to really understand what we need to do.

**Q. QoL of tenants is obviously very important, what do you think can be done to improve the quality of life of your tenant's the most?**

A. I think having a warm affordable home is the biggest priority.

**Q. If you had no constraints what would you like to do that would improve the overall sustainability of your existing housing stock?**

A. I would like to use more sustainable materials so installs sustainable windows, I mean UPVc windows if sustainable if there is such a thing then fine, but there are other systems coming in like fibre glass which we're actually looking at, so I'd like to see that happen, I'd like to see more water conservation measures being dealt with, more environmentally friendly finishes and installing renewable energy systems where it was practical to do so.

4/4/2007 @ 10.00am

**Q. How would you balance the triple bottom line of sustainability?**

A. As an association I would balance them equally. Obviously different departments tend to focus on the social side where as we look on the technical side.

**Q. But generally you'd say they have an equal weighting?**

A. Yes, I think so, yes. Our development department is into environmental sustainability as are the property services but on a wider spectrum, we're more concerned with social cohesion, inclusivity. So both I think, either take president, they are both important.

**Q. From a tenant perspective what is important to them in terms of sustainability?**

A. they want somewhere where they want to live. They want somewhere that is safe, clean, crime free, economically viable area, you know jobs and businesses, facilities, LA facilities, libraries, swimming pools, shops.

**Q. From an environmental perspective what do you think is most important in terms of sustainability?**

A. well from an environmental point of view we are looking at the running costs of heating systems, lighting. From our development side we are looking at, materials, waste, off-site manufacture of components and building systems, WLC, recycling, transport, pollution.

JC. Pollution from transport or pollution in general from housing

A. Pollution from housing and, we're looking at clean heating systems, green heating systems, we're currently working in Sheffield and one of the options, part of the project is looking at green options for the heating.

JC. What sort of options?

A. Well currently we're looking at a cost/benefit analysis on GSHP, CHP and biomass. All of which, at this moment in time are looking like pretty poor options, compared to individual gas heating systems and the communal heating systems that they've already got.

JC. Yes from an economics point of view GSHP don't compare well to gas.

A. Well they've got 400% efficiency, so if you can use them, we'd consider them.

Q. So you'd consider that on a WLC basis would you?

A. Yes, that's what we are doing at the moment.

Q. So you can reconcile your organisation paying the initial cost but the benefit going to the tenant?

A. Yes, because as I say we consider maintenance costs, running costs, replacement costs.

**Q. Have you had any good or bad experiences with environmental techniques implemented?**

A. we've just done a scheme in Ancoats in Manchester, where we used the PowerGen Whisper Jet CHP units and they are not reliable. I think PowerGen have taken them off the market.

JC. Oh was there a design fault?

A. Well there's something wrong with them. Apparently the technology wants fine tuning a little bit. We've just done a scheme in Oldham which has got wind generation and solar thermal

**Q. And how are you finding those?**

A. they are ok. To a certain extent they are too efficient. The water is too hot, we're having to consider putting mixer valves in to prevent scalding.

**Q. The wind turbine, is that a communal or individual?**

A. Each house has got the 1KW turbine wind generator.

**Q. and how are the residents taking to them?**

A. Residents, I don't think they realise they are there, they just work in the background, saving people money. Not as much as we'd like. Wind generation has had a bit of bad press recently as well with the cost benefits.

**Q. So there hasn't been a problem with synchronisation between occupant activity and power generation?**

A. No I don't think so.

**Q. From an Economic perspective, what is important in terms of sustainability and what will improve the economic situation.**

A. the first thing that needs sorting out is government grants or EU grants. If we lived in Denmark where we had to buy 100% of our energy, I think there would be a different philosophy for insulation and grants for better heating systems and fuel switching and things like that. It's just scratching the surface really, it probably needs an overhaul of the grant system. Eke 1 cavity wall basically, Eke 2, we've got millions of homes with solid brick walls, that currently attract no grants what so ever. So the lowest efficient homes to heat are currently attracting the least grant. We're still living on the benefit of cheap oil, in real terms it's not so cheap. And we actually, as a nation need to consider electricity as the number one sustainable option.

**Q. From renewable sources or?**

A. I'm talking about nuclear as well to be honest.

**Q. Yes I had the same conversation yesterday to be honest.**

A. I mean gas, you only get in one way really, you dig a hole in the ground and you pump it out. Whereas electricity you can generate in a number of ways currently, in the future who knows? I was in France last week and electricity is so cheap over there because it's all nuclear, no-one would think about having a gas system, except outside of a city.

**Q. Will monitoring / measuring performance improve the sustainability of the existing stock and if so what should be measure / monitored?**

A. well it's a start. How do you into that, how far do you go. In theory you could put monitoring equipment all over your house, so it would tell a picture throughout the day of what was happening to it but currently we are limited to what we can afford and that at the moment amounts to SAP and carbon emission survey. You could identify a couple of house types, that

you could do a more in-depth study and then you could extrapolate all that information across the different types but currently its just the SAP and $CO_2$

Q. But you think the performance readings of a building could tell you a little bit more about the building than a snap shot condition survey?

A. yes. Going back to the previous discussion about electricity. There's a conflict between the use of electricity and the current EcoHome thinking. I'm a registered BRE assessor and you automatically fail on your energy because electricity in its production produces 1400g of $CO_2$/kWh or whatever. We have this dilemma that, when we develop new schemes the automatic assumption is you've got to put gas in because you automatically fail on the electric heating.

JC. Unless you are able to offset a lot of that electric heating from a renewable source

A. That's right yes.

JC We're kind of limited at the moment aren't we

A. Yes, is it about 8% at the moment comes from renewable?

JC. EcoHomes does have its limitations, quite a number of them but at least it's a step in the right direction. I hear what you are saying about the electric heating. I come from Consultancy and we advise on new build and do come across this problem because an electric system, in a block of flats is so cheaper to put in than a gas system.

A. just a conductive type system, when you get to GSHP and air and water heat pumps, that's where the cost starts to go up. There on about using electric boilers to replace storage rads.

JC. What communal?

A. No it's for 18 flats I think, 18 or 24 flats. They've currently got very old storage radiators and we had a tenants vote and I think it went, if there were 24 flats it went from 113 in favour of gas, but there's no gas in the area for miles so it means massive infrastructure costs. So we're actually fitting electric central heating boilers.

JC. And that's going in at the moment?

A. Yes. That's a first because I don't think we've fit any central heating boilers in the past. Everyone was saying what – that's going to cost us a fortune to run! But compared to the storage radiators it's very comparable

JC. And will they be able to switch over onto renewable sources, if it became viable?

A. Yes, they could do.

**Q. I was going to ask what prevents performance being ranked more important in the decision making process but I'm assuming that will be cost then?**

A. Partly cost and partly education. If you want people to take a different view on energy, because it's automatic that people think a gas central heating system should go in. We've got systems now, sorry projects now that, we've got the U-values down to about 1.7 on the walls, you can literally warm the flat with the television, but unless there is a radiator on the wall people still think they're cold. Even when you size it properly, people think it's too small for the room and they feel cold

JC. Yes it's about breaking down people's perceptions and educating them in possibly a different way.

**Q. What do you think will improve the quality of life of your tenants, what's the one think you could do, that would have the biggest impact on your tenants?**

A. That's going back to that previous question about safe, warm, weather tight environment in an area that's economically sustainable, low crime levels, employment opportunities.

We work a lot with Local Authorities, we work with Manchester in Longsite and Sealy in Salford, where we've actively regenerated the area, we've put wardens on the streets, we've formed community centres, we work with LA to provide 'Home Zones'

JC. Home Zones?

A. yes that's giving the streets back to the tenants basically, making it so that you can go about the streets, so you haven't got people flying 35 mph down the streets. It's a Dutch idea that we've imported into Longsite.

**Q. Do you look a lot towards Europe for ideas?**

A. We look around the world for good ideas really, certainly on modern methods of construction, you've got to go abroad really to look at the best technology, same with heating equipment, we'd still be using back boilers wouldn't we if it wasn't for building regs, most of the technology comes from Europe.

**Q. If you had no constraints what so ever what would improve the sustainability / quality of your stock?**

A. one of the areas we work in is cultural issue rather than compli??? We've got third generation unemployed people in some areas. Really it's getting that ?? to cut out petty crime, go back to, I hate to say this because I'm not conservative but a conservative sort of work ethic. I think the homes themselves, you've got to look at peoples expectations now, we can do as much as we can trying to improve existing homes but people go into central Manchester and see luxury flats and things like, no matter how much you try to improve a terraced house, its never going to compare with that. As generations go on you always want more than your father or your mother had in the past and it's whether people still actually want to live in terraced streets in city centres. I mean 30 years ago people were moving out of towns into the countryside now it's the reverse, everybody is moving back into the towns and there's a massive oversupply of accommodation in the city centres now and prices are plummeting. It's how sustainable that is, every building that becomes empty in Manchester now gets turned into apartments. The next supply shortage I guess will be office accommodation. If we had no constraints at all you'd consider, I guess demolishing parts of the city that, where peoples aspirations are higher than that level, of where they want to live.

**Q. How do you deal with risk and uncertainty with housing maintenance?**

A. We try to minimise the risk at source really, we SCS every 5 years, we've got regional team of surveyors who work in patches, we've got partnering arrangements with contractors for our planned and responsive works and we try to get as much done for the same money. Partnering isn't supposed to save money just get better value.

**Q. Do you find that, that is the case?**

A. Marginally, yes, it's not the better value that Egan thought it would be throughout the range of indicators year on year. If you were to throw your cap at it, it would be nearer to 3% than 10. But there are other benefits, such as supply of labour and skills, its people turning up in proper delivery vans with uniforms on and all those sorts of things that are not part of the job but are part of the whole.

**Q. How confident are you with the science behind Climate Change**

A. at the risk of sounding like George Bush, a lot of these things are cyclical, we had global warming million years ago when we had no industry. I mean, quality of air, if nothing else should preclude people from churning out loads of $CO_2$ and particulates. It's certainly not helping the situation but it's whether, it's been hyped up. People in the main have no control over the outcome. There's people like America, China, India Australia don't sign up to that. The way I look at it is, some years ago, 25 years ago, Acid Lakes, that problem seems to have disappeared out of the news, its probably still got trees growing in Scandinavia and Russia but that's been overtaken now by the hole in the Ozone layer. We've had hot spells and cold spells in the past which haven't been to do with the way we live and occupy the planet but because of the current situation of growth in third world countries is not helping and a cavalier attitude to using fossil fuels certainly isn't helping. That's why most of the wars in the world are occurring at the moment, seeking oil. Russia are sat there rubbing their hands thinking we're out of all this, we're not out there fighting in Afghanistan and Iraq, Iran that was a Freudian slip, they are sat on

another 500 years of oil and 1000 years of coal. I fear for the world my granddaughter is going to inherit and that's not particularly because of the ozone layer, I was in the garden at the weekend and there was glorious sunshine in the beginning of April and thinking, if this is global warming bring it on.

**Q. Can RSLs mitigate or reduce the impacts of climate change?**

A. there is but we're scratching the surface, as a country we can do bits but its scratching the surface, without genuine political will from around the world. I don't think we're all doomed but I do think its going to get worse. You look at the building regulations in Denmark and Sweden and Norway, they are still far superior to ours and you think, if they were really serious about the amount of heat coming out of the home they could rectify that tomorrow, they could stop spending money on wars if they wanted.

**Q. Sustainability has slightly affected maintenance practices – how does sustainability affect you as an RSL and how does it affect your housing?**

A. it's the materials and components really that's affected by our sustainability policy.

**Q. Are you looking for sustainably sourced materials or?**

A. WLC really. We've got a couple of people in the organisation who conveys mixed messages about materials. We, since 1993 have been putting UPVc windows in as a standard item. Its not because I'm particularly a lover of PVC windows because I've got timber in my own house but its horses for courses, they rot the inside out instead of outside inwards, you've got a bit of an issue there so useful in the position where we use them. Some people within the organisation are telling other people that you can't obtain EcoHome Excellent if you've got PVC windows in, and as you know you loose 1 point from material and you can gain that by putting a washing line in. so we're going back a step now. We're trying to source good timber windows, but of course most of the good timber windows come from Germany, Sweden, Denmark, so what you save on

the impact of using petroleum products in the plastic you're shipping stuff all round the world, you have to treat them, you have to paint them, so there's a bit of a debate going on about that at the moment.

Under the Code For Sustainable Buildings you've got to achieve, a D is it and PVC windows are currently under that so you can put PVC windows under.

JC. Going back to what you were saying about mixed messages within your own organisation, like you were saying, you drop a point for PVC windows but you gain it, it's that whole holistic view it's not pinpointing them in isolation isn't it.

**Q. How do you engage with tenants in terms of energy efficiency and other sustainable issues?**

A. You're probably asking the wrong person on this. We have a tenant liaison department who do all that type of work. We do a bit in localised schemes if we're doing replacements we'll do consultation on one block. We have a tenant's forum group. We have about 200 tenants on our internet and if we want to get opinions or anything we'll canvas them.

**Q. But in terms of what topics are discussed you wouldn't know, besides from the consultation on new schemes?**

A. Not really no. There is an initiative called 'you can glow, when you're in the know', I don't know if you've seen it on our website. It's where we go out and visit all the elderly people to make sure they know how to use their heating systems and we're doing anything on insulation or get some energy efficient light bulbs because we've got a million of them. We take some packets of food and porridge and that's done on an annual basis. We started it 2 years ago.

**Q. Do you take into consideration occupier behaviour when you're developing your maintenance schemes, especially where sustainable technologies have been installed?**

A. to be honest with you the sustainable technologies we've put in-to-date have fairly limited, so I couldn't say hand on heart that we do. The biggest scheme that we are doing at the moment is

in Sheffield which is 353 Remer properties. Concrete, conplan panel, system built so we're looking at the biomass and we're over-cladding with a Belgium system 'Gibrick' a composite brick-slip insulation former. So even if we don't do anything with the heating, we've actually worked out that we will half the running costs just by putting in insulation, putting new windows in, insulate, Oak cladding and new doors. Tenants there are paying £15 a week, 50 weeks a year for their heating. £750 for a two bedroom flat and the controls are, if you get too hot you open a window, if you get too cold you close it.

**Q. Sustainability debate is moderately relevant to your work as a maintenance manager – how did you come up with that?**

A. Moderate, when compared to a new development when it's high. New development where it's high because we've got to comply with EcoHomes very good, so we're not under that much constraint. So when I say moderate, its moderate compared to other sections of the association.

**Q. You have a sustainability report**

A. Yes we have a sustainability strategy.

**Q. Could you tell me what's in that strategy and how it was formed, the decisions that went into developing it?**

A. We have a sub group, which is now called the 'Green Group', basically it was, and I might be able to get you a copy of it. It's everything, right from core activities like using car policies and waste in offices and materials that we use, it's everything really. It follows the lines of Environmental Matrix for Housing, I don't know if you're aware of that particular piece of software. The Housing Corporation said about 5 years ago, that they were going to make, environmental monitoring part of the core regulatory information that you've got to provide. Unless you've got ISO 14001 it's going to be so difficult for you to prove. So they developed, a company who's name escapes me, developed this piece of software that was supposed to be ISO 14001 equivalent for housing. And they called it the Environmental Matrix for housing, so we

were one of the first associations to buy it and got a £500 discount, so it only cost us £4500 for this piece of software but it's so cumbersome and difficult to use, eventually we dumped it in preference to sustainable homes. So that was a good way of spending £4500 and the Housing Corporation never actually made it part of their regulatory framework, they said they were going to and that was about 5 years ago but they've never officially done it. They look at your environmental credentials when they're coming to do you're inspection but.

Its evolved has this environmental strategy, sustainability strategy, whatever you want to call it. It started off as an environmental strategy, I did it and it was this big. It covered everything and people looked at it over the years and said there was too much in it, there are bits there that we don't really want to get involved in, like making sure that your car is serviced because serviced cars run better and they don't produce the, the association pay people to, through the essential car user to have their car serviced. So all you've got to do is prove that you've had your car serviced, 'no we can't ask staff to do that', why not, you're paying them for it? It's only like proving that you're insured to drive the car for work, it's no different. 'No we can't do that really', so that got dumped and then it was, we have a cut price car loan system, if you want to buy a very efficient car you get a lower rate, there are bands and you'll get a lower rate on the loan than if you go for an S type Jag or something like that, 'no you can't do that', its people's choice. So it got watered down a bit and in the end it got passed to one of our environment officers who had a particular interest in green issues and she managed to get it from that to that, to about 6 pages of it and now people look at it and say, there's nothing in that we need to bulk it out again. So it's going through an evolutionary period and currently, I'm not involved in that.

**Q. so this environmental strategy, did this come about because of the rating system within the audit commission. To get a 3 star rating you have to have an environmental policy don't you, is that what was driving you or was it something else?**

A. It was a business case really, we didn't want to be in a situation where our activities were affecting the world really. We did an impact assessment on all of our activities that was part of the matrix for houses.

**Q. You answered (the questionnaire) that your current practices could be made more sustainable. How can your practices be improved and what tools do you need to improve them?**

A. We have toolkits in the form of the sustainability toolkits from the Hastoe, we use that, we use ecohome, we'll soon be using the code for sustainable homes, there's only so many variations of a toolkit you can have really. The environmental matrix for housing followed a similar format as ecohomes looking at energy, transport, pollution and it was just reinventing the wheel.

**Q. But what do you think you as an organisation needs to do to improve the sustainability of your existing practices, not thinking about toolkits now?**

A. we need someone really to champion it. We have a board champion who used to be the head of planning in Ilkley apparently but for an association this size and our growth plans at the moment, environmental issues can take a back seat to running the business. So we do have a board champion, but that board champion probably needs to be a more forceful.

**Q. You rated the sustainability of your current maintenance practices as being slightly sustainable. How did you decide upon this rating and is this something the organisation actively measures?**

A. We don't rate it, it we do is follow best practice on, when we do repairs and maintenance and planned programmes.

**Q. So you just thought about what you are doing at the moment**

A. Yes windows, doors. The development department get all the interesting things, like the modern methods of construction.

We're currently spending £40 million a year on development and spent 6 on maintenance. We're one of the biggest corporations in the north of England.

**Q. Internal barriers stated are cost, bureaucracy and culture. Why did were these selected them?**

A. Well the culture bit is the education part, both residents and staff to an extent. What were the others?

A. Bureaucracy and Cost

A. I think when I filled that in I'd just applied for a 'green skies' grant for some solar thermal at Nutsford and after filling in a massive questionnaire I had to get it to Pierce Guys that day because the grant was ran out. They held onto it several months, came back with loads of questions and in the end they turned it down. They turned it down because we weren't replacing the chlorifier, the cylinder. We didn't need to because we were solar twin which used the existing cylinder, its just putting an element in the cylinder. So you go through this, you jump through all the hoops and they say no, you can't have that. Through Eke we're strategic partners with Scottish Power ManWeb and we have been for 5 years now and even accessing what should be standard grant is so difficult and the amount of grant we get is tiny. Probably £30,000 - £40,000 per year for our complete range of activities. What was the last thing?

A. Cost.

A. Cost, really isn't an issue now, we've got to install A rated boilers, we've got to install windows with a U-value of 2, that's just something we have to do, you've got to bite the bullet now. But changes to, Building Regs 2004, I worked out at the time, it would cost £900 per house and I've worked out since what the cost addition of pass to good, good to very good and very

good to excellent on EcoHomes and it works out at something like £450, £1600 and £9000. These are all laudable initiatives but there's no extra money, you get an extra 1% off the Housing Corporation for ticking the EcoHomes box. So to get to excellent you need £9000, a typical house costs £90,000, 10%

JC. Yes there's a big gap there to fill.

**Q. Just going back to culture for a moment, we were talking about education for residents and staff, where does staff get their knowledge from in terms of sustainability and maintenance?**

A. Basically our department are administrators, they act as a link between contractor, Housing Corporation and the Consultant. They go a lot by what consultants tell them.

**Q. And residents, I assume that's going to be through the forms of engagement that we spoke about earlier.**

A. That's right. This job in Sheffield now, we've had a couple of meetings with the steering group about heating and insulating options and we've got a consultant involved again, they are going to do some work with tenants.

**Q. External barriers were lack of government leadership, lack of joined up legislation, no incentive and no commercial imperative. Can you go through why you chose those and what you think can be done to overcome both internal and barriers.**

A. I know it sounds drastic, but until something, it's sort of like a disease it's creeps up and no-one ever sees the impact. I think it will take something like the Housing Corporation to say, you won't get any funding unless you do this, that would be an impact. A big financial impact. I don't think climatic impact is going to make that much of a difference, you see disasters on TV, you see floods in Cornwall, you see typhoons in America, there is always somewhere else, until it happens to you, its always someone else's problem.

**Q. 3 – 5% additional costs could be justified for more sustainable measures, why did you choose this figure and is this on a job by job basis or elemental basis?**

A. I don't know to be honest. I can't remember that question, I can't remember my rationale behind that.

JC. A lot of people did choose it and it wasn't the middle figure. OK not to worry.

A. It was probably best guess at the time, if I put hand on heart.

**Q. When we're thinking about this (additional justified costs) is it per scheme or per element or do you not really think it matters?**

A. Its about the overall life cost its not even the overall build cost, it's the effect of the 100 years that product is going to have an impact on the planet.

I found it quite funny a number of years ago when a guy called Jonathon Porritt came and spoke on behalf of the British Plastics Federation and I thought, how times change, how your views change and I've had these same views since doing my BSc, I did an environmental module as part of that and so I've had an interest in this, so my views haven't changed significantly over the years. I was looking at heat pumps back in the early 70's, long before, obviously they were popular on the continent, but in this country they were always iffy technology. So when you see Jonathon Porritt speaking on behalf of the plastic manufacturers you think …..

**Q. What do you think are the main housing maintenance priorities at the moment and do you think the DHS is addressing them?**

A. They've got to be water tight, wind tight and mould free. Its got to be a safe, healthy environment to live in. Your next priority really is sustainability. Then aesthetics I guess, as a pretty well down third. We do the DH stuff.

**Q. So really your priorities are not really covered, I know you're meeting the DHS, but your concerns are not met by the DHS?**

A. A lot is covered by the HHSRS. The whole thing about the environment is like trip hazards and dampness is all covered by the HHSRS now, so where the first part of DH, the Fitness standard was just a surveyor going in and saying 'yeah that looks alright', you've got to do 23 pages of calculations to get a figure.

**Q. And that came in this year wasn't it?**

A. The Housing Corporation has always said we're not going to impose it on you, just next time you do a SCS think about HHSRS. And of course we have done that the last two SCS which is the north east, Oldham and Nutsford, we've done a full HHSRS survey, it's doubled the cost of the survey mind you, it's about another half hour on the survey time. And it gives you a set of results that unless you have the book at the side of you it means absolutely nothing. J69 and you think, what does J69 mean? And you find out that the mean average is 50, so its like 19 above the mean average.

**Q. So it's a lot more work then?**

a. Well it's the University of Bath. Anything that Bath do for the Housing Corporation tends to mushroom and mushroom, so yeah. I can't make a comment on the University of Greenwich because I've only dealt with things that Warrick and Bath have done.

**Q. There are clear benefits for the tenant by implementing DHS in terms of Health and Safety, fuel poverty but do you think there are any other benefits for the tenant?**

A. We've extended it, we started off as DH, its gone onto DH+ and now its onto decent communities. So yes, I mean the benefits, eventually when the effects are felt should provide a much better living environment for them. Like the HomeZones as part of that work and environmental works, security works, they're not core DH but we tend to do them as standard now.

When we did the bid for Sheffield, because most of the other RSLs have been into Sheffield put together a wish, like a menu of niceties so yeah, we'll do your windows, we'll do your doors, yeah we'll do your kitchens, but what if you want things like security lighting and a burglar alarm? That is going to have to be taken out of this list of extras. A couple of associations said you can have up to £1500, but this is what you can have for £1500, so there was a list of £500 ones, a list of £1000 ones and you could mix and match. We looked at them and said, 'these are our standard items anyway', we wouldn't expect people to say, 'oh we'll have a burglar alarm as extra', we put that in as standard.

**Q. PPM vs. RM do you think one is more sustainable than the other?**

A. There's a place for both really but you can, PPM is ok if you use it sensibly if you go out looking for work, you don't get the life cycle out of your components, if you just go down a street and there's two leaking roofs so we'll do the whole row, its obviously not sensible to do it that way. PPM on M&E equipment is certainly a way to go, but on building components its really got to be, really get the most life, you can't just keep putting things up, taking it down, throwing things away and putting new up, that's no good at all for sustainability. A lot of the time we are taking stuff down, back to the old days of taking out timber windows, you're taking out timber is more like hardwood than softwood and replacing it with softwood. Its like taking something that's been there 90 years that's got 10% rot in it and 90% is ok and we're replacing it with something that's only going to last 25 years. I did a postgraduate course in building conservation at Reading and certainly the philosophy around conversation in this country, if you take SPAB and English Heritage and National Trust is minimum intervention and you just replace what is necessary, don't rip out for the sake of it.

**Q. What historical data do you collect and how is it used to determine maintenance trends?**

A. Its all our maintenance records, SCS and the maintenance records.

**Q. We had found that historically, PPM was differentiated from refurbishment work based on accountancy. The survey doesn't appear to agree with this, have you noticed a shift away from accountancy?**

A. In the main PPM is done on communal services installation, so it does come out of revenue not capital.

**Q. You collect SAP 2001, 2005, SCS and HHSRS and you rated them all as most important. Can you tell me why you chose those pieces of information to collect and how they are integrated into you maintenance decision making process?**

A. With the HHSRS you have knowledge of your stock, we generally do our SCS every 5 years, we've actually done our Oldham and Nutsford, sorry Oldham survey two years ahead of that programme because we didn't think the data was good enough for the asset management strategy. Basically ???? exercise but with transfer you've got to look at the motives behind that information so we've just had this done 2 years ahead and we're doing our south region next year, which again will be a year ahead of our standard 5 years, so its 3 years for this region, 4 years, so we're actually collecting, we're also including more information about SAP and carbon emissions because the last survey was, the Carbon Index, we used the Carbon Index last time and we're using carbon emissions this time, that was the best thinking on the operation. But we've also included the HHSRS. I listed them all as most important because they are all part of the same exercise. And then that information goes into the asset management strategy which informs the business plan to make sure we've got enough money in the pot to do this for the next 30 years. It supplies us with ammunition for going to the Housing Corporation and making a case for major repairs and things like that. Looking at Major Repairs, we've had it every year, 'til this year. This year we've not received any major repair funding. Every year we think we're not going to get it but every year we do. It changed in our CTF as from this year which means that

we can't spend recycled money on major repairs, so it's made us a bit savvy now about where we can go looking for money.

**Q. Do you have your own in-house surveyors to do your SCS?**

A. No we do it externally. There's a practice called PP Projects who've done our last three.

**Q. Do you think the SCS collects the information you need or do you think it does then need to be backed up by the information that's coming in from SAP and the information coming in from HHSRS.**

A. Its all on the same database, its Power Survey, so its all the same. Basically it likes a big Microsoft access database, you just have menu buttons.

**Q. The EcoHomes XB hasn't really penetrated its intended market yet, why do you think that is?**

A. I went on an XB training session last year in Manchester again until the Housing Corporation comes down and says 'you've got to do it' there will be a reluctance to expand EcoHomes into existing buildings. Not because its particularly onerous, its just the bureaucracy of having to fill, the paperwork and having to get someone in to do it for you. When I saw it, when I went up to the training session before Christmas, you can put all your terrace houses together and say 'that band of terrace houses are that rating' and as you improve lots you can take those out and do a distinct, bespoke, chunks of properties. So you can demonstrate that bit has improved by this much, I think its currently set up a system for your existing stock. Its easy enough on new build, most associations our size are developing 300 properties a year, whereas if you've got 8500 existing properties it's a more daunting task than for 100 new ones.

With the Housing Corporation, although you've got a transitional period in, say you've got two years to sort your act out and then we're going to make it regulatory.

**Q. PFI is something else that the government is pushing, which again didn't feature well in our survey. Why do you think RSLs are not using it as a form or procurement?**

A. We spent 2 years doing a PFI scheme in Manchester and came second, Harvest won it.

**Q. Are you using PFI for your RM?**

A. No. we do distinct schemes. We started to do a PFI in Leeds in their social housing in their supported housing division but I think we ended up pulling out of that one. We did a PFI in Manchester with Manchester City Council and Carillion but currently we are partners.

**Q. But this is for new build?**

A. No that was for refurbishments. Refurbishment of 1000 properties on a council estate. As far as I know we haven't been successful on a PFI scheme yet.

**Q. so you wouldn't have any problems working on a PFI scheme then?**

A. No. The philosophy is ok, so long as the money's there but these are done for the reasons that they aren't they. They are there to pay the LA money and to make the contractors profit. You're playing in opposite directions at times

**Q. But you use partnering arrangements, is that for the reasons we were talking about earlier, the savings and the relationships?**

A. I think its more about supply of labour now and skills shortages. If you partner up with a reputable contractor, there'll be a massive skills shortage shortly. I've been looking at, over the past year, its died a death somewhat, actually creating limited partnerships with some of the contractors, so that you end up with a virtual in-house team that you teamed up with a contractor, or even more radical, purchasing a contractor, like northern counties have done. Its ok if you've got 30,000 stock, we've got 11,000 so it was boarder-line as to whether it would ever be viable. It's certainly worth looking at because in-house departments are becoming more and more en vogue now. They got a lot of bad press in the 70's and 80's for being lazy sherkers but the good in-house departments of LA are as good as anyone.

**Q. Our survey showed that the main source of complaint was repair/replace, followed by plumbing and then thermal comfort but the EHCS is saying that thermal comfort is the biggest problem. Do you think there is a conflict between what tenants think is wrong with their properties and what the government says is wrong with them?**

A. Perception and aspiration again I think and you've got to look at the questions that EHCS ask. They wont ever go to a tenant and say answer that, it took me weeks to complete. All tenants are bothered about really is what they can feel and what they can see, if they feel cold the house is inefficient.

**Q. You reported, too many calls for service, not enough money and construction quality were the problems being faced in terms of building mai**ntenance. Is that because of the type, age and location of the building or something else?

A. Its the growth profile really of the association. The association was founded back in the 70's, the early 70's and it was inheriting mainly terraced stock from Manchester and Salford so in the main, sturdily built, tired needing reinvigorating. Then came the growth period of the 70s and again there was a massive skills shortage of the 70s and some of the quality of the construction was a bit iffy. Social housing at the time was a political hot potato, councils were throwing up houses all built to a price all for political ends. It really wasn't until the building regs of '92 that the standard increased really. The Romans thought us everything we knew about how to build and then we spent 2000 years forgetting it, arguably it wasn't until the Georgians that we got decent houses in this county. So you go through periods of poor quality / high quality.

# APPENDIX C

## Octavia Housing Workshop 1 Presentation and Results Slides

workshop 1 presentation and result.pdf

# APPENDIX D

## Octavia Housing Workshop 2 Presentation Slides

Workshop 2.pdf

# APPENDIX E

## Octavia Housing Tenant Telephone Survey and Sample Returns

**Tenant Survey for Octavia Housing *with the* University *of* Greenwich** **Type of property/floor:**

## 1.0 Demographic

1.1 What category of housing do you live in? General Needs ☐ Specialist Service Resident ☐ Temporary Accommodation ☐

1.2 Which household member is completing the questionnaire? Tenant ☐ Tenant Spouse/Partner ☐ Other ☐

1.3 Age of respondent? Under 17 ☐ 18-24 ☐ 25-31 ☐ 32-38 ☐ 39-45 ☐ 46-52 ☐
53-59 ☐ 60-64 ☐ 65-69 ☐ 70-74 ☐ 75-79 ☐ 80- 80+ ☐

1.4 Size of household? Adult ☐ Children (16 and under) ☐

1.5 **If more than one adult:**

1.5a Number of adults within the household who are employed? None ☐ One ☐ Two ☐ Three ☐ +Three ☐

1.5b Number of adults in full time education? None ☐ One ☐ Two ☐ Three ☐ +Three ☐

1.6 Are you? Unemployed ☐ Employed Part time ☐ Employed Full Time ☐
Self employed ☐ Student ☐ State Pensioner ☐
Private Pensioner ☐ Other ☐ …….

## 2.0 Overall Satisfaction

2.1 Please confirm your level of satisfaction with the following

| | Satisfied | Neutral | Dissatisfied |
|---|---|---|---|
| 2.1a Size of home | | | |
| 2.1b Quality of home | | | |
| 2.1c Quality of neighbourhood | | | |
| 2.1d Modernisation (kitchen & bathroom F&F, technology, double glazing) | | | |

2.2 What kind of impact do the following have on your quality of life

| | -ve Impact | N | +ve Impact |
|---|---|---|---|
| 2.2a Heating Costs | | | |
| 2.2b Electric Costs | | | |
| 2.2c Water Costs | | | |
| 2.2d Rents and services charges | | | |
| 2.2e Entertainment Costs | | | |
| 2.2f Food costs | | | |
| 2.2g Fear of crime | | | |
| 2.2h ASB | | | |
| 2.2i Noise (heard within your home from outside/neighbour) | | | |
| 2.2j Overcrowding | | | |
| 2.2k Maintenance and repairs service provided by your landlord | | | |
| 2.2r Other *please state* …….. | | | |

## 3.0 Household Running Costs

3.1 How is heating and hot water delivered to your home?
Gas Central Heating ☐ Electric Central Heating ☐ Electric Storage Heater ☐ Economy 7 ☐ Oil central heating ☐ Renewable ☐
Don't Know ☐ Other ☐ *please specify*, …….....

3.2 How do you receive your household electricity?
From the grid ☐ From a renewable source ☐ Don't Know ☐ Other ☐ *please specify*, ……

3.3 Do you pay for your household gas and electricity separately? Yes ☐ (go to 3.4) No ☐ (go to 3.5)

3.4 If yes, is this: quarterly bill ☐ monthly bill ☐ Monthly direct debit ☐ Quarterly Direct debit ☐ other ☐…….

3.5 If No, is this: (tick all that apply) Electric meter ☐ Electric monthly bill ☐ Electric quarterly bill ☐ Gas meter ☐ Gas monthly bill ☐ Gas quarterly bill ☐ Other ☐ *please specify*, …….

3.5 Please confirm which of the following appliances you currently use at home

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 3.5a Cooker | Yes ☐ | No ☐ | Number ☐ | 3.5k Cable | Yes ☐ | No ☐ | Number ☐ |
| 3.5b Fridge | Yes ☐ | No ☐ | Number ☐ | 3.5l Sky | Yes ☐ | No ☐ | Number ☐ |
| 3.5c Freezer | Yes ☐ | No ☐ | Number ☐ | 3.5m Laptop | Yes ☐ | No ☐ | Number ☐ |
| 3.5d Fridge/freezer | Yes ☐ | No ☐ | Number ☐ | 3.5n PC | Yes ☐ | No ☐ | Number ☐ |
| 3.5e Washing Machine | Yes ☐ | No ☐ | Number ☐ | 3.5o Broadband | Yes ☐ | No ☐ | Number ☐ |
| 3.5f Dryer | Yes ☐ | No ☐ | Number ☐ | 3.5p TV | Yes ☐ | No ☐ | Number ☐ |
| 3.5g Washer / Dryer | Yes ☐ | No ☐ | Number ☐ | 3.5q DVD | Yes ☐ | No ☐ | Number ☐ |
| 3.5h Dishwasher | Yes ☐ | No ☐ | Number ☐ | 3.5r Video | Yes ☐ | No ☐ | Number ☐ |
| 3.5i Microwave | Yes ☐ | No ☐ | Number ☐ | 3.5s HiFi | Yes ☐ | No ☐ | Number ☐ |

3.5j Games Console Yes ☐ No ☐ Number ☐ 3.5t Digital top box Yes ☐ No ☐ Number ☐
3.5u Digital Radio Yes ☐ No ☐ Number ☐ 3.5v Other *state* …….. Yes ☐ No ☐ Number ☐

3.6 Approximately how much money do you spend monthly on: Gas:£…… Electric:£…… or Both:£……
3.7a Is your property on a water meter? Yes ☐ No ☐

3.8 How do you pay for your water supply? Tick all that apply
Annually ☐ Quarterly ☐ Monthly ☐ Bi-annually ☐ Direct Debit ☐ Bill ☐ Other ☐ *please specify*, ……

3.9 Is this your preferred method of payment? Yes ☐ No ☐

## 4.0 External Environment

4.1 Please confirm your level of satisfaction with the following

| | Satisfied | Neutral | Dissatisfied |
|---|---|---|---|
| 4.1a Maintenance of garden | | | |
| 4.1b External appearance of dwellings | | | |
| 4.1c Cleanliness of external space | | | |
| 4.1d Appearance of communal hall / stairs / landing (flats only) | | | |
| 4.1e Cleanliness of communal hall / stairs / landing (flats only) | | | |
| 4.1f Security of access (flats only) | | | |

4.1lgOther *please state* ……

## 5.0 Health and Safety

| | Safe | Neutral | Unsafe |
|---|---|---|---|
| 5.1a How safe do you feel in your home? | | | |
| 5.1bHow safe do you feel in the area in which you live? | | | |

If answer to 5.1a is 'unsafe':
5.2 Could OH do the following to make you feel safer within your home?

| | Yes | No | Don't know |
|---|---|---|---|
| 5.2a Improve windows | | | |
| 5.2b Improve external doors | | | |
| 5.2c Improve / install Secure gate | | | |
| 5.2d Install / improve fencing | | | |
| 5.2e Burglar alarm provision | | | |
| 5.2f Install / improve security lighting | | | |
| 5.2g Other *please specify*, …… | | | |

5.3 Rank which concerns you most? (1st, 2nd, 3rd)
A Crime against the property
B Crime against a person
C Crime against a vehicle

5.4 Do you believe anti social behaviour is a problem where you live? Yes ☐ No ☐

| 5.5 How concerned are you of the following occurring in your home **at the moment**? | Concerned | Neutral | Unconcerned |
|---|---|---|---|
| 5.5a Falls | | | |
| 5.5b Overheating | | | |
| 5.5c Excessive Cold | | | |
| 5.5d Damp and mould growth | | | |
| 5.5e Draughts | | | |
| 5.5f Carbon Monoxide emissions | | | |
| 5.5g Noise from outside / neighbours | | | |
| 5.5h Pest infestation | | | |
| 5.5i Entry by intruders | | | |
| 5.5j Levels of natural light | | | |
| 5.5k Hygiene – layout of property / condition & No. of facilities | | | |
| 5.5l Fire | | | |

5.5m Other *please state* ……

## 6.0 Maintenance and Repairs

| | Likely | Unlikely |
|---|---|---|
| 6.1a How likely are you to undertake internal decoration works yourself? | | |
| 6.1b How likely are you to undertake simple DIY works (e.g. re-hang kitchen cupboard door) | | |
| 6.1c How likely are you to replace broken items (e.g. internal door handle) | | |

## 7.0 Energy Conservation

Very Very

7.1 How important is energy saving within the home to you?

| Important | Important | Neutral | Unimportant | Unimportant |
|---|---|---|---|---|

7.2 Are you actively trying to reduce your household energy consumption Yes ☐ No ☐

7.3 If you are actively trying to reduce your energy consumption is this because you wish to
7.3a Save Money Yes ☐ No ☐ 7.3b Reduce Carbon Dioxide Emissions Yes ☐ No ☐ 7.3c Both Yes ☐ No ☐

7.4 If you are actively trying to reduce your energy consumption which of the following are you doing?

| | | | | | |
|---|---|---|---|---|---|
| 7.4a Switching off lights | Yes ☐ | No ☐ | 7.4bTurning down thermostat (ideal 18-21°C) | Yes ☐ | No ☐ |
| 7.4c No leaving on standby | Yes ☐ | No ☐ | 7.4d Shower instead of bath | Yes ☐ | No ☐ |
| 7.4e Boil only water needed | Yes ☐ | No ☐ | 7.4f Heat on only when needed | Yes ☐ | No ☐ |
| 7.4g Install draught excluders to doors & windows | Yes ☐ | No ☐ | 7.4h Installed Energy Efficient light bulbs | Yes ☐ | No ☐ |
| 7.4i Insulate loft/walls | Yes ☐ | No ☐ | 7.4j Insulate hot water tank | Yes ☐ | No ☐ |
| 7.4k Replaced white goods with A rated goods | Yes ☐ | No ☐ | 7.4l Use correct sized pans and lids | Yes ☐ | No ☐ |
| 7.4m Full load washes at cool temp | Yes ☐ | No ☐ | 7.4n Installed radiator panels (external walls) | Yes ☐ | No ☐ |
| 7.4o Dry clothes outside or on a clothes rack | Yes ☐ | No ☐ | | | |

7.4 Other *please state* ……...

7.5 Who do you think should be responsible for energy conservation within your home Resident ☐ Landlord ☐ Both ☐

7.6 Is your annual spend on energy Low ☐ About Right ☐ Too Much ☐

## 8.0 How Can Octavia Housing Help You?

8.1 Should OH help reduce tenants household running costs by doing the following?

| | Yes | No | Don't know |
|---|---|---|---|
| 8.1a Provide energy efficiency advise | | | |
| 8.1b Provide water efficiency advise | | | |
| 8.1c Provide energy efficient light bulbs | | | |
| 8.1d Provide appliance switch off devices | | | |
| 8.1e Provide advise on benefits | | | |
| 8.1f Improve windows | | | |
| 8.1g Improve draught proofing | | | |
| 8.1h Improve roof | | | |
| 8.1i Improve external walls | | | |
| 8.1j Improve insulation | | | |
| 8.1k Provide 'back to work' advise and support | | | |
| 8.1l Provide household accountancy advise and support | | | |
| 8.1m Install water efficient sanitary ware | | | |
| 8.1n Install water saving cistern widgets | | | |
| 8.1o Provide advise on local amenities and access | | | |
| 8.1p Provide information and advise on voluntary organisations | | | |
| 8.1q Provide advise and support to tenants starting their own business | | | |
| 8.1r Provide alternatives to gas and electricity | | | |
| 8.1s Provide information on local allotments and growing your own food | | | |

8.2 Do you think Octavia Housing's tenants should be awarded for abiding by the terms of your tenancy agreement? Yes ☐ No ☐

8.3 If you answered 'Yes' please suggest a reward that you think tenants would find beneficial?
……..……..

# APPENDIX F

## Octavia Housing Workshop 3 Slides and Agenda

**ASSET MANAGEMENT STRATEGY WORKSHOP**

**AGENDA**

**9.30: Introduction**

The outcome Octavia Housing are looking for from today:

1. A shared view of what OH would put in a really good Asset Management Strategy, and
2. A list of things OH need to do to be able to compile that Strategy.

**9.40: Presentation**

What a good Asset Management Strategy should

a. The role of the strategy (the focus should be on management not assets)
b. The components of the strategy
c. Monitoring and reviewing the strategy

**10.10: A shared view of what we would put in a really good Asset Management Strategy**

**11.00: Feedback from Groups**

**11.15: Coffee Break**

**11.30: What things do we need to do to be able to compile that Strategy**

**12.30: Feedback from Groups**

**13.00: Summary of Outcomes and Actions**

**13.15: Close and Lunch**

# Strategic Built Asset Management (BAM)

Keith Jones

## Introduction

- In this presentation I will
  - Discuss the role of a BAM strategy;
  - Present the components of a BAM strategy;
  - Outline the delivery of the strategy;
  - Examine monitoring and feedback mechanisms;
  - Present a holistic model of BAM.
- Questions/discussion
- Workgroups.

## What is a BAM?


## What is a BAM? Part 1


## What is a BAM? Part 2


## Developing the Strategy

- A good built asset management strategy should:
  - Reflect the wider organisational context
  - Be aligned to organisational goals
  - Be timely (medium/long term objectives)
  - Provide:
    - basis for structured and rigorous forward thinking;
    - an explicit description of the elements of the strategy;
    - a clear statement for communicating the strategy;
    - a basis for future decision making.
  - Bring clarity to the way assets are managed in the organisation:
    - the organisational arrangements for asset management;
    - corporate processes for assets;
    - performance measures and measurement;
    - data management;
    - capacity management

Source: RICS Public Sector Asset Management Guidelines 0

## Developing the Strategy

- A good built asset management strategy will take time to develop.
- It will need to be refined in light of changing business drivers and feedback.

- However, the strategy is not the delivery programme. It is part of the organisations business process, not operational plan.

Source: RICS Public Sector Asset Management Guidelines 0

## Preparing a BAM Strategy

- Five key stages
- Preparation
  - Identify business drivers
  - Map the drivers to the asset base
    - KPI
    - Future needs
- Draft the Strategy
  - Obtain buy-in from key stakeholders
  - Test the strategy
  - Write the strategy
- Implementation


Source: RICS Public Sector Asset Management Guidelines 0

## Preparing a BAM Strategy

- The BAM strategy drivers the entire BAM process
  - Against what do we assess potential projects?
  - What implementation mechanisms are best suited to our needs?
  - How will we measure our success in implementing our strategy?
  - What organisational changes do we need to manage to achieve the strategy?
  - How should we organise ourselves to implement our strategy?
  - How will we provide the capacity to do it?
  - Precisely what data do we need?


Source: RICS Public Sector Asset Management Guidelines 0

## Business Drivers


Source: RICS Public Sector Asset Management Guidelines 0

## Mapping the Drivers to Assets

- Aspirations v Constraints
- How do the business drivers shape the asset objectives?
  - How can we develop robust measures of performance?
  - What should our targets be?
- How are the assets currently performing against the targets?
  - How do compare contrasting measures?
    - Balanced scorecard? Priority ratings?
- What actions are required to meet the targets?
  - Short/Medium/Long term
- How much will this cost?
  - Can the organisation afford it?
  - If not, what can be done? Disposals/Acquisitions
- Remember, this is a strategic vision.

## Obtaining Stakeholder Buy-in

- Who are the key stakeholders?
- Who is going to champion the strategy?
- Where is it going to presented?
- How is feedback going to be handled?

## Test the Vision

Is the strategic vision achievable?

- ICT
  - Do you the right systems?
  - Do you have the data?
- Property
  - Do you have supply chain?
  - Procurement?
  - Availability?
  - What are the risks?
- HR/HM
  - How will you manage change?
- Financial
  - Estimated costs?
  - Capital receipts?

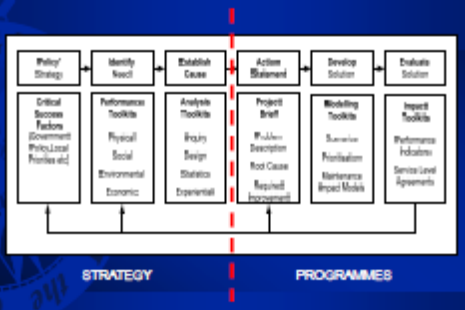

Source: RICS Public Sector Asset Management Guidelines 6

## Assemble the Strategy

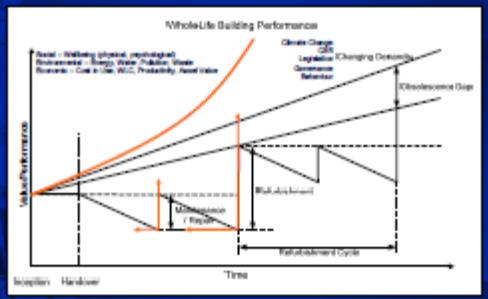
- The BAM strategy drives the entire asset management process.
- The BAM strategy should provide answers to the following questions:
  - Against what do we assess potential projects?
  - What implementation mechanisms are best suited to our needs?
  - How will we measure our success in implementing our strategy?
  - What organisational changes do we need to manage to achieve the strategy?
  - How should we organise ourselves to implement our strategy?
  - How will we provide the capacity to do it?
  - Precisely what data do we need?

Source: RICS Public Sector Asset Management Guidelines 6

## My Version of a BAM Plan




## BAM and the Building Life Cycle



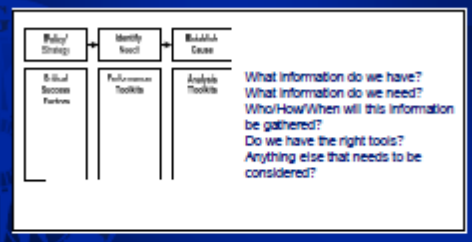

## Summary

- Strategic built asset management is the activity that ensures that the buildings organisation is optimally structured in the best corporate interest of the organisation concerned.
  - It seeks to align the asset base with the organisation's corporate goals and objectives.
- Property management is the activity that ensures that buildings operate efficiently and effectively.
  - In effect it delivers the strategic asset management objectives
  - It is the 'operational' plan that ensures that work necessary to ensure that property is operating at the desired performance level.

## Fill in the boxes


What should be included in a BAM strategy?
How does this link back to Octavia's CSF's
What can we effectively measure?
What should our targets be?
What are our future needs?
How should we assess our current position?
Anything else that needs to be considered?

## Fill in the boxes




## Built Asset Management Programmes


## Asset Review

- The outcome of an asset review must be the identification of potential projects which will move the asset base from its current state to a state better aligned with overall organisational objectives.
- There may be many possible projects that will achieve this as well as alternative options for projects on specific sites.
- In addition, the total cost of all the projects/options may exceed the funding available. For that reason all projects and options will need to be evaluated to test:
  - the degree to which they will meet organisational
  - objectives from a non-financial and financial perspective;
  - the feasibility of project implementation.

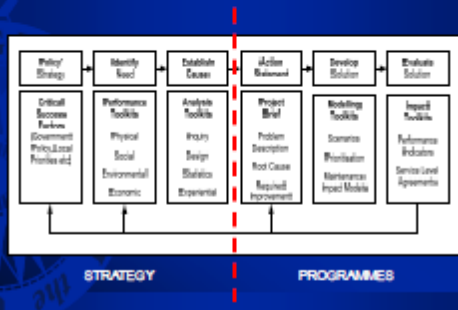
## Project Evaluation - Business Case

- The implications for each potential project need to be considered:
  - Strategic justification;
  - Impact
    - Do nothing
    - Do something
    - Do everything
  - Financial model
    - Discounted cash flow
  - Non-financial model (PESTEL or other)
    - Scoring matrix – AHP
  - Procurement routes
  - Project management options
  - Risks
- A project is assessed by drawing together all the assessments and making a decision on overall value for money, affordability benefits and non-financial costs and risks.

## Asset Programme Evaluation

- The aim of the programme is to provide the basis for priorities to be set.
- The programme will usually contain a schedule of actions required to change the asset base:
  - Acquisitions and new builds;
  - Refurbishment and maintenance of the stock retained;
  - Disposals of surplus or unfit-for-purpose assets;
- Projects might be prioritised for early start, or pushed back in the programme.
- Ultimately the list of potential projects will need to be ranked so the impact of budgetary constraints can be evaluated against the organisations key business drivers.
- Finally, robust financial planning is required before any work starts.

## My Version of a BAM Plan



# APPENDIX G

## Octavia Housing Abridged Standard

**Octavia Standard (abridged version)**

**Free from damp and mould growth**

- Homes will be warm dry and well ventilated
- The structure (roof and walls) will be free from rising and penetration dampness or persistent condensation.

**Free from excessive cold**

- Structural thermal insulation will be provided to minimise heat loss.
- Loft spaces will have a minimum of 200mm of insulation.
- Cavity walls will be filled with insulation where technically feasible.
- Windows will either be double glazed or where single glazed have draught excluders.
- All our homes will have an EPC energy rating of C and a SAP of 75 as measured by the Government approved Standard Assessment Procedure 2005 (SAP).
- The average SAP score will be in the top quartile for London as measured by HouseMark
- Homes heated by gas will have a boiler which is in good condition and efficient. Normally a boiler of less than 15 years is considered to be in good condition and our measure of efficiency is having a boiler efficiency rating (called SEDBUK) of A or B.

**Noise**

- All properties built since 1992 will comply with noise levels as determined by the Building Regulations at the time of construction
- There is currently no legal requirement for a Landlord to address noise insulation within existing blocks where no regulations applied at the time of construction. Octavia will be developing a Sound Insulation Policy and Procedures; this will indicate that work will only be done in exceptional circumstances. We will also be discouraging resident from laying hard flooring, but where they do we will be recommending that a sound insulation layer is fitted first.

**Safe from Exposure to Asbestos**

- Ideally our homes will be free from asbestos, however, given their age and construction it is present in our homes and, given the cost and disruption to tenants, removal is not a realistic option. We will therefore manage asbestos in homes and common areas, how we do this is described in our recently approved revised Asbestos Policy which is available on the Intranet.
- Octavia have surveyed all its common areas and recorded where asbestos is present. This will be annually reviewed.

- Octavia will undertake a survey of all its homes to identify where asbestos is present. These surveys will be undertaken when homes are vacant and prior to major works be carried out in a property.

**Free from Carbon Monoxide and Fuel Combustion Products (Gas)**

- Gas appliances will be correctly installed and inspected on an annual basis by a Gas Safe inspector.
- Homes with concealed flues which run between rooms and/or have bends will have carbon monoxide detectors fitted.

**Secure from Entry by Intruders**

- Homes will be capable of being secured against unauthorised entry, which will both delay and deter intruders.
- Main doors will have spy holes and at least one (fire safety complaint) dead lock.
- The aim is not to create a fortress like dwelling, which might also conflict with other risks such as fire safety. Therefore, we do not support the fitting of security grills on windows.
- All multi occupied buildings served from a common entry will have a door entry system, if tenants want and are prepared to pay a service charge toward its installation and maintenance costs.

**Domestic Hygiene, Pest and Refuse**

- Areas within the home intended for personal washing, sanitation or food storage, preparation and cooking will be capable of being maintained in a hygienic condition.
- Walls and ceiling will be reasonably free from cracks which could provide harbourage for insect pests.
- As far as possible the design and construction will prevent means of access by pests.
- There will be suitable storage for hold waste, which do not cause problems of hygiene and allow access to pests.

**Structurally sound**

- Building elements such as foundations, walls, roofs, windows and doors will be properly constructed, and in good repair.

**Food Safety (kitchens)**

- Kitchen facilities will be in a properly designed room or area, laid out so as to make safe and hygienic preparation and cooking of food easy.
- Facilities will be of adequate size for the household
- Kitchens older than 30 years will generally not meet this standard.

**Personal Hygiene, Sanitation and Drainage (bathrooms)**

- Water closet (WCs), baths and hand basins will be of smooth and impervious surface.
- The number of WCs and baths will be adequate for the size of property
- All sinks, wash hand basins and baths will have adequate drainage.
- Bathrooms fittings over 40 years will generally not meet this standard.

**Water supply for Domestic Purposes**

- Drinking water will be wholesome
- Storage tanks will be covered to prevent contamination.
- To prevent Legionella growth hot water needs to be stored above 55 degrees centigrade. To achieve this hot water tanks will be set to store water at above 60 degrees centigrade.
- Storage tanks and distribution pipes will be insulated.
- We will inspect communal water supplies every 6 months.

**Electrical Hazards**

- Electrical installations will be safe, with system isolation and/or insulation to prevent shock
- Electrical installations will be tested every 5 years.

**Fire Safety**

- All commons areas in converted houses or purpose built flats will have a fire risk assessment (FRA), building works identified as being required will be undertaken in priority order and the FRA will be regularly updated.
- The design, construction and condition will limit the chances of carelessness causing fire, limit the spread of fire and provide a safe and ready means of escape.
- Hardwire with battery back up smoke (or heat) detectors will be fitted in all homes, a minimum of one per floor level. They will be regularly maintained. Special alarms will be provided for tenants with hearing impairment on request.

**Lifts**

- Lifts will be inspected twice a year to ensure they remain safe to use.
- Lifts will have remote monitors to enable early warning of lift failure as well as providing accurate performance data.
- The average availability of our lifts will be 97%.

**Regular Cyclical Maintenance**

- Octavia will undertake cyclical maintenance to the exterior and common areas of homes on a seven year cycle.

- Tenants will be consulted before during and after major works in accordance with our tenants approved Tenants Consultation Procedure.

**Good TV Reception**

- Tenants will be provided with a TV aerial to enable them to receive digital television.
- On large purpose built blocks, with more than 3 homes, satellite TV receivers will be installed to enable tenants to access digital TV.

**Disability Discrimination Act**

- All Sheltered Blocks, Day Care Centres and Office will comply with the Disability Discrimination Act.