Allestree

Local Community Energy Assessment

Nottingham Energy Partnership

On behalf of

Allestree Neighbourhood Board

March 2012

This report has been produced by:

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1. Acknowledgments

Thanks for their contribution to this report:

Allestree Neighborhood Board

Derby City Council

Derby Homes

HI4EM

2. Executive summary

The wide range of types and ages of properties in Allestree means that a range of approaches would be possible. To narrow down the range to the most appropriate and effective programmes has required some categorisation and analysis to identify clusters and archetypes.

A number of general recommendations have been made based on the analysis of the data. Within the Archetypes section, these have been detailed with regards to the types of prevalent housing stock in the area. These are summarised below.

General project recommendations

1. The relative affluence of the area would suggest that many households, once they have been upgraded for modern energy efficiency, may wish to consider further improvements or investments such as solar water heating and solar electricity. Promotion of solar water heating and solar electricity with impartial advice and guidance on economics is likely to lead to an increased take-up. NEP provides a free advice and guidance service in the East Midlands through the Sungain Project[1].

2. Many homes have a greater number of rooms with less occupants, retired couples, individuals or parents with children who have left home. Consideration should be given to working with behaviour change groups to promoting energy awareness and including promotion of heating control upgrades. This should be done alongside training on how to get the most out of heating controls in larger properties with fewer occupants.

3. There is still a considerable amount of loft insulation work to do, particularly in the older, pre 1950's housing. Solutions could include:

    - Incorporating work with local builders on raising joists into local energy efficiency schemes.
    - Checking whether incorporating this work into insulation works would show a good return on investment if included in the costs, then developing local finance packages to encourage increased take-up.
    - Establishing local community volunteer loft clearance schemes.
    - Working with trusted local agencies such as Age UK Derby and Derbyshire, church or scout groups to offer loft clearance.

4. Solid wall pre 1950's properties make a significant contribution to the areas carbon emissions and residents are more at risk of fuel poverty.

[1] www.nottenergy.com/projects/domestic/sungain_solar_pv

- The intrusive nature of dry lining and the need to redecorate may be an impediment to undertaking this work. It would be valuable to identify a small number of pioneering early adopters, across housing types, who would be happy to undertake this work and act as case studies and advocates to convince others that the benefits of such home improvement work outweigh the costs and disruption.
- Data on cost and carbon savings vs costs from real life local examples should be sought.
- Consider using examples from the HOBBS project (another LEAF project in West Bridgford, Nottingham). The area is similar in income and solid wall housing has been targeted.

5. More efficient boilers offer one of the most significant opportunities for carbon and cost savings. There is significant opportunity here to promote boiler upgrades to Allestree households through promotion of the cost benefits of investment in modern heating systems.

   Many very old boilers will have been replaced through the boiler scrappage scheme. Identifying financing routes such as the Green Deal and promoting the return on investment for new boilers should encourage householders to upgrade older boilers to newer condensing types.

6. As system boilers and system boiler tanks are replaced, solar water heating should be promoted. If a system boiler and a new tank is installed, householders with roofs facing East through South to West should be encouraged to consider including a twin coil tank to allow later retrofitting of solar water heating.

Specific to archetypes

1930-49 properties

A 5 or 6 room, 1930-49 solid wall, semi-detached property on Allestree Lane would serve as a good exemplar. Typically these properties will have 1 or 2 residents, are owner occupied and have less than 150mm of loft insulation.

Key measures include

- **Condensing combination boilers;**
- **Heating controls;**
- **Loft insulation;**
- **Solid wall insulation;**
- **Support in energy management;**
- **Identifying a local exemplar home as a pilot or case study.**

1950-66 Bungalows

A 3 room detached bungalow on Birchover Way would be a good exemplar. These properties are largely energy efficient already; most have insulated cavities and significant loft insulation. Occupancy is typically single person owner occupied, though with some 2 person occupancy.

Key measures include

- **Peer support in energy saving behaviour (tenants and residents groups, local community facilities such as health centres and health visitors);**
- **Smart metering;**
- **Tariff switching (NEP offer a free impartial tariff switch tool[2])**
- **Upgrading to condensing boilers.**

1950-66 House

A 5 or 6 room detached house property on Birchover Way, or Carsington Crescent would be a typical exemplar. These properties are generally energy efficiency already, with filled cavities, mostly with good loft insulation and heating systems controlled with programmers with room and radiator thermostats. There are however, a considerable number that still have less than rafter depth loft insulation and many that do not have condensing boilers. While the houses are larger and owner occupied, occupancy is typically 2 or 1.

- **Energy saving behaviour change support to reduce energy use in unused rooms;**
- **Smart metering;**
- **Loft clearance schemes to support in topping up remaining lofts, possibly in partnership with local churches, or Age UK;**
- **Promote boiler upgrades, switching to combi for lower occupancy homes;**
- **Tariff switching;**
- **Solar technologies.**

1976-82 House

A 5 room detached house on Lambourn Drive would be a typical exemplar. These properties are likely to have already undertaken a significant number of energy saving measures including good controls, filled cavity and loft insulation. There are however, a fair number of homes that could benefit from more loft insulation. The most common occupancy is 2, however there are a number of family homes in this group with 3 or 4 occupants.

- **Energy saving behaviour change support to reduce energy use in unused rooms;**
- **Smart metering;**
- **Loft clearance schemes to support in topping up remaining lofts, possibly in partnership with local schools or school service schemes;**
- **Promote boiler upgrades, switching to combi for lower occupancy homes;**
- **Tariff switching;**
- **Solar technologies.**

A summary of the level of opportunity across Allestree has been calculated from the sample:

[2] www.nottenergy.com/tariff_switch

Measure	% of sample	Extrapolated opportunity in Allestree
Boiler upgrade, pre 2004	51%	3,128
Boiler upgrade, pre 1999	21%	1,289
Cavity wall insulation	Up to 16%	500
Loft top up(<200mm)	46%	2,823
Virgin lofts(<50mm)	16%	982
Solid wall insulation	11%	675
Double glazing	1%	61

As has been seen in Allestree, a lot of the easier energy savings measures, such as cavity and loft insulation or double glazing, have now been completed. Funding for these improvements will soon become harder than has been the case to date. The major free insulation programmes drawing to a close in 2013 are to be replaced with the Green Deal and Eco.

These 2 parallel programmes will require householders to borrow a substantial part of the value of energy savings measures in the form of a loan that stays with the house and is repaid from the savings realised on energy bills. The issues raised earlier about providing local examples of the financial case for householders to borrow against a projected return on investment will become more important.

The loan rate will be low, probably equivalent or maybe a little higher than the rates currently available through borrowing against a property or adding to a mortgage. Even if households decide not to take the Green Deal, promoting an investment case for energy efficiency will be important.

The loan is intended to meet a 'Golden Rule', that the repayments do not exceed the bill savings.

The Eco element will be divided into two parts. One part to subsidise expensive measures on hard to treat homes, such as the solid wall properties in Allestree, to ensure they meet the Golden Rule. The second part is earmarked to support low income households in installing measures. The Eco for low income homes may in some cases make some major refurbishments free for low income, vulnerable, groups in solid walled properties, potentially benefiting some Allestree households.

The focus for renewables has also moved away from grants, to improved return on investment through subsidised income, ie Feed in Tariffs and Renewable Heat Incentive. The promotion of renewables will need to be as 'good investments' with at least a 5% RPI linked return possibly higher.

There are major savings still possible in Allestree through free or low cost measures that result in adjustments to how people use energy. Advice engagement and support coupled with smart metering and better energy controls.

The most important resource across all areas of future funding will be high quality advice and guidance from trusted and credible sources combined with local real examples of success.

3. Background

The Local Energy Assessment Fund aims to support communities across England and Wales to play an active role in the development of a low carbon society where energy supply is both secure and affordable. The fund has resourced work by community groups to understand their potential for improvements in energy efficiency and local deployment of renewable energy, alongside demonstrations of solid wall insulation.

The grant fund provided by the programme was intended to help communities prepare for new opportunities in sustainable energy and climate change arising from the Green Deal, Renewable Heat Incentive and Feed in Tariffs. The grants could be used to fund projects that follow the Energy Hierarchy (reduce energy use, use energy efficiently and generate renewable energy); specifically the following types of activi

Energy efficiency

- Understanding what the potential for energy saving is in homes within your community, how that could be delivered cost effectively under the Green Deal in a way that allows the community to realise some of the benefit.
- Demonstrating energy saving technologies such as solid wall insulation in local homes and using community buildings as exemplars of energy saving technologies and measures.
- Helping local people to understand the potential of energy saving measures and behaviours.

Renewable energy

- Area-wide studies to highlight which renewable energy technologies would be most appropriate and beneficial for the area.
- Outline feasibility studies into specific renewable energy projects that could be financed through Feed in Tariffs, Renewable Heat Incentive or the new Renewable Energy Revolving Fund.

This fund is a response by Department of Energy and Climate Change (DECC) to the efforts of community groups across the UK in raising awareness of climate change and energy issues. It aims to help empower communities to play an active role in the development of the low carbon economy within England and Wales.

National policy

There has been a step change in policies relating to carbon reduction and energy security over the last 5 years. This has been underpinned by the interdependent issues of climate change, power supply security and peak oil. There is now a small window of opportunity to meet the parallel global challenges of avoiding dangerous climate change, preparing for peak oil and, against the national picture of potential power supply insecurity towards 2017 and ensuring continuity of affordable energy supply in Allestree.

The UK's energy policy aims to meet the challenge of reducing carbon emissions as well as providing a secure and safe supply of affordable energy. Renewable energy and energy efficiency are seen as key elements of the national strategy. In particular the national strategy will work towards de-carbonising the energy supply, which will help to meet long term climate change targets. As part of the EU Climate and Energy package, the UK has committed to sourcing 15% of its energy (both heat and power) from renewable sources by 2020[3].

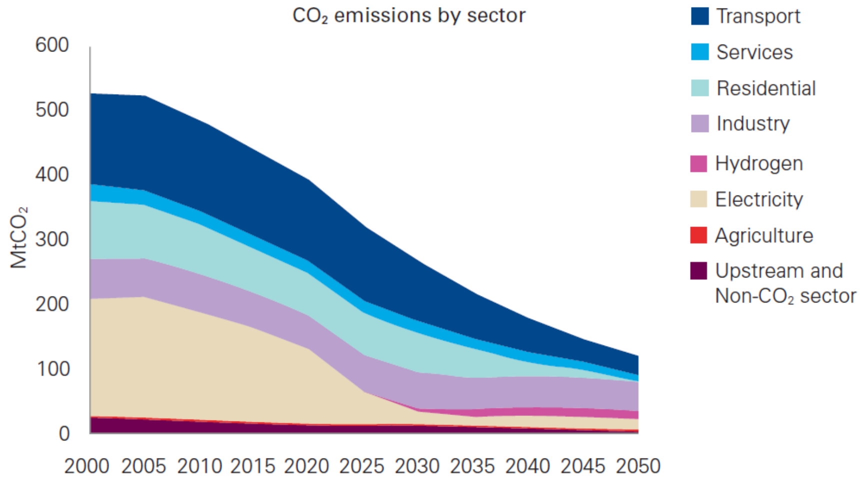
The target of sourcing 15% of energy from renewable sources nationally needs to take into account the changes to demand for energy. It is expected that even while the population grows, national energy consumption will decrease from 1695 TWh in 2008 to 1590 TWh by 2020, a total fall of 6.2% or a per capita fall of 13.7%[4]. Energy efficiency is therefore also an important part of national energy policies.

Nationally, the renewable energy targets could be achieved from different sectors. The Government has decided to take the following[5] as the lead scenario:

- 30% of electricity demand met by renewables (2% from small-scale sources such as domestic solar power and 28% from large scale renewables);
- 12% of heat demand from renewables;
- 10% of transport demand from renewables.

The Government has set a series of interim targets and carbon budgets from 2011 to 2018 to ensure the UK is on track to meet the overall 2020 target[6] (set by the Committee on Climate

One scenario for UK sectoral CO_2 emissions to 2050 on an 80% CO_2 emissions reduction path



Source: MARKAL (2008)

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[3] The UK Renewable Energy Strategy (2009), Page 10. Available at: http://www.decc.gov.uk/en/content/cms/publications/lc_trans_plan/lc_trans_plan.aspx

[4] Population projections by the Office for National Statistics (ONS): http://www.statistics.gov.uk

[5] The UK Renewable Energy Strategy (2009). Page 8. Available at: http://www.decc.gov.uk/en/content/cms/publications/lc_trans_plan/lc_trans_plan.aspx

[6] The UK's Climate Change Act (CCA, 2008) creates a new approach to managing and responding to climate change in the UK. At the heart of the Act is a legally binding target to reduce the UK's greenhouse gas emissions to at least 80 % below 1990 levels by 2050, to be achieved through action at home and abroad. To drive progress towards this target, the Act introduces five year "carbon budgets", which define the emissions pathway to the 2050 target by limiting the total greenhouse gas emissions allowed in each five year period, beginning in 2008. Alongside Budget 2009, the Government announced that it agreed with the Committee on Climate Change (CCC)'s approach on carbon budgets and intended to set the levels of the budgets now for the period 2008-2022. These 'interim' budgets require a reduction in greenhouse gas emissions by at least 34% by 2020, relative to 1990 levels. The first three carbon budgets were designated as 2008-12, 2013-17, and 2018-22. Further details available at: http://www.hm-treasury.gov.uk/bud_bud09_carbon.htm

Change, CCC[7] in respect of the national 80% CO_2 reduction target and ratified in the 2009 budget to 2020).

Peak oil and energy security

"Energy reserves are concentrated in some of the most unstable parts of the world. That's an issue of national security. There is no crisis but we can never be complacent. As we move out of recession, the global grab for energy will resume in earnest, consumption is predicted to rise, and with it, prices"[8].

"Complete energy independence is an unrealistic goal but there is much we can do to insulate ourselves from the risks, in large part by driving our climate policies even further, quicker. We must be far smarter with the energy we use and invest in home grown energy sources, such as new nuclear and renewables without delay[9]."

By 2025, the UK will be importing 57% of its oil, up from 15% in 2010[10]. There has been no appreciable increase in global conventional crude oil output since 2005 despite increases in drilling rig activity (see Figure 5 and 6).

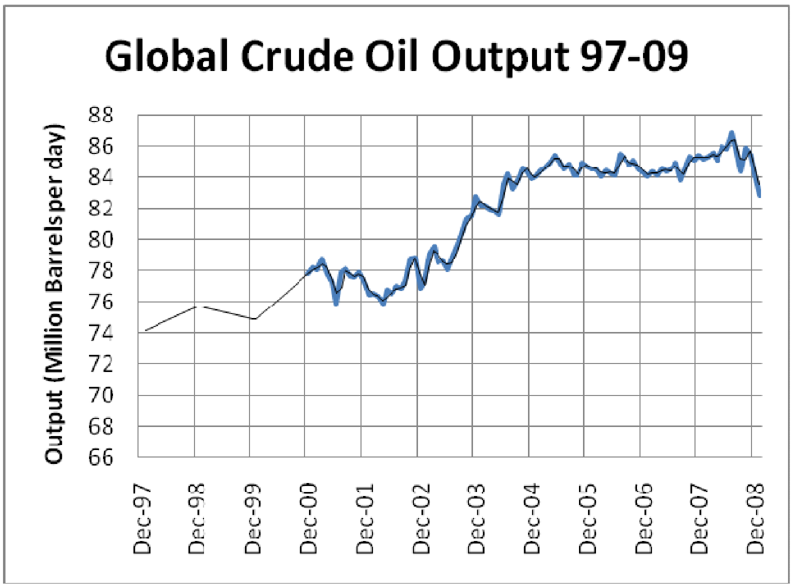

Figure 5: Global crude oil output between 1997 and 2009 (measured in million barrels per day). *Source: EIA, 2009.*

[7] The Committee on Climate Change (CCC) is an independent body established under the Climate Change Act (CCA, 2008) to advise the UK Government on setting carbon budgets and to report to Parliament on the progress made in reducing greenhouse gas emissions. Further information at: http://www.theccc.org.uk/

[8] DECC (2009). *Energy Security: A national challenge in a changing world. Report by Malcolm Wicks MP*. Available at: www.decc.gov.uk/en/content/cms/what_we_do/change_energy/int_energy/security/security.aspx

[9] DECC (2009). Energy Security […] Available at: www.decc.gov.uk/en/content/cms/what_we_do/change_energy/int_energy/security/security.aspx

[10] Analytical Annex, Table 19, *UK Low Carbon Transition Plan* (2009). Available at: http://www.decc.gov.uk/en/content/cms/publications/lc_trans_plan/lc_trans_plan.aspx

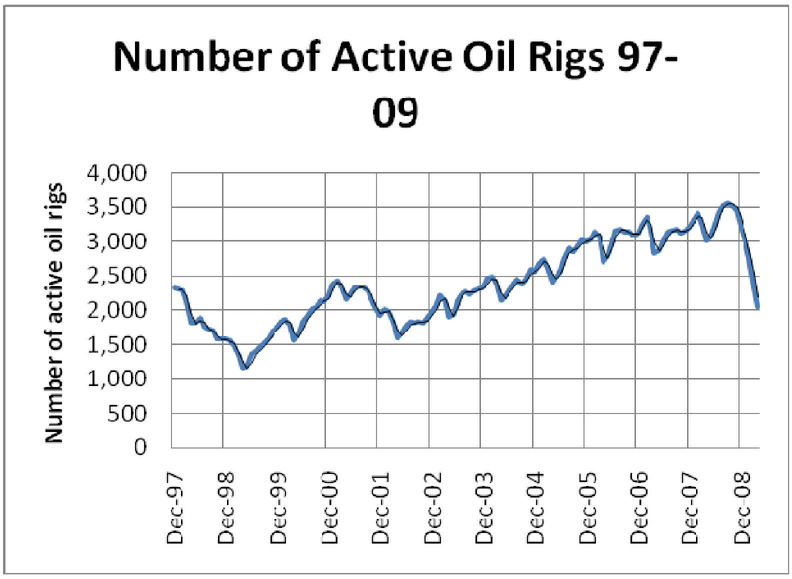

Figure 6: Number of active oil rigs worldwide between 1997 and 2009. *Source: EIA, 2009.*

The International Energy Agency (IEA) now believe that we will pass geological peak oil for conventional crude oil within 8 years, then all oil, including non conventional sources, within 18 years. The IEA also predict a supply crunch due to industry under-investment in 2-3 years. It can also be seen from Figure 5[11] that we may already have reached the peak of conventional oil output, given that the amount of crude oil available worldwide has not increased significantly since 2005, despite demand and exploration growth.

Actual global crude oil output is limited by political and economic factors well before geological peak oil is reached. Many credible sources including several governments, independent expert bodies and major oil companies believe we will reach peak oil well in advance of IEA projections. We will see the economic impacts of falling global crude oil supply well before 2020; in reality, with an oil price spike of $147 in 2008, and current prices in excess of $125, we are already experiencing them.

Spikes in the price of crude oil (see Fig.7), followed by those in energy, food and inflation as experienced in 2008, will become more frequent and more severe, as global oil supply falls and competition for energy resources increases. The IEA has pointed out that any recovery of the global economy will inevitably lead to a recovery in oil demand and consequential steep energy commodity price rises.

Along with the rest of the UK, these impacts will clearly have significant effects on the residents and the economy of Derby and Allestree.

[11] Data from the US Energy Information Administration (EIA): http://www.eia.doe.gov/

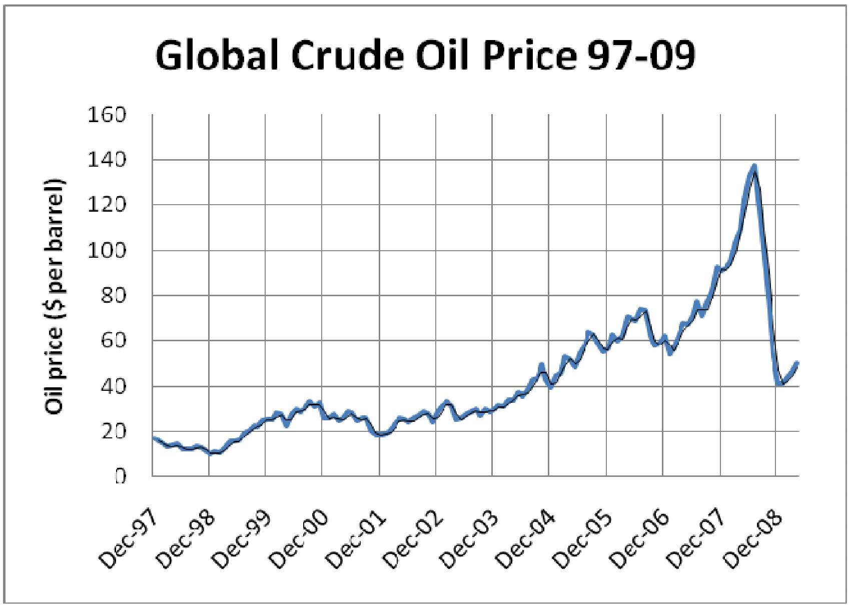

Figure 7: Global crude oil price between 1997 and 2009 (measured in $ per barrel). *Source: EIA, 2009.*

Over the coming 15 years, the UK also faces a far heavier reliance on imported gas by 2020. Varying estimates suggest that the UK will be importing 45-80% of its gas[12] up from 31% in 2010. Gas prices and supply security in Europe have proved volatile in recent years with increased friction with Russia, Europe's largest single gas supplier. While the UK has recently increased pipeline connections to access Norwegian gas and has developed new supply agreements and infrastructure to import liquefied natural gas, we will still feel the sting of a cold wind blowing from Russia, if Eastern European gas supply is again restricted.

Peak oil and security of fossil fuel supply represent urgent cross cutting risks with social and economic impacts from rising commodity prices, including inflation and potential further economic stagnation. A stable economic environment is essential while we make the transition to a low carbon economy. This can only be achieved through intense work on energy efficiency, generation and low carbon sector growth work at the level of cities, communities and homes.

In terms of security of energy supply, the UK is also facing a potential electricity generation gap, as a significant proportion of the UK's electricity generating capacity needs to be replaced over the next 8 years. This is identified in the supporting documents to the Government Low Carbon Transition Plan[13].

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[12] DECC (2009). Energy Security […] Available at: www.decc.gov.uk/en/content/cms/what_we_do/change_energy/int_energy/security/security.aspx

[13] *Implementation of the EU 2020 Renewables Target in the UK Electricity Sector*. RO Reform, June 2009. Available at: http://www.berr.gov.uk/files/file46778.pdf)

Under EU legislation[14] around one-third of the UK's coal and oil fired power generating capacity will need to be decommissioned by 2020. Several nuclear power stations are also due for decommissioning in the same timeframe.

The intention is to fill this gap by increasing the UK's gas powered generation in the short term and lifting renewable energy capacity from a current 5.5% to 28% over the next 8 years, largely from wind power.

This intensive investment required to increase the UK's renewable capacity almost five-fold over a 10-year period gives rise to concerns over spare capacity. By 2017 we can expect only 5-10% spare capacity, as opposed to 15% today. Unexpected power station shutdowns could have a more serious impact on the UK grid power supply. If the country cannot build wind capacity at the rates proposed and the intended plant closures go ahead, then Derby, along with the rest of the country, would need to plan for a far less reliable power supply from the UK grid.

Fuel poverty and energy costs

"The era of cheap energy is over"[15]. With peak oil and a heavier reliance on gas powered generation, we can expect further retail energy cost rises over the coming years above those expected through the need to deliver the UK's low carbon transition. This will impact all fuel types including petrol, diesel, gas, electricity, oil, liquid petroleum gas (LPG) and even wood fuel costs as demand rises for alternatives. Recent rises in fuel costs to over £1.40 per liter are a testament to this.

Higher energy prices have had a universal impact but have been particularly severe on low income households in 'hard to heat' homes. These households spend a disproportionate amount of their income on fuel and are said to be in 'fuel poverty' – a fuel poor household needs to spend more than 10% of its income on fuel in order to heat the home to an adequate standard.

The Governments Fuel Poverty Strategy set a target to eradicate fuel poverty by 2016. The unprecedented increase in the price of energy has put this target in doubt.

The latest **'Annual Report on Fuel Poverty Statistics' (DECC Oct 2009)** includes the following;

* Since the fuel poverty low of 2004, domestic energy prices have risen by 80% between 2004 and 2008, driving the trend in fuel poverty in recent years.

* Projections for England indicated a likely upper bound of around 4.6m households in 2009, up from 2.4m in 2006.

These figures represent a 90% increase in fuel poverty in 3 years, with a 21% fuel poverty rate for England.

[14] EU Large Combustion Plants Directive (LCPD) (LCPD 2001/80/EC). Available at: http://eur-lex.europa.eu/LexUriServ/site/en/oj/2001/l_309/l_30920011127en00010021.pdf

[15] John Hutton, business secretary-Sept 08

Energy prices have now been stabile for 2-3 years. With most price increases in response to Government policy and economic recovery. The Government estimates that, taken in isolation (i.e. before the impact of scarcity, competition and energy efficiency measures), the investment outlined in the national Renewable Energy Strategy will increase household electricity costs by 15% and gas costs by 23% by 2020[16]. Non-domestic bills could rise by up to 21%[17].

However, Ofgem's review of Britain's energy markets, Project Discovery[18] took market factors into account and models 4 different scenarios. Their worst case scenario admits the possibility of the average annual bill rising from £1,247 in 2009 to £1,995 in 2016, a further 60% increase in domestic fuel bills. The other scenarios point to a more modest 14% to 25% increase above the level of inflation by 2020. With current rises in global energy costs the high price scenario now looks more likely.

Whichever model proves to be right, we cannot escape rising energy costs. We can however minimise the impact through targeted energy efficiency measures and local generation.

The Government response to rising energy prices and fuel poverty is the extension of existing energy efficiency programmes and funding of new schemes.

The two major existing schemes (CERT – Carbon Emissions Reduction Target and Warm Front) are targeted at the basic measures of cavity wall and loft insulation, with heating repairs and improvements for the most vulnerable. The basic measures will be completed by 2015.

A major problem remains with existing solid wall properties as identified in the Government's Household Energy Management Strategy. This strategy outlines the need to insulate 7 million homes by 2020 with expensive solid wall insulation (i.e. more than 10 times the cost of cavity wall insulation). There has been much discussion on how to identify methods of funding for much more costly measures, including for micro generation.

For this reason the government has introduced new measures including the Renewable Heat Incentive and the Feed in Tariff to push investment in renewable energy systems. The Green Deal and Eco, planned for later in 2012 are aimed at supporting households to make investments in solid wall insulation, lofts and boiler replacement.

The roll out of smart metering technologies should help householders manage energy use more closely.

[16] The UK Renewable Energy Strategy (2009). Page 19, Section 5.2. Available at: http://www.decc.gov.uk/en/content/cms/publications/lc_trans_plan/lc_trans_plan.aspx
[17] The UK Renewable Energy Strategy (2009). Page 184, Section 7. Available at: http://www.decc.gov.uk/en/content/cms/publications/lc_trans_plan/lc_trans_plan.aspx
[18] Available at: http://www.ofgem.gov.uk/markets/whlmkts/discovery/Documents1/Discovery_Scenarios_ConDoc_FINAL.pdf

Climate change mitigation

Climate change mitigation refers to actions that reduce our contribution to the causes of climate change. This means reducing our emissions of greenhouse gases (GHGs), such as carbon dioxide (CO_2), through energy efficiency and using alternative forms of transport and energy[19].

It is now widely accepted amongst the scientific community that if the world continues emitting greenhouse gases due to human activity at today's levels then average global temperatures could rise by 4°C by as early as 2060, and up to 6°C by the end of this century[20]. Alongside frequent and unpredictable extreme weather events, these temperature rises will bring severe and permanent changes to regional climates with impacts on global economies and socio-political instability; resulting in growing conflicts, public health related deaths and migration of peoples. It is important to note that early action could prevent some of the worst excesses of climate change.

To avoid the most dangerous impacts of climate change, **average global temperatures must rise by no more than 2°C[21]. This means that global emissions must start falling before 2020 and then fall to at least 50% below 1990 levels by 2050. More recent science suggests that even rises of 1°C will lead to significant economic impacts.**

In recognition of the above, the UK has committed to cut its own greenhouse gas emissions by 34% from 1990 levels by 2020[22], and potentially by 42% if other countries play their part at the global climate negotiations. The UK will make an above average contribution within the EU, reflecting our relatively high income and by 2050, cut CO_2 emissions by 80%. This commitment has resulted in the Government setting detailed carbon budgets nationally and, effectively for large organisations, through the Climate Change Act[23].

The City of Derby and the community of Allestree will have to play their parts in achieving these challenging cuts. Action to reduce CO_2 emissions at local level will also help to reduce fossil fuel reliance and enhance energy security, create new economic opportunities and bring wider environmental benefits.

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[19] http://www.ukcip.org.uk/index.php?option=com_content&task=view&id=73&Itemid=186

[20] United Nations Environment Programme (UNEP) (2009). *Climate Change Science Compendium.* Available at: http://www.unep.org/compendium2009/

[21] At the G8 summit held in L'Aquila, Italy, in July 2009, world leaders agreed that the increase in global average temperatures should not exceed 2 degrees Celsius over pre-industrial levels by 2020. http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=593&ArticleID=6245&l=en

[22] Climate Change Act, 2008.

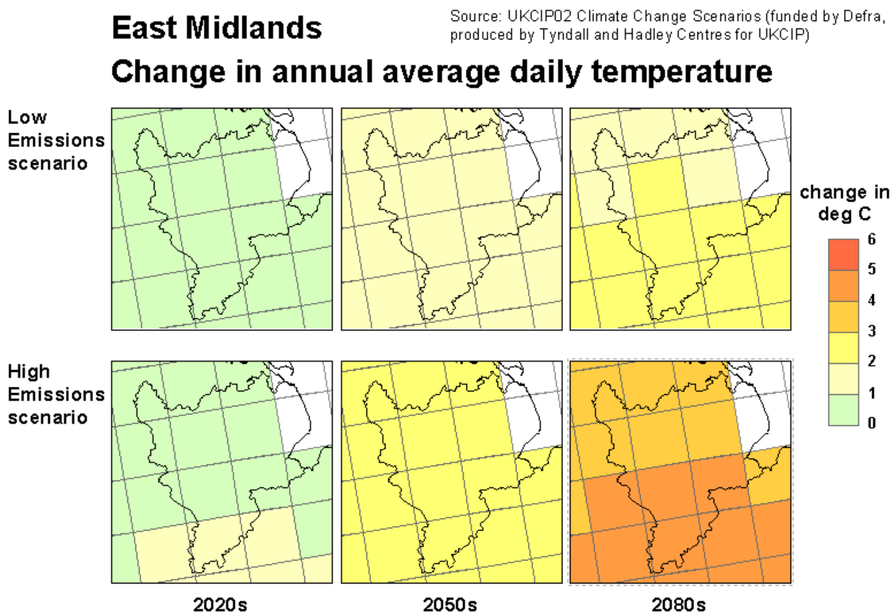
[23] Further details available at: http://www.hm-treasury.gov.uk/bud_bud09_carbon.htm

The direct and indirect dangers of climate change cannot be overestimated[24]. The window of opportunity to take effective action to avoid catastrophic climate change is rapidly closing. The consequences of inaction will endanger the livelihoods of current generations and condemn generations to come to an uncertain future of widespread human adversity, ecological disasters and political, social and economic instability.

Climate change adaptation

Despite efforts to avoid dangerous climate change, the levels of greenhouse gases in the atmosphere are already sufficient to guarantee some level of climate change. Indeed, we are already locked into around 40 years of unavoidable change[25].

The UK Climate Impacts Change Programme (UKCIP)[26] has predicted that the East Midlands will continue to get warmer, wetter and windier, with more storms and flooding in the winter and more droughts in the summer. This could have some very severe consequences for the city of Derby. Increased temperatures, evaporation and changing rainfall patterns would mean less water available from the River Trent and Derwent Valley reservoir system, exacerbated by an increased likelihood of summer droughts and higher water demand for irrigation.



[24] In 2006, the Stern Review concluded that the costs of uncontrolled climate change could be in the range of 5% to 20% of global gross domestic product (GDP) per year, averaged over time.

[25] United Nations Environment Programme (UNEP) (2009). *Climate Change Science Compendium.* Available at: http://www.unep.org/compendium2009/

[26] http://www.ukcip.org.uk/index.php?option=com_content&task=view&id=353&Itemid=408

The actions we take now, if sufficient, will ensure that towards the end of the next 40 years the climate may start to stabilise. However, we will still have to adapt to cope with some level of change that could potentially affect all systems that support our current lifestyle on which we directly depend, such as water supply, agriculture and farming, manufacturing, industry, transport, health provision, tourism and recreation, etc.

4. Methodology

To ascertain the range and level of opportunities in Allestree we collected energy survey data from a significant random sample of homes in across the community.

This data was collected by telephone, web and doorstep survey. Participants who were happy to share their property information were entered into a £150 voucher prize draw.

NEP processed this data to generate energy, carbon and stock condition reports for all the homes surveyed. We compared the data to known reference points from other data sets to ensure that the sample was statistically representative. The data was then extrapolated for the whole community.

We have used the building stock data collected to identify building archetypes and to identify and suggest home and building improvement programmes and where appropriate, potential funding routes.

We have also examined local energy, infrastructure and human resources in the contexts of the local socio-economic background to identify community specific opportunities for energy and carbon saving programmes.

To achieve this we:

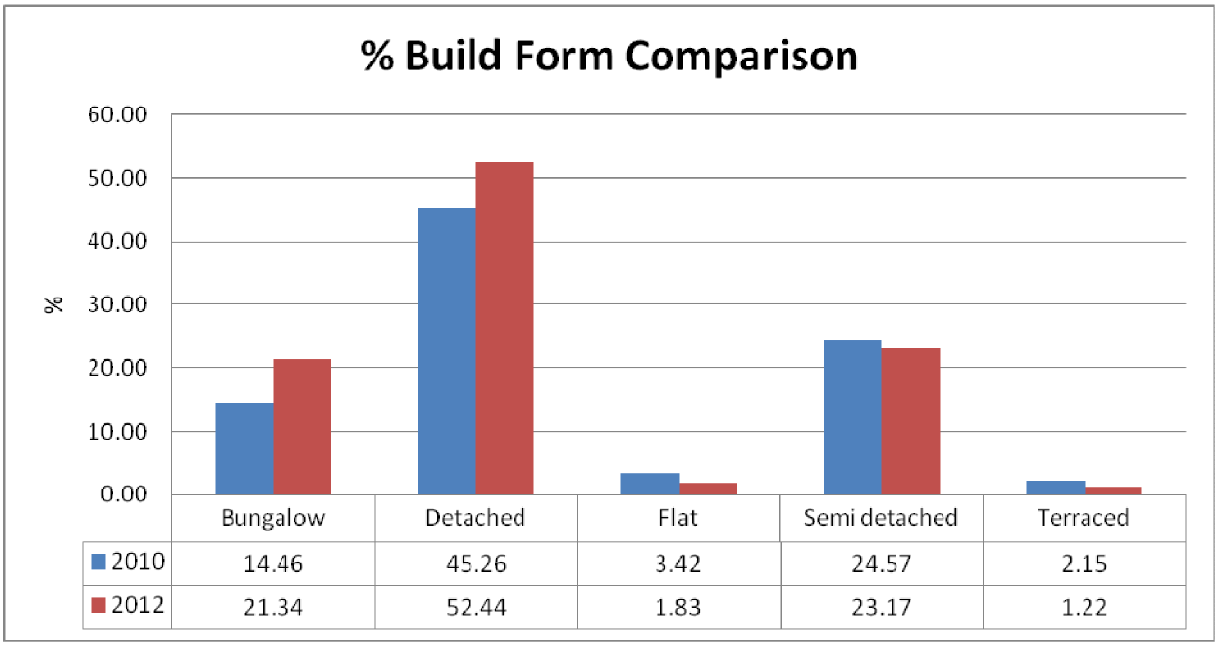
1. produced appropriate survey materials in print for mail-out and in an accessible web format. These were developed with Derby City Council and the Allestree Neighbourhood Board. Hand delivery of materials was selected as the lowest carbon delivery method. Cycle courier was explored as an option however, the couriers were not available over the period required;
2. collected sample home data from respondents to generate home energy profiles. Over 200 responses were received to a mail out of 5,000, a 4% response rate;
3. analysed local trends and data to identify archetypes and trends in stock and energy data and related these to other locally available data sets;
4. further analysed local socio-economic data to produce area wide energy and sustainability opportunity reports;
5. identified key projects and opportunities linked to local need and resources and where suitable national, regional and local initiatives, support and funding;
6. presented reports to local communities for discussion and input at a community engagement event.

5. Limitations and Assumptions

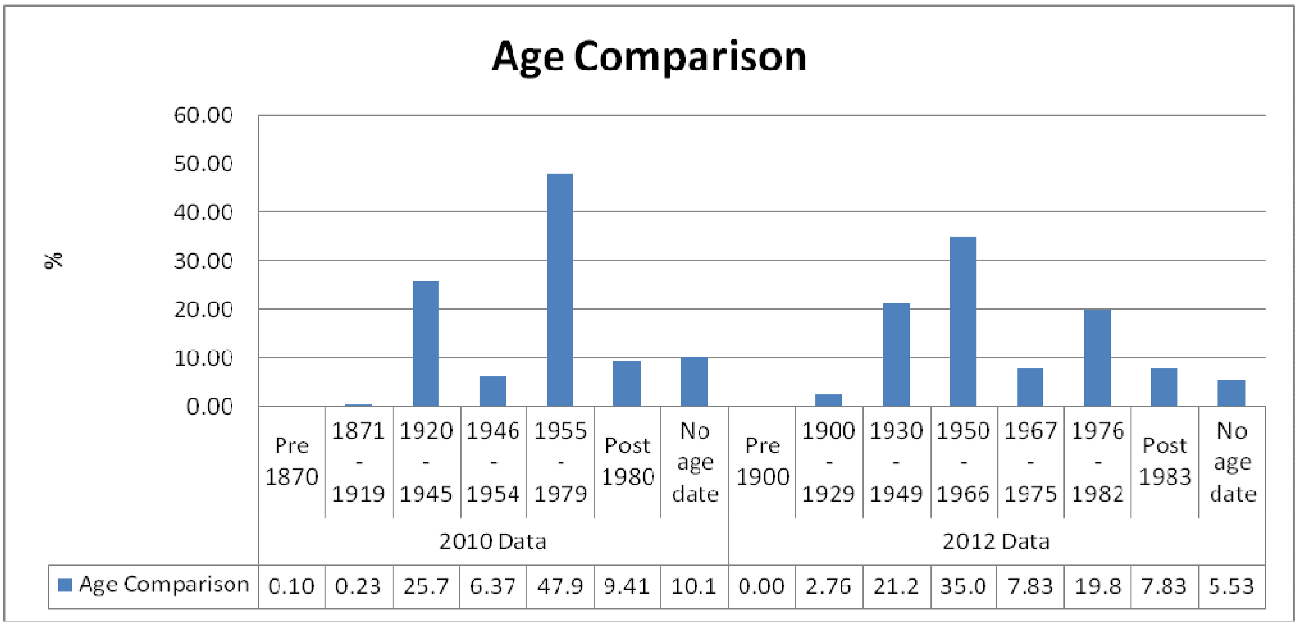
Initially it was hoped that a mail out to 5,000 homes would illicit around 400 responses, about 140 responses were received through this route. Further local engagement events and posters attracted 24 more responses. To lift this over 200, we sent in a surveyor for 2 days to knock on doors in the Allestree area. Our surveyor collected a further 53 responses, taking our total to 217.

We had to stop collecting responses at this point to ensure we had sufficient time to process and analyse the resulting data.

The resulting data was compared to another 2010 reference data set from Experian to check that the collected data was representative of the built form of properties in the area.



While 400 would have generated a better statistically significant sample it can be seen from the above that the sample is fairly representative of the Allestree area. We have worked to link the 217 surveys to building archetypes to get an impression of the numbers of each type of building across the area and an estimate of the opportunity in terms of energy saving works.



A comparison of stock age data with the Experian 2010 analysis of the 2001 census data is a little more difficult as the age ranges collected were different to those required for energy analysis. Energy analysis data has to be collected against the age bands that correspond to changes in building regulations. The broad spread though is largely comparable.

6. Allestree community

This information is taken from the draft **Neighbourhood Overview: Allestree, *Derby City Council***

The ward covers approximately 650 hectares and is bordered by the wards of Mackworth and Darley Abbey and the administrative area of Amber Valley to the north and west. The centre of the ward is approximately 2 miles from the city centre and access is predominantly along the Kedleston Road, Duffield Road and A38 transport corridors. The population of the ward was estimated at 13,535 in 2007; however estimates also suggest the figure could be nearer to 13,575.

Residents of the ward are generally older than the age profile across the city as whole and are also healthier than other parts of the city. However, there are no nursing homes or residential homes located in the ward.

Historically, Allestree was a distinct village, surrounded by countryside. Development was centred upon the old village area, including the Church of St Edmund and the Red Cow public house. Throughout the last century the village expanded, eventually being incorporated into the urban area of the city, establishing the character of a mature suburb. Population growth predominantly occurred during the 1930s and then through the 1950s and 60s. In more recent times, development has reached the city boundary and there has been pressure to develop brownfield infill sites.

There are approximately 6,139 dwellings within the ward of which the majority are owner occupied. House prices are the highest in the city and affordability is a significant issue.

Allestree is a residential suburb, providing homes for people working within the city and areas beyond such as Amber Valley. The proportion of residents working within the city is however, lower than other parts of the city and residents tend to travel further to work than residents of other wards. Residents of Allestree are also more likely to travel to work by car or van. The increasing dominance of journey to work by private motor vehicles has influenced the level of congestion along Kedleston Road, Duffield Road and at Markeaton Island.

Whilst being a leafy residential suburb, the ward also contains the main campus of The University of Derby. In total the University employs approximately 3000 people. There are very few other employment generating uses although Park Farm provides a range of shops and other neighbourhood facilities.

There are also a range of important open spaces within the neighbourhood, including Markeaton Park and Allestree Park. Combined, the two City Parks cover an area in excess of 200 hectares. Public open space accounts for nearly 30% of all land within the ward. There is also a substantial area of green belt land in the north of the ward, which is also within the boundary of the World Heritage Site at Derwent Valley Mills.

Allestree contains a conservation area, centred upon the old village. There are a number of significant buildings within the conservation area including the Church of St Edmund, which dates back to the 12th century. Kedleston Hall is located approximately a mile and a half from the western boundary of Allestree.

Allestree is one of the least deprived wards in the city and educational attainment amongst residents is generally better than average. GCSE performance at Woodlands Secondary School is also above the city average.

Beyond the western boundary of the ward, the landscape opens out into estate farmland surrounding the villages of Mackworth, Kedleston and Quarndon. Beyond the northern boundary of the ward (including parts of Allestree Park) the landscape is charcterised by wooded slopes and valleys and riverside meadows that form the Derwent Valley.

Approximate Area: 648 hectares
Population Estimate: 13,535
Number of Households: 6,139

Household Composition:
Census data identifies that as at 2001, there were significantly more pensioner households in Allestree than in other wards. This is backed up by the age profile data. The Census data also identifies a higher proportion of married couple households in Allestree than the city average.

Housing Age:
Allestree Conservation Area is home to a number of properties that date prior to 1900. Residential expansion took place during the 1930s in areas surrounding the conservation area however, the most significant housing growth took place in Allestree during the late 1950s and early 1960s, through the development of over 2000 properties, notably in and around the Park Farm area.

Housing Types & Tenure:
There are approximately 6000 properties in Allestree of which a high proportion are detached, with very few terraces or flats. Owner occupation accounts for the majority of housing in Allestree, with a high proportion being owned outright. Derby homes only manages 96 homes in Allestree.

House Sizes:
Allestree has a lower than average proportion of properties with 1-5 rooms, however there is a higher than average proportion of properties with 6, 7 and 8+ rooms. Properties in Allestree are therefore generally larger than in other parts of the city.

Key Points:

- **Retail:** There is no major (> 1000m^2) food store within the ward;
- **Facilities:** There is no community centre within the ward;
- **Care Homes:** There are no nursing homes or residential homes for older people in the ward;
- **Congestion:** Significant delays are experienced on Duffield Road and Kedleston Road. Markeaton Island is also a traffic hotspot;
- **Travel to Work:** A high proportion of residents travel to work by car or van rather than more sustainable alternatives. This is linked to the fact that a lower proportion of residents work within the city, compared to other areas;
- **Allotments:** Anecdotal evidence suggests that plot demand is not currently being met;
- **Population:** Allestree's residents are generally older than in other parts of the city;
- **Employment:** There is very little commercial activity within the ward.

7. Fuel poverty in Allestree

Allestree is a relatively affluent area however, rising energy costs and an older population means that there are a fairly high number of larger homes with small household sizes. This means that there are still a significant number of homes where pensions make up the large proportion of income.

Consequently while Allestree is one of the least fuel poor areas in Derby, there are still a significant number of homes that are likely to be in fuel poverty.

The Department of energy and Climate Change have undertaken an assessment of this issue by area. The areas assessed are Lower super output area. See Appendix 2 for the geographical splits of these areas.

The distribution of fuel poverty across these areas is detailed below.

Ward	Lower Super Output Area (LSOA) Code	LSOA name	No. Households	No. of households fuel poor	% of households fuel poor
Allestree	E01013461	Derby 001A	694	95	14
Allestree	E01013462	Derby 001B	621	87	14
Allestree	E01013463	Derby 001C	620	65	10
Allestree	E01013464	Derby 001D	638	91	14
Allestree	E01013465	Derby 002A	688	103	15
Allestree	E01013466	Derby 002B	640	84	13
Allestree	E01013467	Derby 002C	606	83	14
Allestree	E01013468	Derby 002D	703	95	14
Allestree	E01013469	Derby 002E	746	113	15
Allestree			**5,956**	**816**	**13.70**

Fuel poverty is most prevalent in the areas that include solid wall housing.

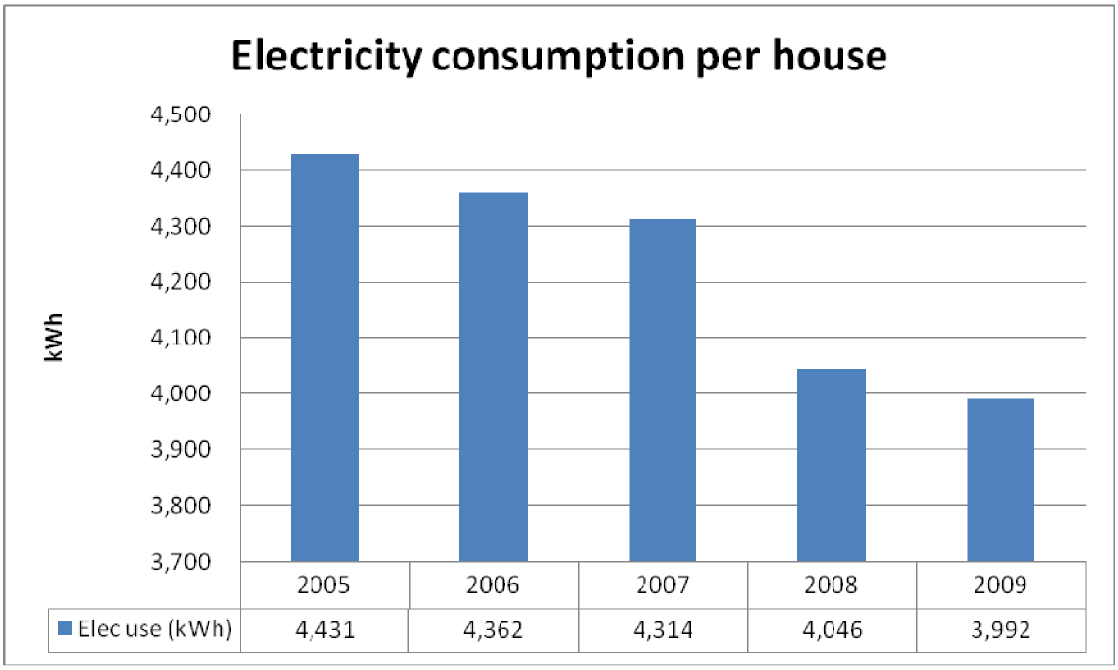
8. Carbon and energy trends

Data on energy use from meter readings is supplied by utility companies to the Department of Energy and Climate Change (DECC). This data is currently available up to 2009 down to Middle layer Lower Super Output Area level around 3-4000 homes). There are 2 MLSOA areas for Allestree, Derby 001 and Derby 002.

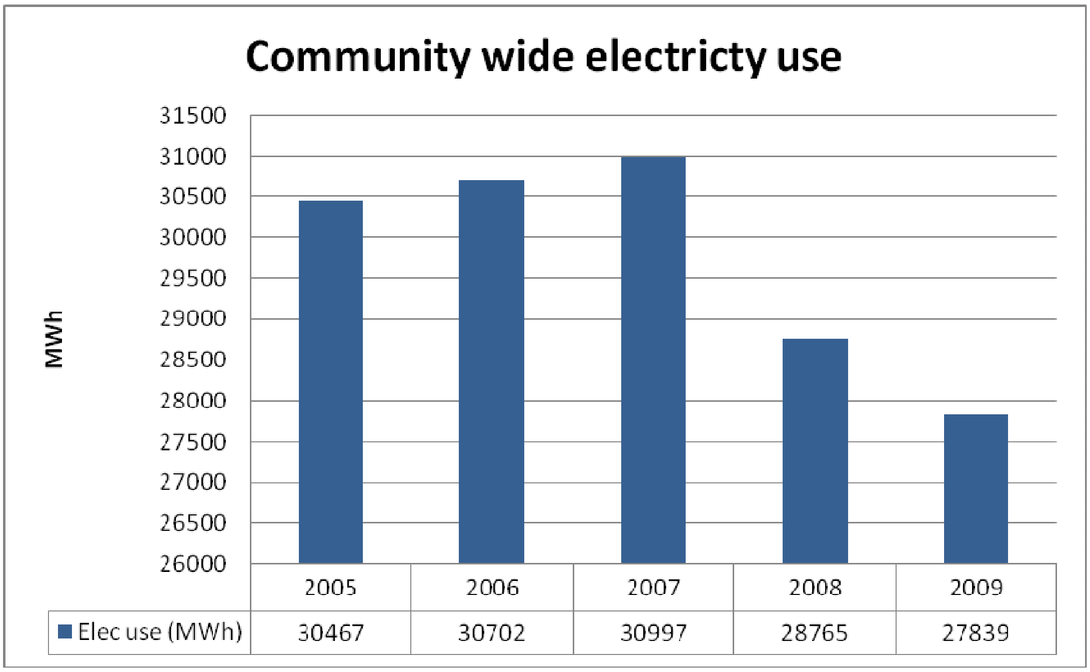
Analysis of the 5 year trends in energy use from DECC data per dwelling and across Allestree community shows steadily declining energy consumption. Domestic electricity use has fallen about 10% between 2005 and 2009 to around 3,990 kWh per house in 2009.

Electricity use fell significantly between 2007 and 2008, probably due to the significant jump in electricity prices in 2008. Retail electricity prices jumped 10.6% January to February 2008 and again by 10.3 % August to September 2008[27]. This is likely to have driven behavior change and increase investment in energy efficient appliances and low energy lighting.

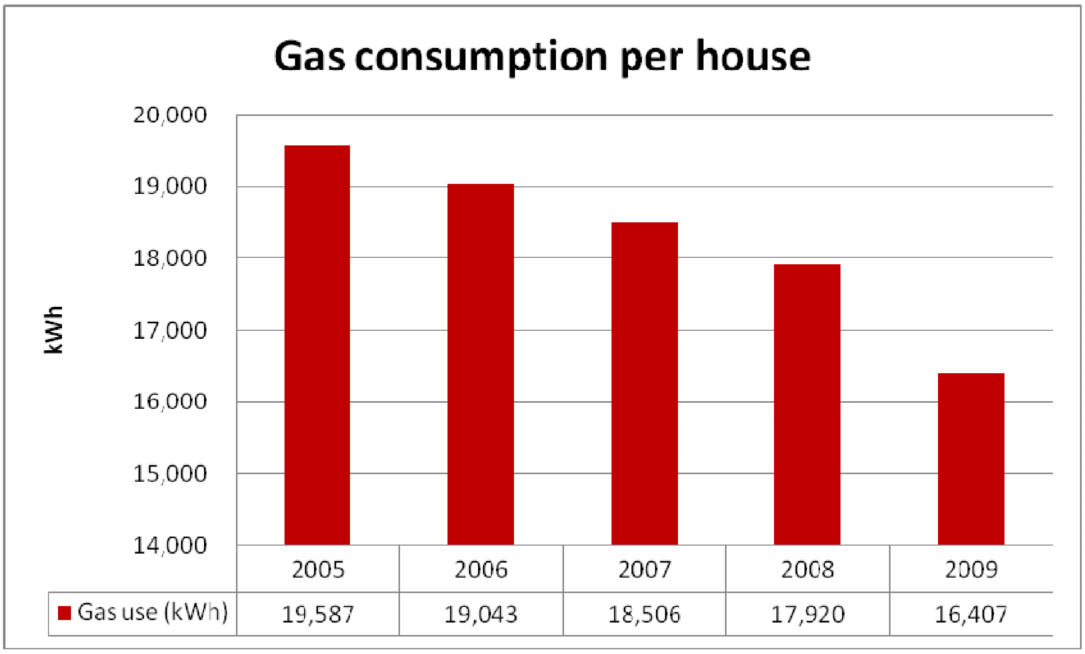
[27] Table 2.1.3 Retail prices index: fuel components, monthly figures, DECC July 2009



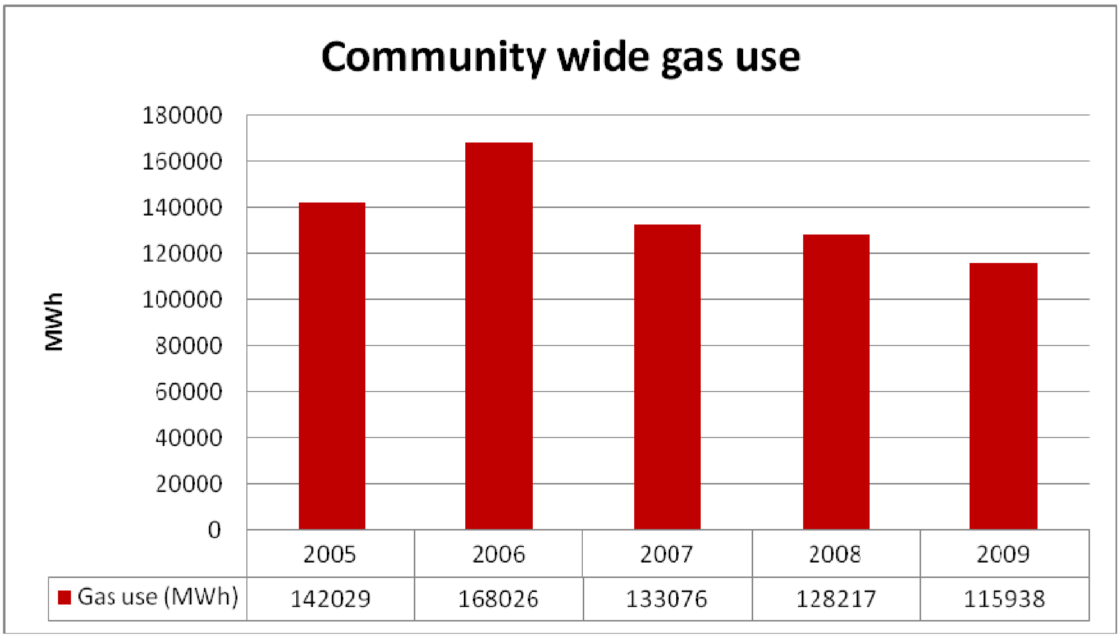
Across the whole community, including commercial electricity use, electricity consumption was still rising up to 2008. However, since 2008, significant reductions have been achieved.



Domestic gas use has also continued to fall steadily since 2005 as boilers are replaced and cavities and lofts are insulated. Similarly to electricity, an increase in efficiency accelerated subsequent to 2008 probably due to rising prices. Over the 2005 to 2009 period domestic gas use has fallen by over 16%.



Community wide, gas use has fallen more slowly than domestic gas use after peaking in 2006. Local businesses and public buildings could do more to reduce their gas use.



Overall carbon emissions in Allestree have fallen by about 14.5% since 2005.

9. Data collected

Data was collected from 217 homes. We collected sufficient data on building fabric to calculate energy profiles for each property surveyed and also to extrapolate an energy profile for the area. We can also extrapolate the likely number and types of measure that are available to take forward to reduce Allestree's energy use.

2010 Data from Experian is available across the 46 Census Output Areas (COA)

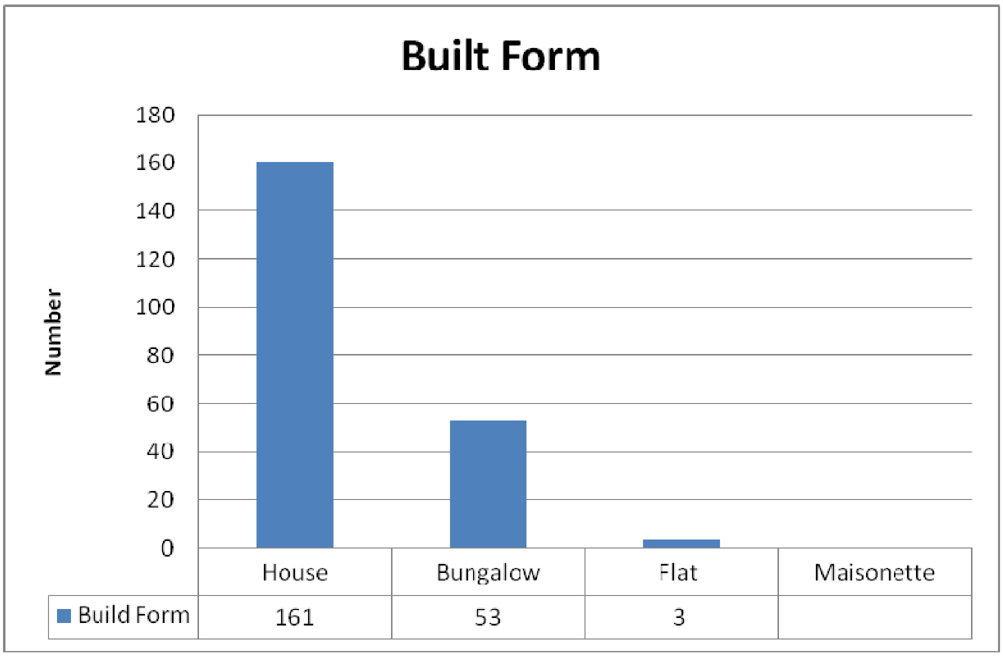
Ward	Allestree
Households	6134
pre 1870	6
1871-1919	14
1920-1945	1580
1946-1954	391
1955-1979	2944
post 1980	577
No age data	622
Bungalow	887
Detached	2776
Flat	210
Semi	1507
Terraced	132
Unknown type	622
Property CO^2 kg	34932.466
Transport CO^2 kg	23972.975
Total CO^2 kg	58905.441

10.Allestree housing stock

There are about 24million homes in the United Kingdom. Of these, 21.8million are in England, comprising around 29% terraces, 27% semi-detached, 17% detached, 9% bungalows, 3% converted flats and 14% purpose-built flats (DCLG, 2007). So, unlike many countries, the vast majority of dwellings in the UK are houses—86% in England. The stock is also fairly old. In England, 39% predate 1944, 42% were built between 1945 and 1980 (when thermal standards we re-raised significantly in building regulations and 19% after 1980. It is estimated that around a third of dwellings which will comprise the2050 stock have yet to be built, and that by the same date, 75% of the currents stock will still exist. (Wright, 2008).

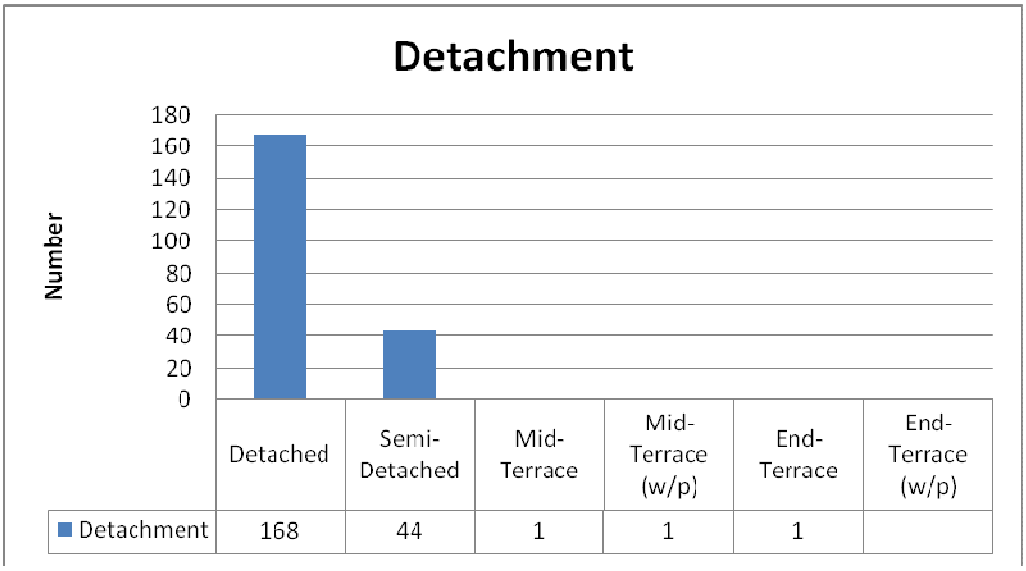
According to Owen (Owen, 2006), 83% of energy use in the home is accounted for by space and non-electric water heating and the vast bulk of this, is done by gas. The remainder is accounted for by electricity use for other purposes, including electric water heating.

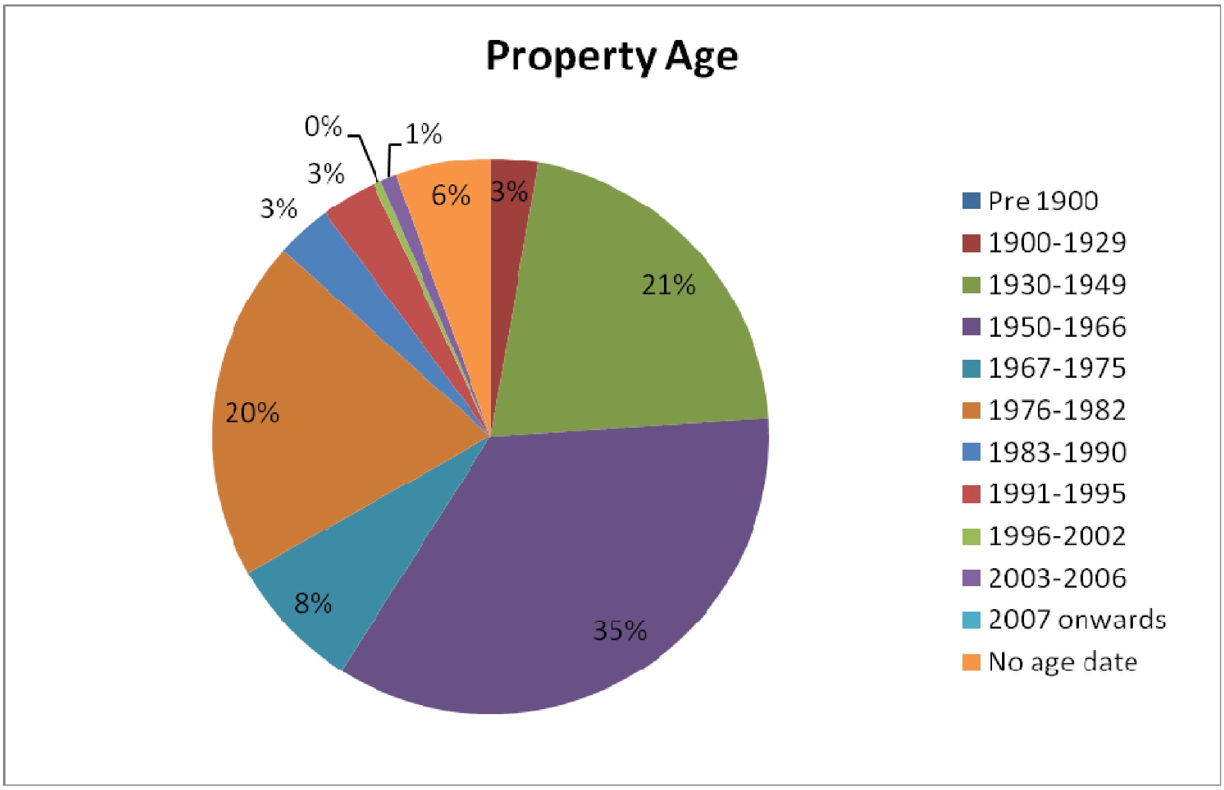
10.1. Build form and age



The vast majority of homes in Allestree are houses or bungalows with a smaller number of flats and no maisonettes in our sample. Of all the homes in the sample the majority are detached with a significant minority semi-detached and a small number of terraced properties.

This would suggest that properties will benefit significantly from cavity or solid wall insulation as properties will generally have a large exposed heat loss perimeter.





Property age reflects the building regulations prevalent at the time in the thermal properties of the building fabric. Most homes built post 1930 will have cavity walls, though not all cavities are suitable to be cavity filled.

From the early 1980s all homes would have had cavities as this was enforced through building regulations.

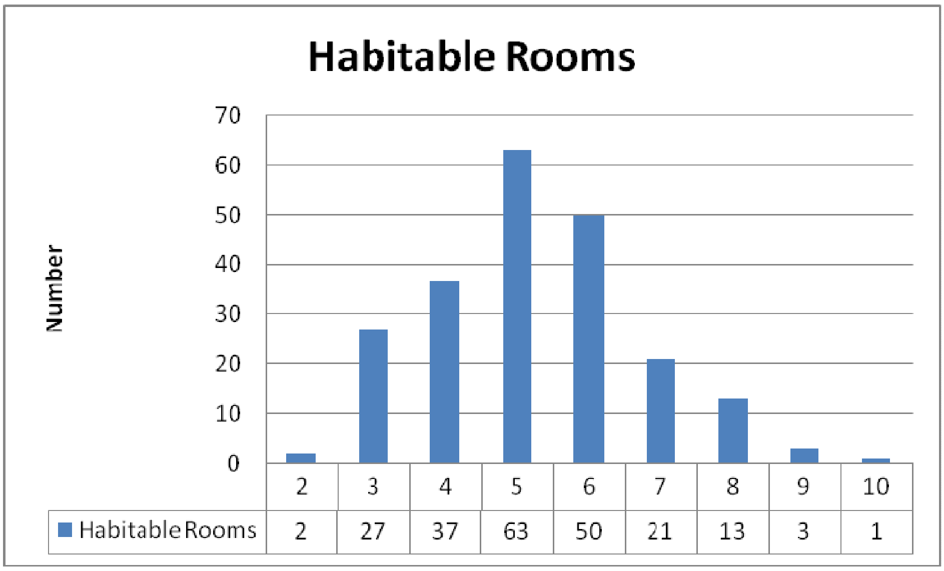
The 3 most significant age clusters in Allestree, 1930-1949, 1950-1966 and 1976-1982 are all likely to have cavity walls. The earlier wall types may however, have narrow cavities that make cavity insulation difficult.

This spread of ages suggests that this community of properties should be a relatively easy area to achieve significant improvements on, 'as built' heating energy efficiency, if opportunities are provided in the right way at the right cost.

This coupled with the relative affluence of the area would suggest that many households, once they have been upgraded for modern energy efficiency, may wish to consider further improvements or investments such as solar water heating and solar electricity.

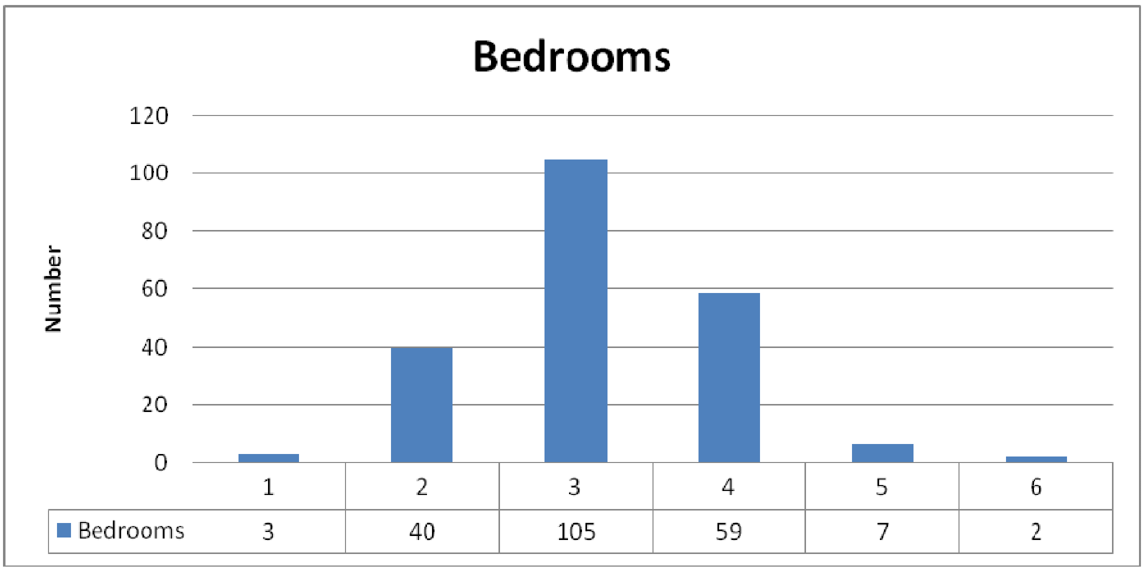
Investments in domestic solar water heating and solar electricity can offer RPI and energy price linked returns of 5%-10%, better than money in the bank. Older people with bank savings may be interested in these types of slow release savings as an alternative to ISAs or SIPs.

10.2. House size

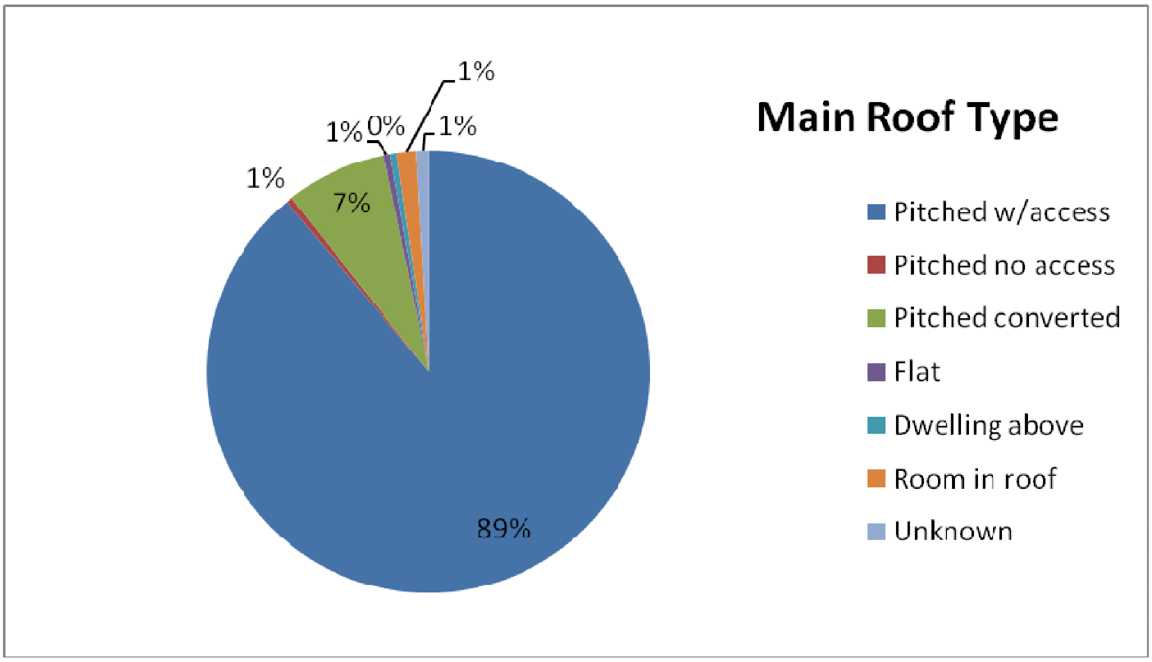


Houses in this area are generally larger than average, alongside the prevalence of detached and semi-detached properties. This suggests that energy use will be higher than average. Larger numbers of rooms and an older population could also suggest that better heating controls, timers, thermostatic radiator valves and zoning, could offer significant improvements on enabling homeowners to match their heating needs to their occupancy patterns.

Consideration should be given to working with behaviour change groups to promoting energy awareness and including promotion of heating control upgrades. This should be done alongside training on how to get the most out of heating controls in larger properties with fewer occupants.

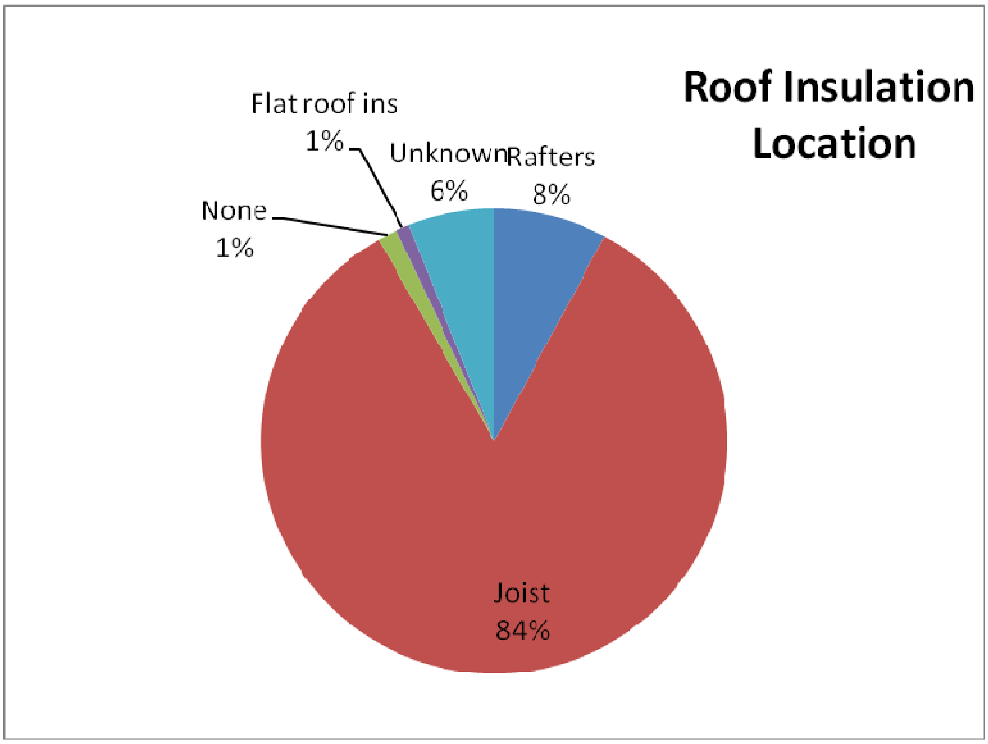


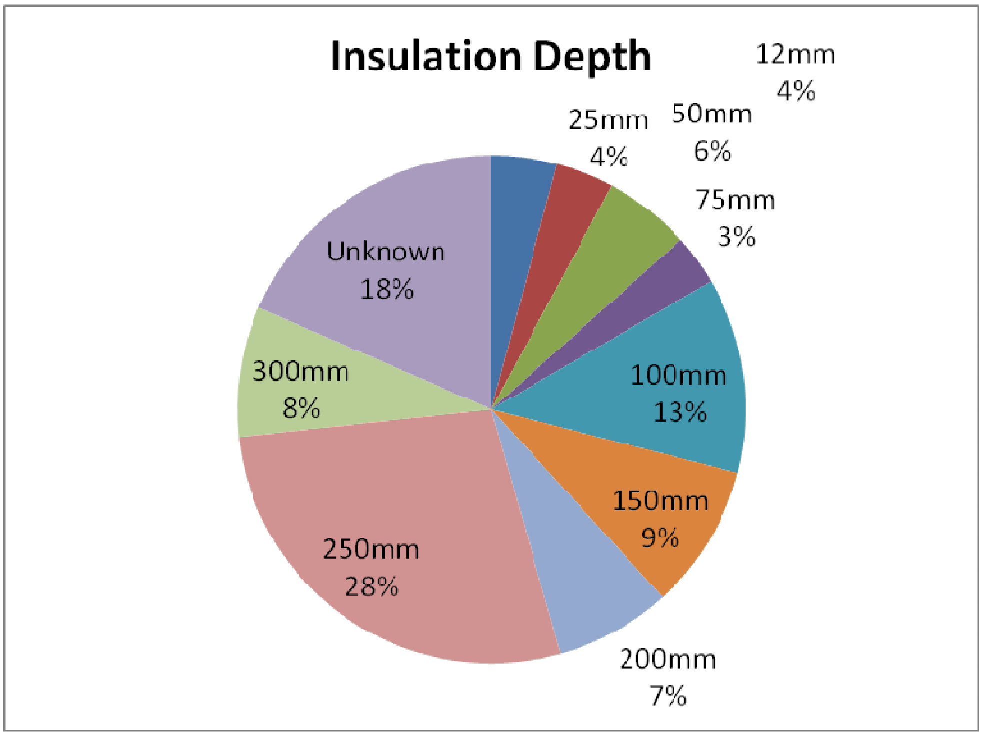
10.3. Roofs



The vast majority of Allestree roofs are pitched with access, with a significant minority having been converted into additional living space.

The vast majority of these roofs have some level of insulation, either between joists or rafters.





While many homes (43%) have 200mm or more of loft insulation, 30% of homes still have 100mm or less. A large number 17% have less even than joist depth (100mm). This is a significant area of opportunity for saving carbon emissions and reducing energy use, especially within larger homes.

The local reasons for high levels of insufficiently insulated lofts should be explored. Often roof spaces are used for storage and the inconvenience of emptying lofts for insulation, or the additional costs and loss of space from raising joists can be impediments to taking up the opportunity to install loft insulation.

There are some low cost DIY solutions available for raising joist heights[28]. It must be mentioned however, that while lofts are often used for storage, they are not usually designed for storage.

Additional weights on joists cannot usually be encouraged without structural survey and building regulations approval. These will of course add to costs in the case of loft insulation schemes where the householder requires to continue using the loft for storage. Joist raising for providing boarded access over increased insulation, may be less of a problem than joist raising for providing loft storage.

The fairly high number of unknowns may be due to large number of boarded lofts and conversions.

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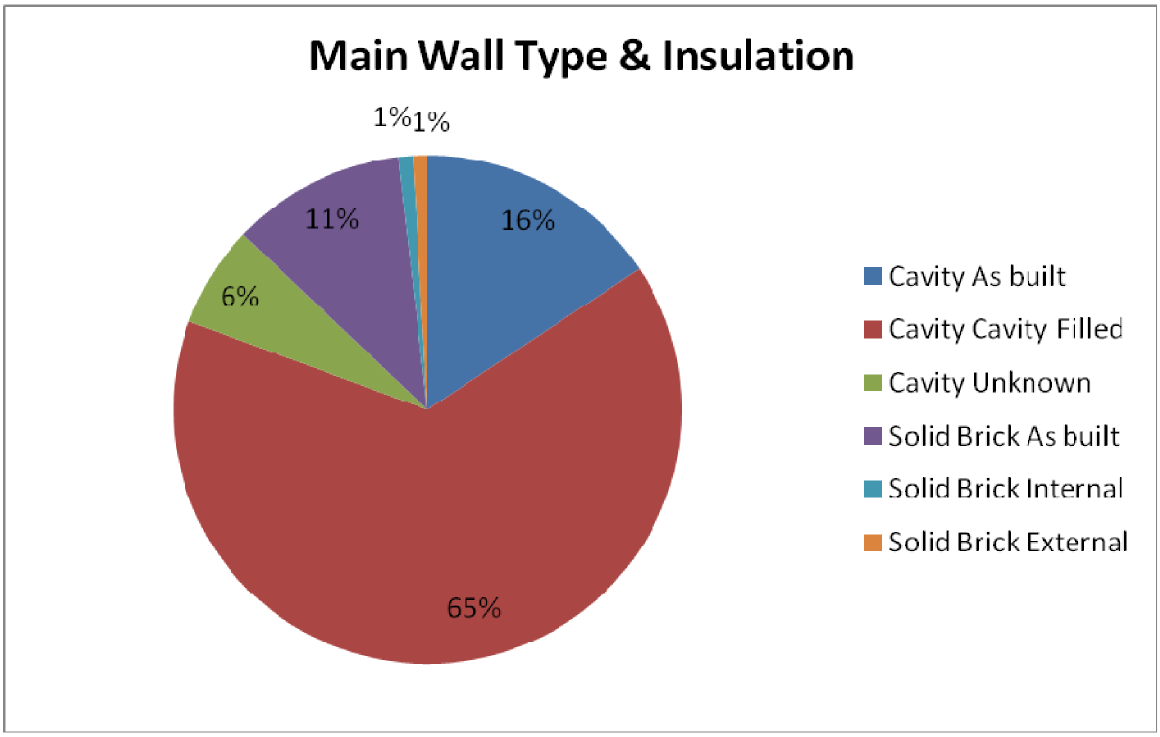
[28] http://www.diy.com/nav/build/insulation/loft-insulation/loft_storage_stilt/Diall-Loft-Storage-Stilts-12-Pack-11837507

Solutions could be include:

- **Incorporating work with local builders on raising joists into local energy efficiency schemes.**
- **Checking whether incorporating this work into insulation works would show a good return on investment if included in the costs of finance packages to encourage increased take up.**
- **Establishing local community volunteer loft clearance schemes.**
- **Working with trusted local agencies such as Age UK Derby and Derbyshire, church or scout groups to offer loft clearance.**

10.4. Walls



Significant work has already been undertaken across Allestree on cavity wall filling with 65% of all cavities already filled. Since the 1980s, all new buildings have been required to have filled cavities on construction.

There is still however, a smaller but significant proportion (16%) of homes in the area that could potentially benefit from cavity filling. Further analysis will reveal whether these homes have cavities of a suitable width to be filled, have been filled when built or require solid wall insulation.

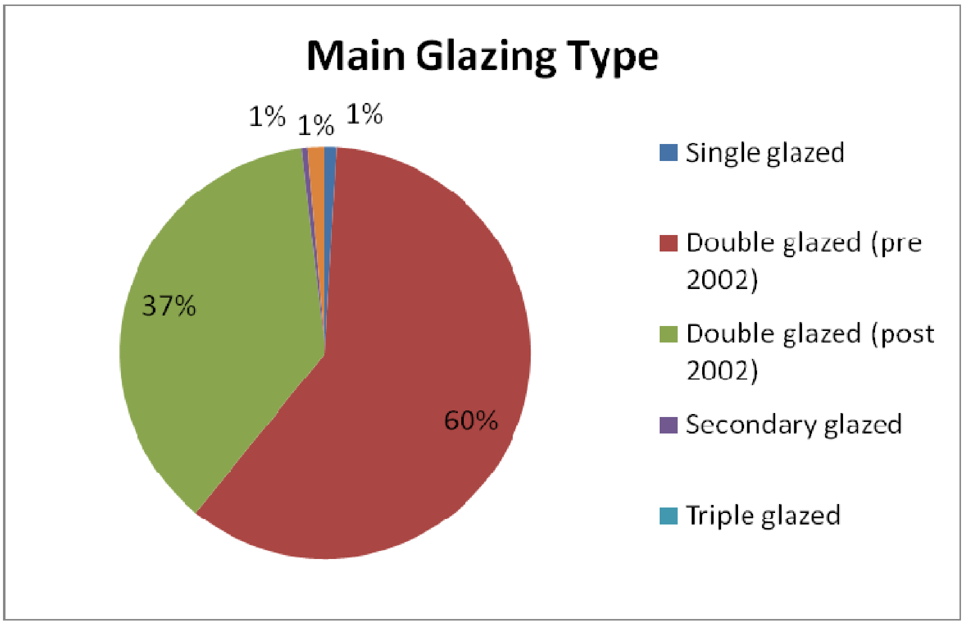
There is also a significant, but smaller, amount of homes (11%) listed as solid brick. These homes would potentially benefit from funding or initiatives to promote the financial and environmental savings from solid wall insulation.

As homes are larger and often detached, householders may be averse to external solid wall insulation that may be seen to detract from the character of the property. Internal solid wall insulation may be a preferred option in many cases. Given that most homes in Allestree are larger, there are less likely to be perceived problems with households losing internal space from dry lining of properties.

The intrusive nature of dry lining and the need to redecorate may be an impediment to undertaking this work. It would be valuable to identify a small number of pioneering early adopters, across housing types, who would be happy to undertake this work and act as case studies and advocates to convince others that the benefits of such home improvement work outweigh the costs and disruption.

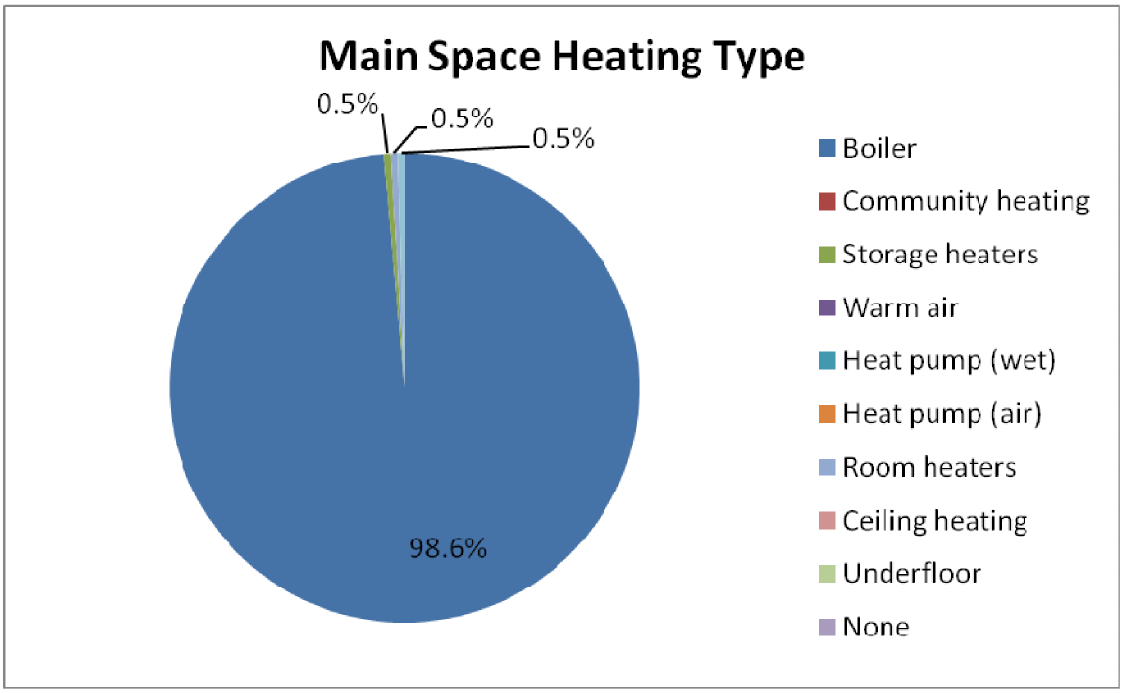
Data on energy bill and carbon savings vs costs from real life local examples should be sought.

10.5. Glazing



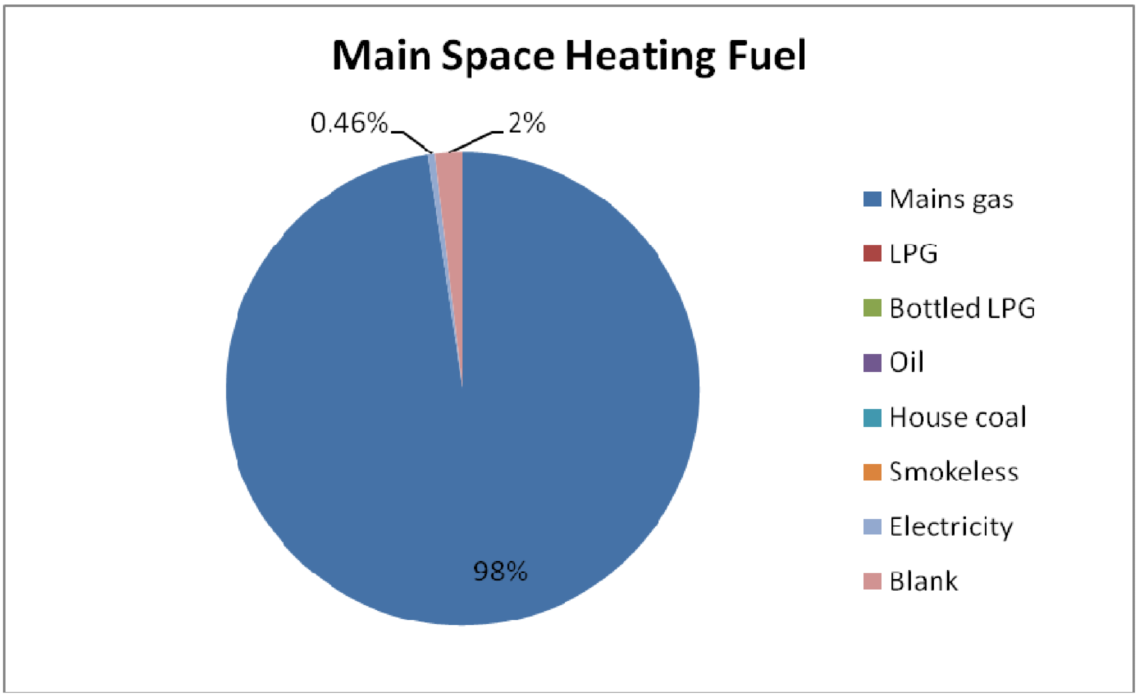
Properties in Allestree seem to be already largely double glazed, there seems little merit in promoting the benefits of this technology further. While double glazing does improve noise levels and reduce drafts it generally has a long payback in energy and carbon terms.

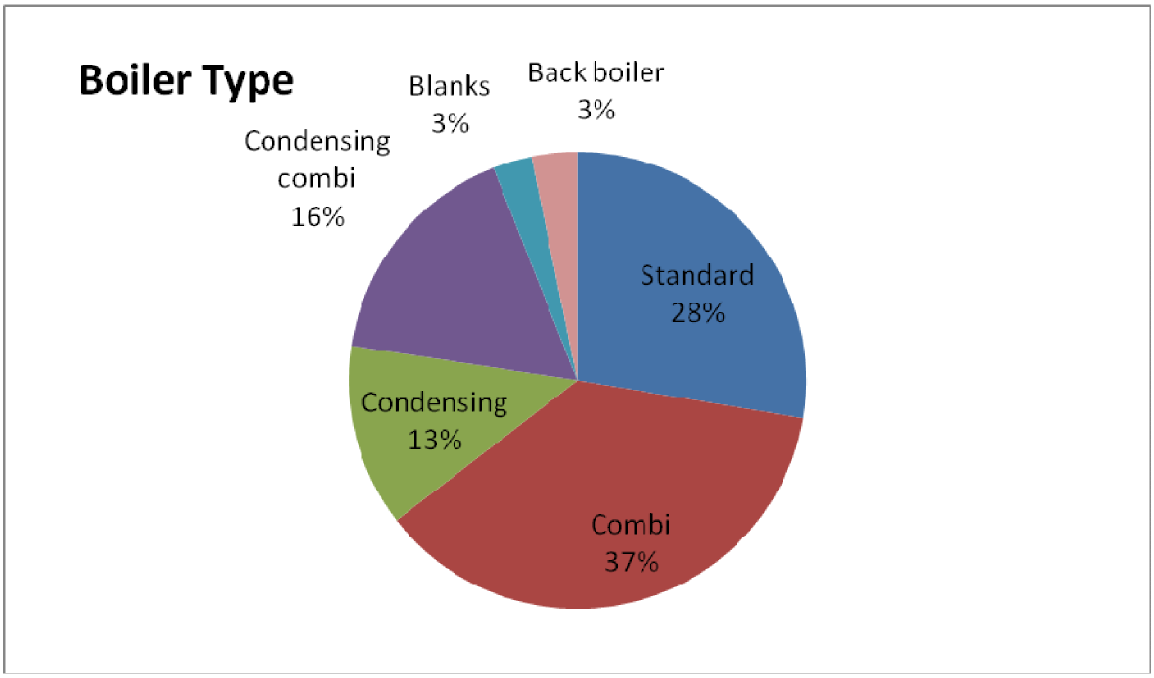
10.6. Boilers



Heating types in Allestree are almost exclusively mains gas central heating systems.

Energy use density in Allestree is around 18,000KWh/km^2 per year, which is fairly low, suggesting that district heating is unlikely to be viable here.





29% of boilers in Allestree are condensing with the remainder non-condensing. Condensing boilers, if installed well, are able to operate more efficiently than non-condensing boiler types. All new boilers installed since 2004 must be condensing types.

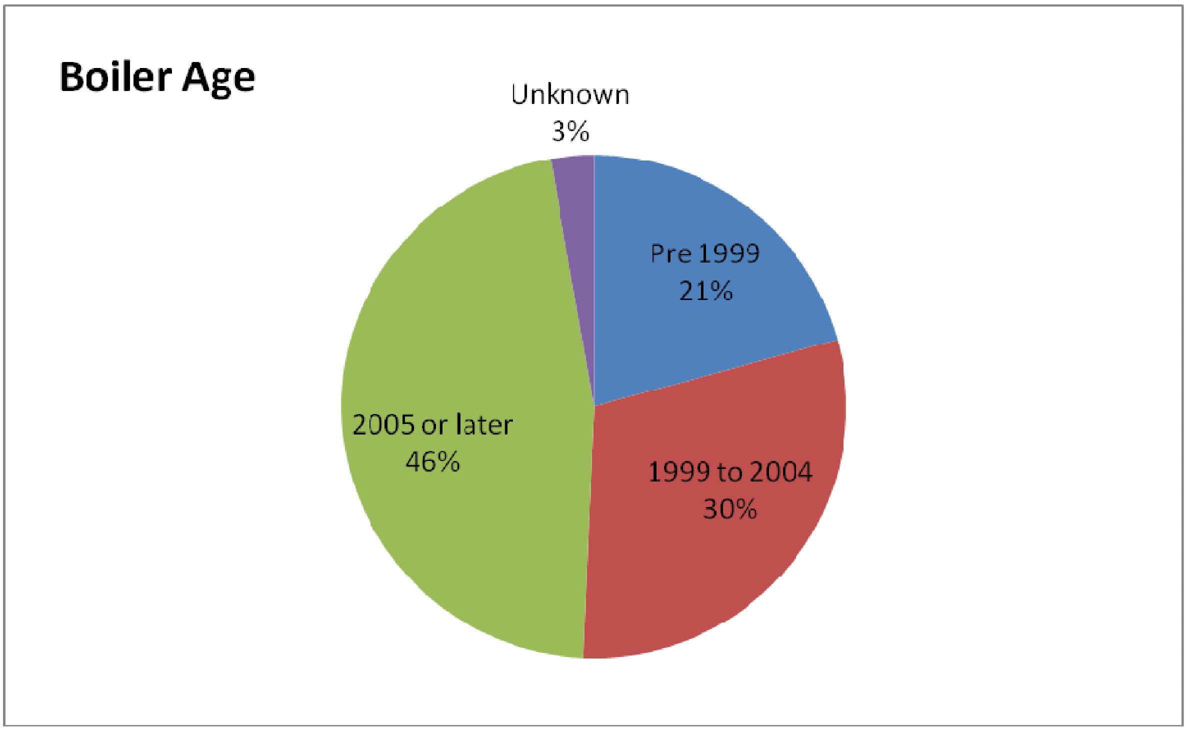
More efficient boilers offer one of the most significant opportunities for carbon and cost savings. There is significant opportunity here to advocate boiler upgrades to Allestree households through promotion of the cost benefits of investment in modern heating systems.

Many very old boilers will have been replaced through the boiler scrappage scheme. Identifying financing routes such as the Green Deal and promoting the return on investment for new boilers, should encourage householders to upgrade older boilers to newer condensing types.

53% of boilers in Allestree are combination boilers, the remainder being largely system boilers with hot water tanks.

Allestree is an area that would be likely to have a larger number of households prepared to invest in solar water heating, particularly with new initiatives such as the Renewable Heat Incentive. Solar water heating is difficult to retrofit to combination systems, however is easier to retrofit to system boiler types.

As system boilers and system boiler tanks are replaced solar water heating should be promoted. If a system boiler and new tank is installed, householders with roofs facing through south to west should be encouraged to consider including a twin coil tank to allow later retrofitting of solar water heating.



51% of boilers are Pre 2004 and 21% are older than 13 years. Typically a boiler will be replaced every 12 years and boilers older than 2004 are unlikely to be as efficient as modern systems.

46% of the households visited stated that their boiler had been replaced since 2005. All boilers installed since 2005 should be of condensing type which suggests that a larger number of boilers are efficient condensing boilers that was picked up in the survey. This has been taken into account in the modelling

This represents a key opportunity for householders in Allestree to save money and carbon and should form a central part of any promotion of energy saving investment opportunities locally.

11. Allestree-wide estimate of opportunity

Measure	% of sample	Extrapolated opportunity in Allestree
Boiler upgrade, pre 2004	51%	3,128
Boiler upgrade, pre 1999	21%	1,289
Cavity wall insulation	Up to 16%	500
Loft top up(<200mm)	46%	2,823
Virgin lofts(<50mm)	16%	982
Solid wall insulation	11%	675
Double glazing	1%	61

12. Prevalent archetypes

Building archetypes were characterised by age, built form and number of habitable rooms to give 51 archetypes.

From these 8 common archetypes were identified each representing more than 4% of the building stock. These 8 types between them account for 53% of the housing stock.

These were:

Age	Built form	Habitable rooms	% of stock
1930-49	House	5	8.6%
		6	6.6%
1950-66	Bungalow	3	8.6%
	House	4	5.1%
	House	5	8.6%
	House	6	5.6%
1976-82	House	5	6.1%
	House	6	4.1%
		Total	53.3%

In targeting programmes, maximum impact could be achieved by designing programmes around these 8 archetypes. Case study material targeted at these homes could have most resonance with the residents of Allestree.

1930-49 properties

If developing a local solid wall programme, a 5 or 6 room 1930-49 solid wall, semi-detached property on Allestree Lane would serve as a good exemplar. Typically these properties will have 1 or 2 residents, are owner occupied and have less than 150mm of loft insulation.

Residents are likely to have an annual energy bill of over £2,000, if properties are fully heated. Some residents with older boilers and larger homes could experience bills considerably in excess of that. All of these households would require incomes of over £20,000pa to avoid fuel poverty. With these homes, water heating is likely to represent around 10% of the overall gas bill, electricity 30% and the majority, 60% from space heating.

Condensing combination boilers, controls, loft insulation and solid wall insulation with support in energy management would help residents of these properties cut bills and reduce emissions. Identifying a local exemplar home as a pilot or case study would be very useful.

1950-66 Bungalows

If developing a programme here, a 3 room detached bungalow on Birchover Way would be a good exemplar. These properties are largely energy efficient already, most have insulated cavities and significant loft insulation. Occupancy is typically single person owner occupied, though some with 2 person occupancy.

Residents are likely to have an annual energy bill of around £1,400. Water heating typically represents 15% of the energy costs with around 46% on space heating and 39% on electricity bills. Most of these households would need to have an income of more than £13,000 for single occupancy and closer to £18,000 per annum for double occupancy to avoid fuel poverty.

Peer support in energy saving behaviour through tenants and residents groups and local community facilities, such as health centres and health visitors, smart metering, tariff switching and upgrading to condensing boilers, would be of most use to these households.

1950-66 House

If developing a programme here, a 5 or 6 room detached house property on Birchover Way or Cassington Crescent would be a typical exemplar. These properties are generally fairly energy efficiency already, with filled cavities, mostly with good loft insulation and heating systems controlled with programmers, room and radiator thermostats. There are however, a considerable number that still have less than rafter depth loft insulation and many that do not have condensing boilers. While the houses are larger and owner occupied, occupancy is typically 2 or 1.

Residents are likely to have an energy bill of around £2,000 per annum. Water heating represents typically 14% of energy costs with around 48% on space heating and 38% on electricity bills. Most households would need an income of around £19,000 per annum to avoid fuel poverty.

With larger homes in low occupancy, energy saving behaviour change support may be of benefit, this could help to reduce energy use in unused rooms. Smart metering could be introduced, to help in electricity use management. Loft clearance schemes to support in topping up remaining lofts, possibly in partnership with local churches, or Age UK. Programmes to promote boiler upgrades and switching to combi for lower occupancy homes, may also help in energy saving. This group could also benefit from looking at switching energy supplier and may consider solar technologies.

1976-82 House

If developing a programme here, a 5 room detached house on Lambourn Drive would be a typical exemplar. These properties are likely to have already undertaken a significant number of energy saving measures including good controls, filled cavity and loft insulation. There are however, still a fair number of homes that could benefit from more loft insulation. The most common occupancy is 2, however there are a number of family homes in this group with 3 or 4 occupants.

From our sample it would seem that family homes are a little less likely to have topped up their loft insulation, possibly with needs for loft storage.

Residents are likely to have an average energy bill of around £1,970 per annum. Similar to the last group, water heating represents 14% of energy costs, 48% space heating and 38% electricity bills.

With larger homes in low occupancy, energy saving behaviour change support may be of benefit to reduce energy use in unused rooms, smart metering to help in electricity use management, loft clearance schemes to support in topping-up remaining lofts and possibly promoting home loft insulation through local school, with school service base loft clearance schemes for families. Programmes to promote boiler upgrades and switching to combi for lower occupancy homes, may also help in energy saving. This group could also benefit from looking at switching energy supplier and may consider solar technologies.

13. Stock data analysis

Of the 217 homes for which data was collected 197 had sufficient data of the requisite quality to be assessed for energy efficiency.

For ease of profiling and generating archetypes, these properties have been grouped by age band. These bands correspond to changes in building regulations.

It is important to note that some age bands, particularly the 1996-2002 and 2003-2006 bands, have a very small sample size, so are not suitable for extrapolation, they have been marked in red.

Age	Average of Footprint (m^2)	Average of Habitable Rooms	Average of Total Number of Occupants	Count
1900 – 1929	107.67	5.83	2.33	6.00
1930 – 1949	73.36	5.89	2.15	44.00
1950 – 1966	71.44	4.71	1.95	72.00
1967 – 1975	78.24	5.24	2.00	17.00
1976 – 1982	72.95	4.88	2.23	40.00
1983 – 1990	85.88	5.00	1.75	8.00
1991 – 1995	67.86	6.14	2.57	7.00
1996 – 2002	118.00	7.00		1.00
2003 – 2006	106.00	6.50	2.00	2.00[29]
Grand Total	**74.91**	**5.18**	**2.09**	**197.00**

[29] Very small sample size

The Nottingham Energy Partnership generates monthly updated East Midlands average fuel costs for all domestic heating fuels [30].

From this data, using energy assessment software average energy costs, split by space, water and electricity bill costs were created for all homes surveyed. The full data set is available in the spreadsheet appendices.

While households in Allestree are generally better off than other areas in Derby, high energy bills still mean that a significant number of households could be at risk of fuel poverty. This is a risk particularly where residents are elderly and claiming pensions and in older solid walled properties.

Fuel poverty is described as having to spend more than 10% of household income on paying domestic energy bills[31]. The average required household income to avoid fuel poverty in Allestree is just under £20,000 per annum though residents of properties built between 1900 and 1929 could have to earn close to £30,000 to avoid fuel poverty.

Water heating costs are more a factor of household occupancy and boiler efficiency and tend to remain more constant, however as building regulations have improved, newer homes in Allestree have seen falling heating bills. Electricity and water heating costs thus make a more significant proportional contribution to the bills in newer more efficient homes.

In homes built since 1950, targeting behaviour change measures to reduce electricity use and costs alongside supporting building fabric investments, such as insulation and new boilers, become more important in reducing the risk of fuel poverty.

Age	Average of Space Heating Costs	Average of Water Heating Costs	Average of Electricity bill	Average of Required income to avoid FP
1900 – 1929	£1,921.75	£241.38	£803.26	£29,663.91
1930 – 1949	£1,365.45	£254.63	£747.25	£23,673.30
1950 – 1966	£915.52	£252.31	£675.67	£18,434.97
1967 – 1975	£837.20	£234.69	£693.16	£17,650.51
1976 – 1982	£876.57	£229.31	£713.30	£18,191.86
1983 – 1990	£899.52	£237.82	£672.97	£18,103.12
1991 – 1995	£839.57	£229.04	£798.57	£18,671.75
1996 – 2002	£972.03	£390.94	£1,366.91	£27,298.74[32]
2003 – 2006	£943.44	£228.06	£873.01	£20,445.13
Grand Total	**£1,029.21**	**£245.35**	**£714.46**	**£19,890.23**

[30] www.nottenergy.com/energy_cost_comparison/energy_comparison_data
[31] http://www.decc.gov.uk/en/content/cms/statistics/fuelpov_stats/fuelpov_stats.aspx
[32] Very small sample size

Space and water heating per m^2 are lower in newer homes as building regulations improvements have affected successive construction phases in Allestree. Electricity use per m^2 in newer homes however, is typically higher.

Age	Average of Footprint (m^2)	Average of space heat kWh/m^2	Average of water heat kWh/m^2	Average of power kWh/m^2
1900 – 1929	107.67	399.70	50.93	51.11
1930 – 1949	73.36	426.32	82.51	76.17
1950 – 1966	71.44	290.15	85.23	69.17
1967 – 1975	78.24	262.76	77.74	67.77
1976 – 1982	72.95	279.77	76.23	73.00
1983 – 1990	85.88	240.21	65.45	57.02
1991 – 1995	67.86	283.56	76.13	80.70
1996 – 2002	118.00	185.95	74.79	79.72[26]
2003 – 2006	106.00	200.36	48.55	57.01
Grand Total	**74.91**	**315.73**	**79.55**	**70.69**

Average carbon emissions, per home, in Allestree are around 7.2 tonnes per annum however, this is significantly weighted towards the pre 1950 housing stock. Homes built between 1950 and 1995 are more likely to have carbon emissions in the region of 6.5 tonnes.

On the basis of the significant contribution that homes build between 1930 and 1949 make to area's carbon emissions, the likelihood of these residents experiencing fuel poverty and the number of properties that fall in this band, working to draw funding into the area to target these properties should be a priority.

Age	Average of SAP	Average of CO^2	Average of space heating energy (KWh)	Average of water heating energy (kWh)	Average of electricity energy (kWh)
1900 - 1929	50.67	12026.50	43380.41	5448.82	5528.26
1930 - 1949	51.70	8759.45	30822.79	5747.81	5142.82
1950 - 1966	56.71	6605.82	20666.37	5695.45	4650.16
1967 - 1975	60.82	6233.35	18898.35	5297.79	4770.55
1976 - 1982	60.85	6459.40	19787.10	5176.38	4909.18
1983 - 1990	57.50	6493.50	20305.27	5368.33	4631.60
1991 - 1995	61.00	6585.71	18951.92	5170.10	5496.01
1996 - 2002	64.00	9579.00	21941.98	8824.77	9407.48
2003 - 2006	67.50	7286.00	21296.71	5148.17	6008.30[33]
Grand Total	**56.93**	**7206.78**	**23232.80**	**5538.30**	**4917.16**

[33] Very small sample size

14. Appendices

Appendix 1

Build type age, form, no. Rooms	Number of dwellings in sample (Most common in red)
1900 – 1929	**6**
Bungalow	**2**
3	1
4	1
House	**4**
5	1
7	1
8	2
1930 - 1949	**44**
Bungalow	**3**
4	1
5	1
6	1

House	**41**
4	1
5	17
6	13
7	5
8	3
9	2
1950 - 1966	**72**
Bungalow	**28**
3	17
4	5
5	4
6	2
House	**44**
4	10
5	17
6	11
7	3
8	3
1967 - 1975	**17**
Bungalow	**5**
3	1
4	3
6	1
House	**12**
3	1
4	2
5	3
6	2
7	2
8	2
1976 - 1982	**40**
Bungalow	**9**
3	4
4	5
House	**31**
3	1
4	6
5	12
6	8
7	4

1983 - 1990	**8**
Bungalow	**4**
3	1
4	2
5	1
House	**4**
5	1
6	2
7	1
1991 - 1995	**7**
House	**7**
5	2
6	2
7	3
1996 - 2002	**1**
House	**1**
7	1
2003 - 2006	**2**
House	**2**
6	1
7	1
Grand Total	**197**