

BUILD2LC Project

Boosting Low Carbon Innovative Building Rehabilitation in European Regions

State-of-Art, SWOT analysis and
identification of needs



Region: Gloucestershire, UK – February 2017

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1 STATE OF ART OF ENERGY REHABILITATION IN BUILDINGS

1.1 Overview of Gloucestershire, UK

1.1.1 Background

Gloucestershire is the northern most county in the South West region of the UK and comprises six districts: Cheltenham; Cotswold; Forest of Dean; Gloucester; Stroud and Tewkesbury. There is one county council, Gloucestershire County Council, located within Gloucester. Gloucestershire comprises a mix of urban and rural communities, with two main urban clusters: Gloucester City and Cheltenham Town. Each of the other districts is largely rural with a number of market towns. Its location is ideal in terms of accessibility with strong transport links (both rail and road) to London, Birmingham (and the north), Bristol (and the south) and Cardiff, Wales.

Gloucestershire has a population of 579,000 (2011 Census), which represents an increase of 5.7% against the previous recording in 2001. There is a high proportion of people aged 65+ (18.6% compared to 16.4% national average) and this proportion is expected to rise into the future. There are 268,860 dwellings across the county with two thirds made up of detached and semi-detached properties. With 88% of residents working within the county there is considered to be a net balance with 12% working in other areas, but a similar number working in Gloucestershire from other areas.

1.1.2 Economy

There are approximately 30,000 businesses in the region employing around 291,000 people. In 2013, the total output of the local economy was £11.28 billion, which is approximately 1% of the overall UK economy and 12% of the economy of South West England. Gloucestershire had a prosperous and resilient economy therefore there are opportunities for expansion. However, there is evidence that growth has slowed compared to the national average with the average percentage growth rate in nominal GVA 0.5% below the national rate of a 14 year period between 1997 and 2011. (GFirst LEP, 2014)

This reduction in growth rate has been reflected in productivity, as show in *figure 1*. According to the Office of National Statistics (ONS) the GVA per hour worked has increased yet the national growth rate has increased more substantially resulting in a net loss. Therefore, the GVA per filled job in 2014 was 8% lower at £39,726 compared to the UK average of £43,236.

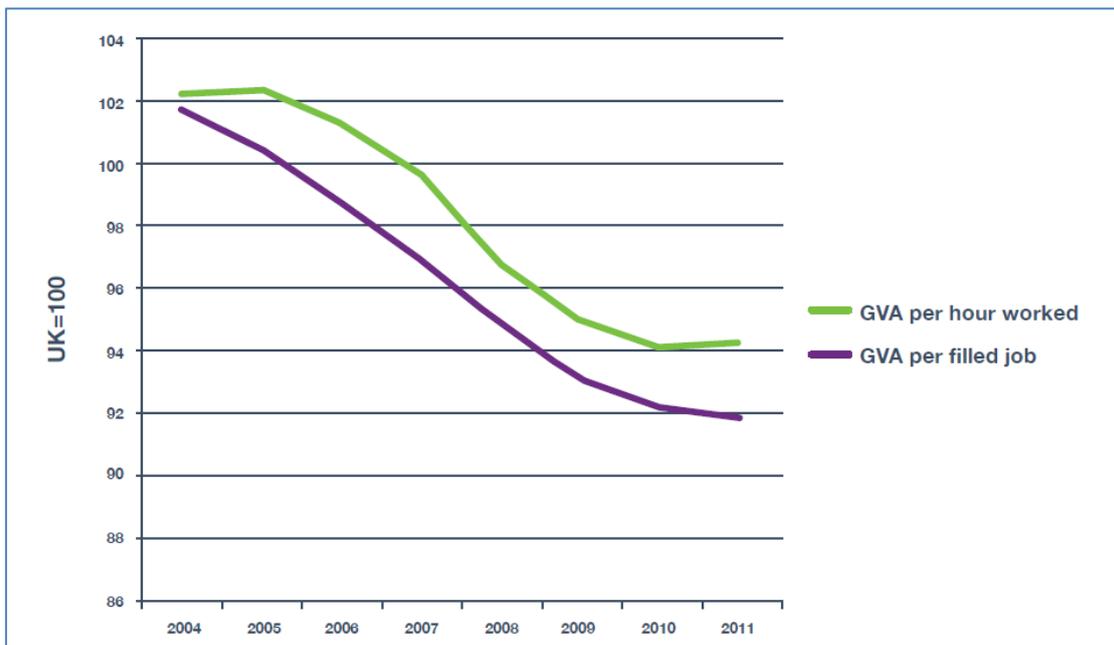


Figure 1: Productivity in Gloucestershire compared to the UK (ONS, 2013)

The dominant employment sector within Gloucestershire is manufacturing, followed by public services and then construction (*figure 2*).

In 2013, manufacturing employed 33,000 people in the county (11.7%) with construction employing 21,700 people (7.1%). According to data from the LEP Network (2012), Gloucestershire has the highest proportion of employment of all LEP regions in 'high and medium technology manufacturing' at 6.7%. For example, the county is home to Renishaw, a global company with core skills in measurement, motion control, spectroscopy and precision machining, and GE Aviation, a world leading provider of commercial and military jet engines. (GFirst LEP, 2014)

The 'Growth Statement-2025' (LEP, 2013) forecast potential changes to the Gloucestershire economy in 2025. They predicted that population increase will cause a steady rise in employment of 0.8% annually, amounting to 33,800 additional jobs in total. Productivity is also expected to rise at an annual average of 2%. Interestingly, projected employment change by sector shows a 1% reduction in the proportion of people employed in manufacturing but a 26% rise in construction and 34% increase in health; both are relevant to the Build2LC project. It should also be noted that there is a predicted 30% decline in the number of people employed in education; this could have implications for future training in the area. The figure is likely to reflect financial cuts and demographic change due to an aging population.

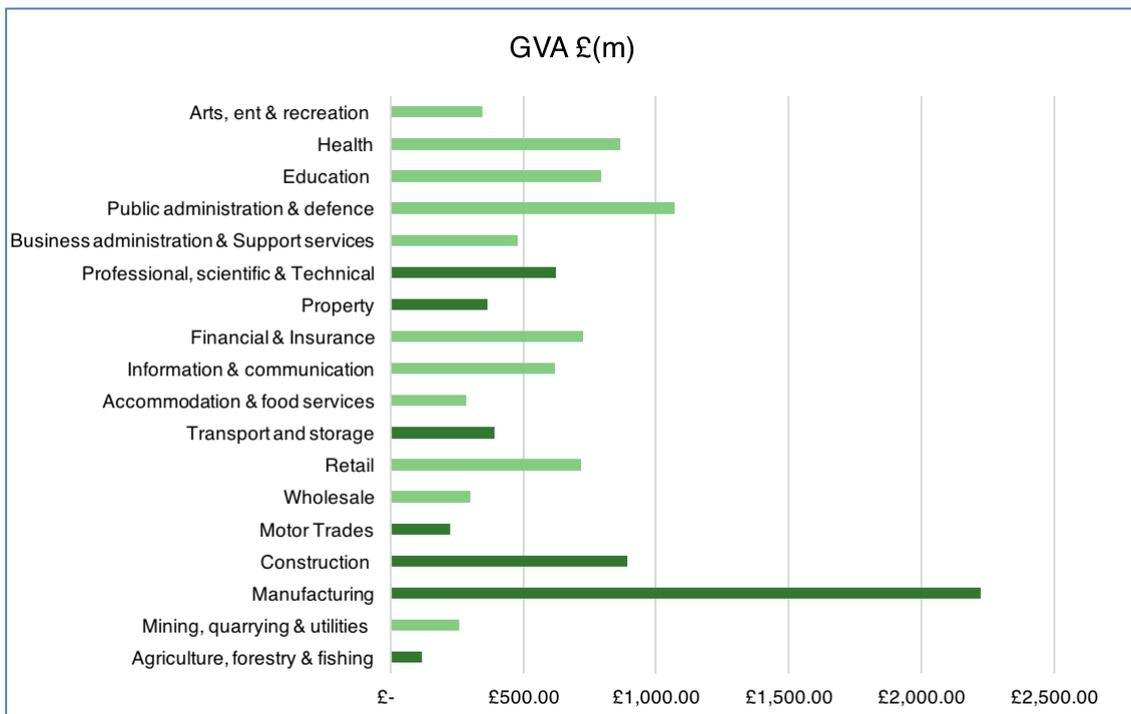


Figure 2: GVA by sector within Gloucestershire (GFirst LEP, 2014)

1.1.3 Energy use and housing

In 2015, England had 75.1% of all UK electricity generated amounting to 254.7TWh. 35% of England’s generation was from gas and 22.4% was from coal. 24.6% of electricity generated in the UK came from renewables in 2015; the majority of this production was in Scotland. (Department for Business, Energy & Industrial Strategy, 2016)

Figure 4 shows the changing fuel mix in the UK. “In 1970, solid fuels and petroleum dominated the fuel mix accounting for 47% and 44% respectively. As solid fuel’s share decreased sharply in 1984 during the miners’ strike, use of petroleum spiked due to substitution for low coal production. Solid fuels’ share recovered to 1987 before steadily declining to a 16% share in 1999. During this period, North Sea Gas increased its share from just 5% in 1970 to a maximum of 43% in 2010. Electricity’s share also increased during this period, and more recently, renewables share has increased from 1% in 1999 to 6.8% in 2015, the result of various drives to reduce reliance on fossil fuels and production of greenhouse gases.” (Department of Business, Energy & Industrial Strategy, 2016)

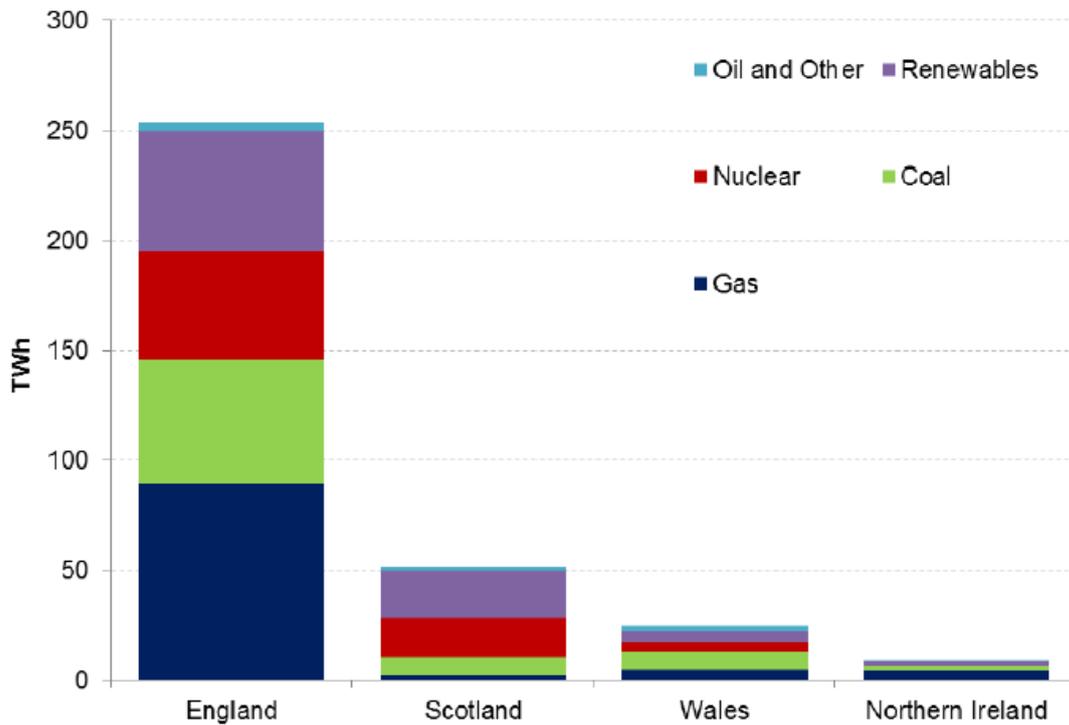


Figure 3: Generation by fuel in 2015 for England, Scotland, Wales and Northern Ireland (Department for Business, 2016)

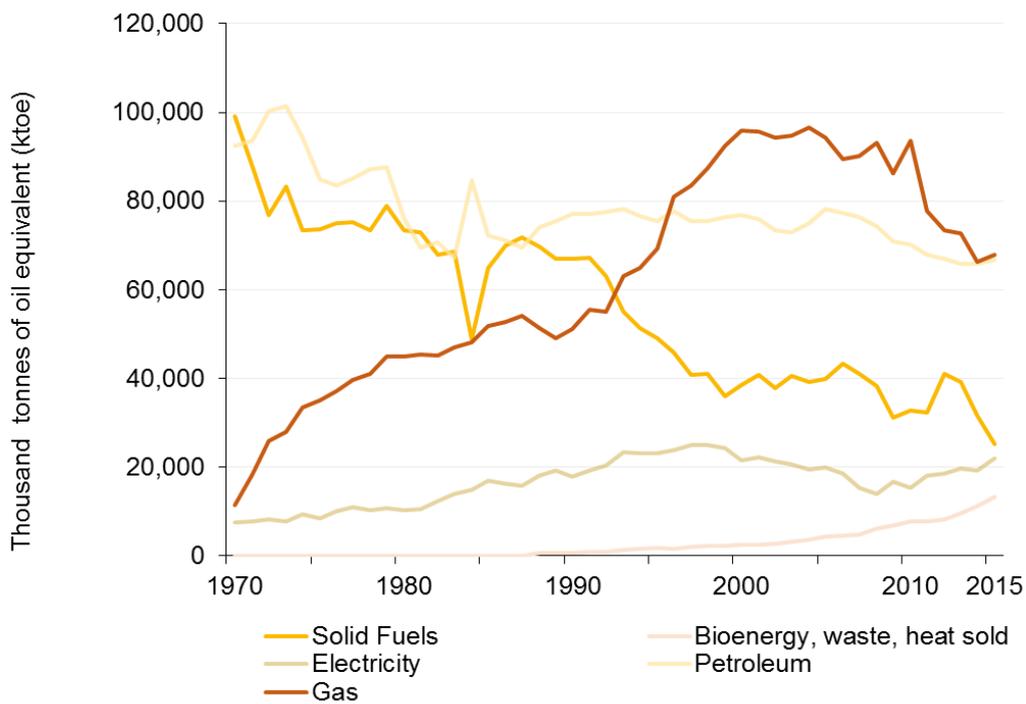


Figure 4: Final energy consumption in primary energy equivalents by fuel type (Department of Business, Energy & Industrial Strategy, 2016)

Within Gloucestershire, the majority of domestic energy consumption, 57.8%, is from gas. (Department of Business, Energy & Industrial Strategy, December 2016)

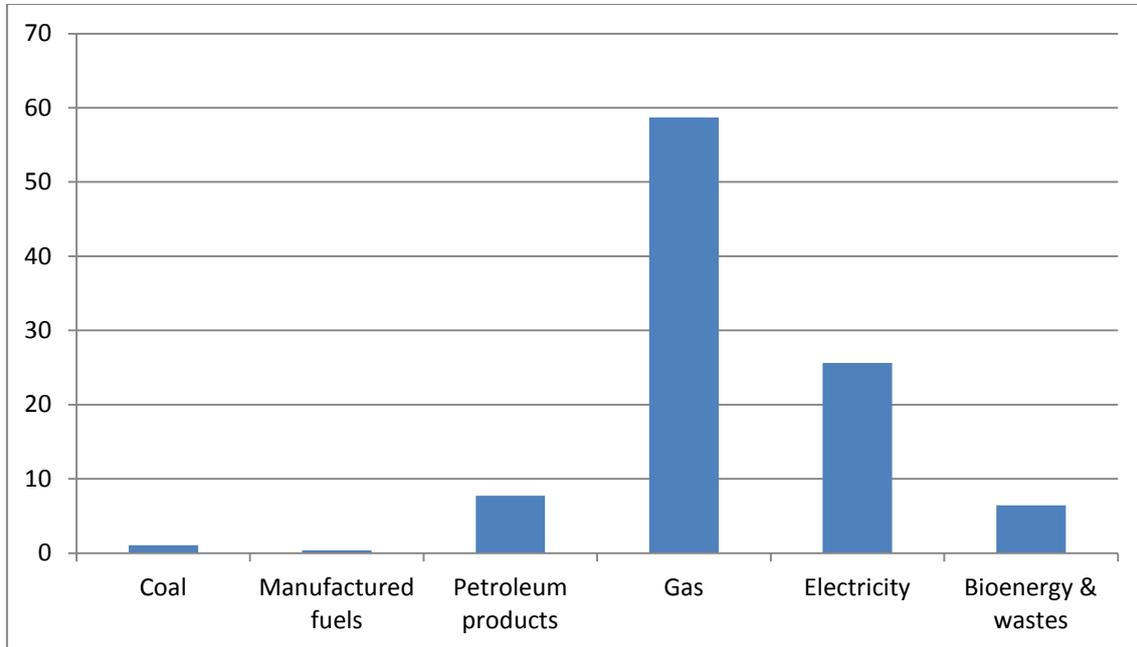


Figure 5: Proportion of domestic energy consumption in Gloucestershire 2015 (Department of Business, Energy & Industrial Strategy, December 2016)

However it is interesting to explore the differences between energy consumption in rural and urban areas of the county (*figure 6*). Forest of Dean is the most rural district and also has the highest proportion of households in fuel poverty.

Gas consumption within the Forest of Dean is significantly lower than more urban districts whilst the use of oil and bioenergy & wastes is far higher than urban areas where no energy is produced from bioenergy & wastes (Department of Business, Energy & Industrial Strategy, December 2016). This low gas consumption in the Forest of Dean is due to the large proportion of properties which are off-grid. *Figure 7* shows that large areas of the Forest of Dean and Cotswold are not connected to the central gas supplies.

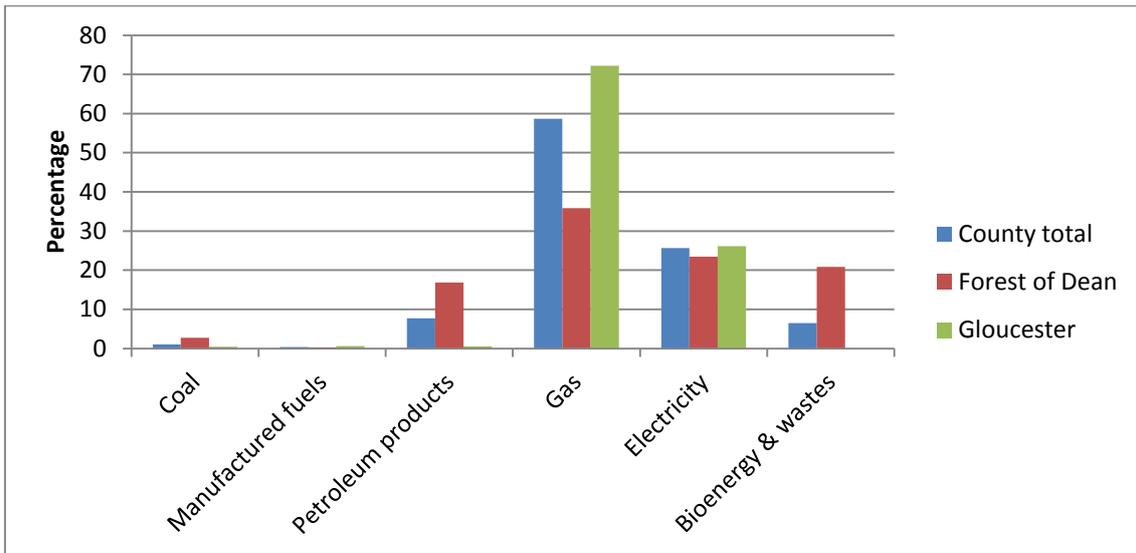


Figure 6: Proportion of domestic energy consumption in rural and urban districts in Gloucestershire 2015 (Department of Business, Energy & Industrial Strategy, December 2016)

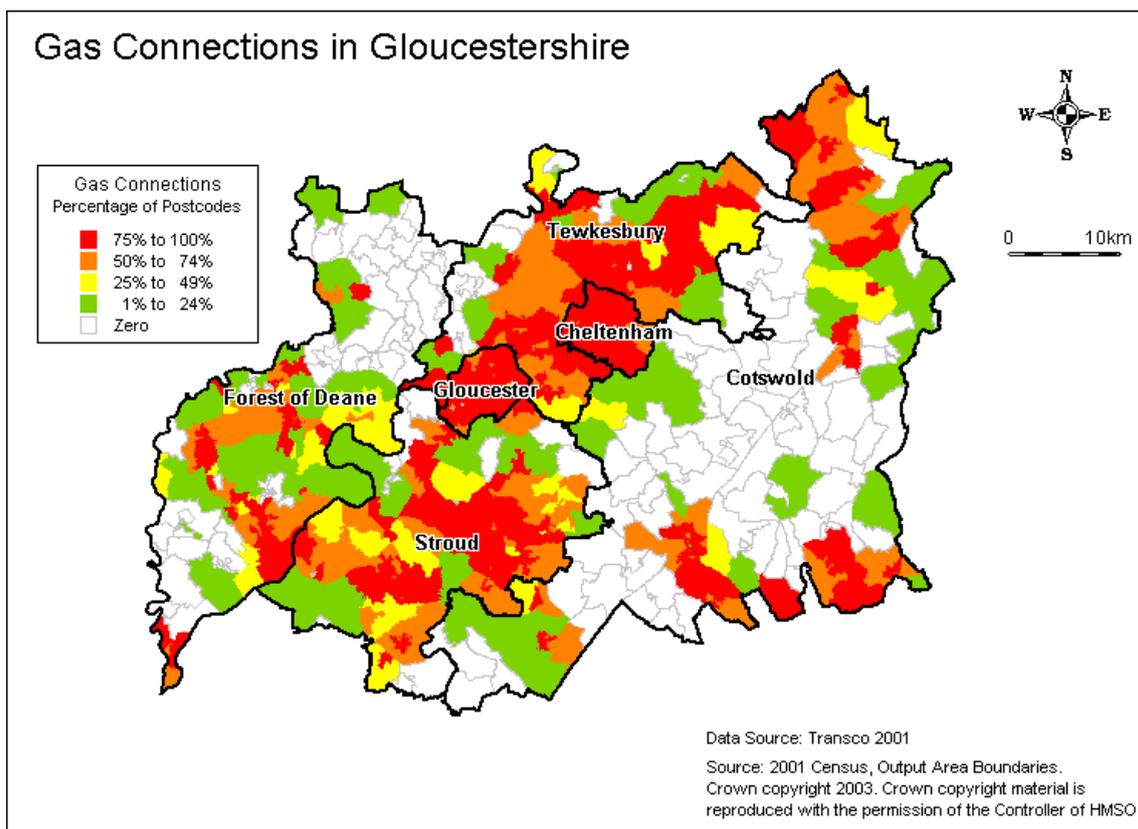


Figure 7: Proportion of gas connections to properties in Gloucestershire. (Centre for Sustainable Energy, 2017)

Many of the properties in these rural areas are also solid wall construction as shown in figure 8. It is important to note that there is a wide range of housing stock in

Gloucestershire, ranging from multi-apartment blocks (*figure 9a*) to Victorian terraced properties (*figure 9b*), more energy efficient new build properties (*figure 9c*) and the more rural semi-detached or detached solid wall housing (*figure 9d*).

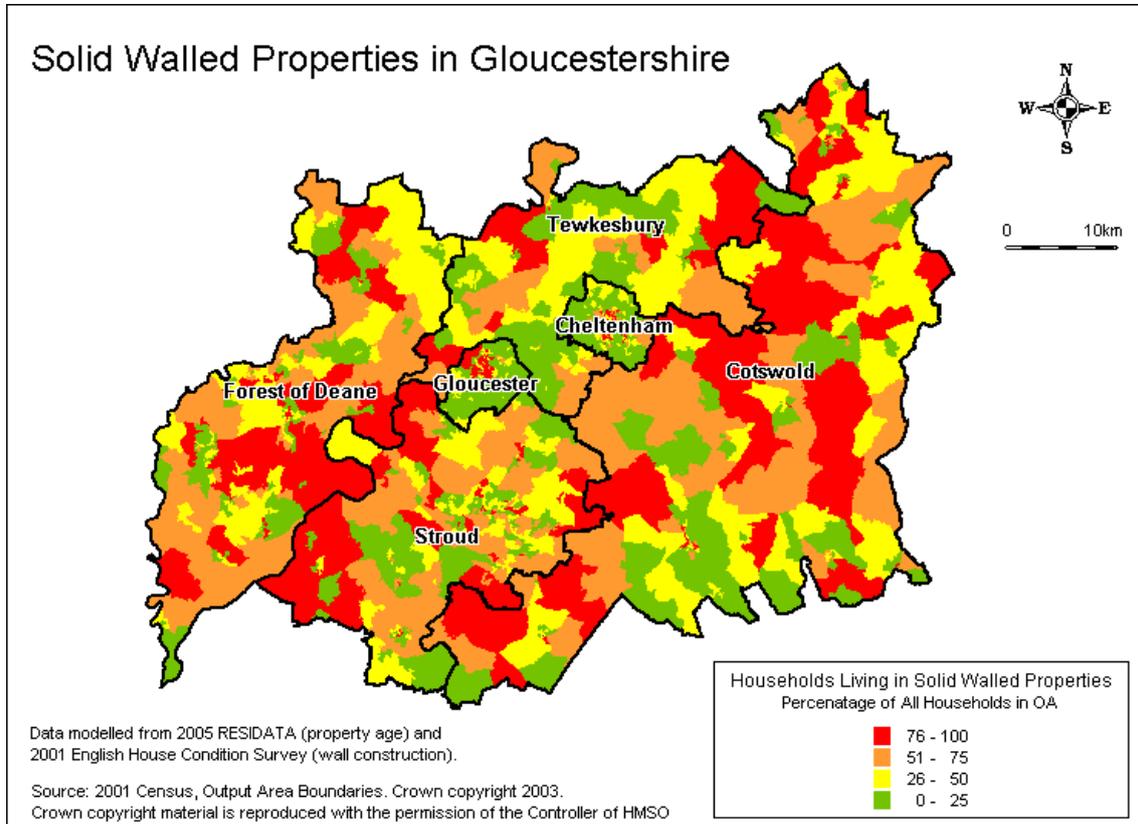


Figure 8: Proportion of solid wall properties in Gloucestershire. (Centre for Sustainable Energy, 2017)





Figure 9: (a) Multi-apartment building, Hester's Way, Cheltenham, (b) terraced housing in Gloucester, (c) new build in Quedgeley, Gloucester, (d) Solid wall in Cotswold district

An increasing population and changes to living arrangements mean that there needs to be a significant increase in national housing availability at a rate of 232,000 to 300,000 new units per year (www.parliament.uk, 2015). Demand is outstripping supply by two to three times (www.parliament.uk, 2015) hence ensuring current housing stock is suitable and affordable is particularly important.

Within Gloucestershire, the overall number of households is projected to “rise by around 48,500 between 2006 and 2026, from 250,400 to 298,900. This is an average increase of 2,425 households per annum. The numbers of single person households and couples without children are expected to rise by 49% and 16% respectively. This correlates strongly with projected growth in the number of households belonging to the 60-74 year old age band (a 38% increase) and those aged 75 or more (a 56% increase).” (Peter Smith Research & Consulting, 2009)

Relevant stakeholders in Gloucestershire are taking the demand for such a substantial increase in homes seriously and recently held an event called ‘50,000 New Home Challenge’. The event was led by social housing providers which is encouraging as there is a focus on people most in need.

1.1.4 Household tenure

69.4% of households in Gloucestershire are privately owned, either outright or with a mortgage. This means that communication systems need to be clearly and successfully established regarding retrofit opportunities in order to access this large number (over 175,000) of households. Only 12.9% of properties are socially rented and these are overseen by Registered Social Landlords (RSLs) who work well across a network. Private rented households are more difficult to access but with the government setting targets to improve all housing stock to a Category E by 2020 and Category D by 2025

(Committee on Fuel Poverty, 2016), private landlords will come under increasing pressure to implement energy efficiency measures.

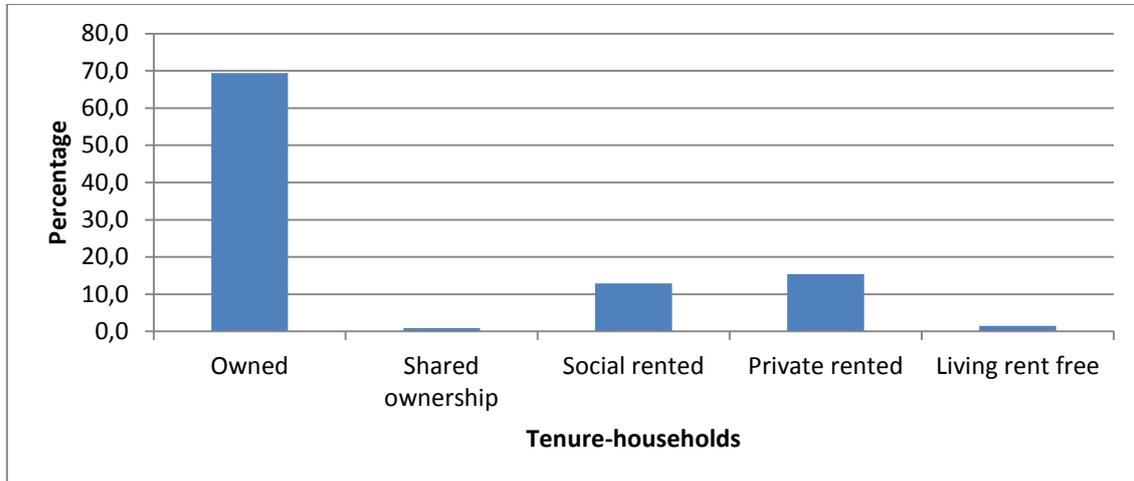


Figure 10: Housing tenure in Gloucestershire (Office of National Statistics, 2011)

1.1.5 Demographic structure and change¹

The population of Gloucestershire was estimated to be around 617,200 in 2015, representing a rise of approximately 5,800 people since 2014. This is equivalent to a growth of 1.0% in population from 2014 to 2015, which is higher than the England & Wales growth of 0.8%.

The district of Gloucester has the largest population in the county, followed by Cheltenham and Stroud districts. From 2014 to 2015, Tewkesbury and Stroud had the fastest rates of growth in the county (1.3%), followed by Gloucester (1.2%). Cheltenham had the slowest rate of growth (0.2%) during this period.

The working age population (aged 20-64) made up 56.9% of the population in Gloucestershire in 2015. This was slightly higher than the figure for the South West, but lower than that for England and Wales. The proportion of people aged 65 or over (20.6%) was slightly lower than that for the South West but higher than that for England and Wales. The proportion of children and young people aged 0-19 (22.2%) was slightly higher than that for the South West but lower than that for England and Wales.

¹ All information in this section is taken directly from the Inform Gloucestershire website Current Population (Gloucestershire County Council, 2017) and Projected Population (Gloucestershire County Council, 2017)

	Population 2015	Population 2014	Change 2014 to 2015	% Change 2014 to 2015
Gloucestershire	617,162	611,332	5,830	1.0%
Cheltenham	116,781	116,495	286	0.2%
Cotswold	85,162	84,637	525	0.6%
Forest of Dean	84,544	83,674	870	1.0%
Gloucester	127,158	125,649	1,509	1.2%
Stroud	116,627	115,093	1,534	1.3%
Tewkesbury	86,890	85,784	1,106	1.3%
South West	5,471,180	5,423,303	47,877	0.9%
England and Wales	57,885,413	53,575,343	4,310,057	0.8%

Figure 11: Gloucestershire and districts mid-year population estimates, 2015 (Gloucestershire County Council, 2017)

Population growth in Gloucestershire was fastest in the 65+ age group, which increased by 2.5%; this was faster than the rates for the South West and England and Wales (2.0% and 1.8% respectively). The rates of growth in the children and young people (0-19) and working age (20-64) populations were comparable with those for the South West and England and Wales.

	% change in population 2014-2015		
	Gloucestershire %	South West %	England and Wales %
0-19	0.7	0.7	0.7
20-64	0.5	0.5	0.6
65 or over	2.5	2.0	1.8

Figure 12: Population change by age 2014-2015 (Gloucestershire County Council, 2017)

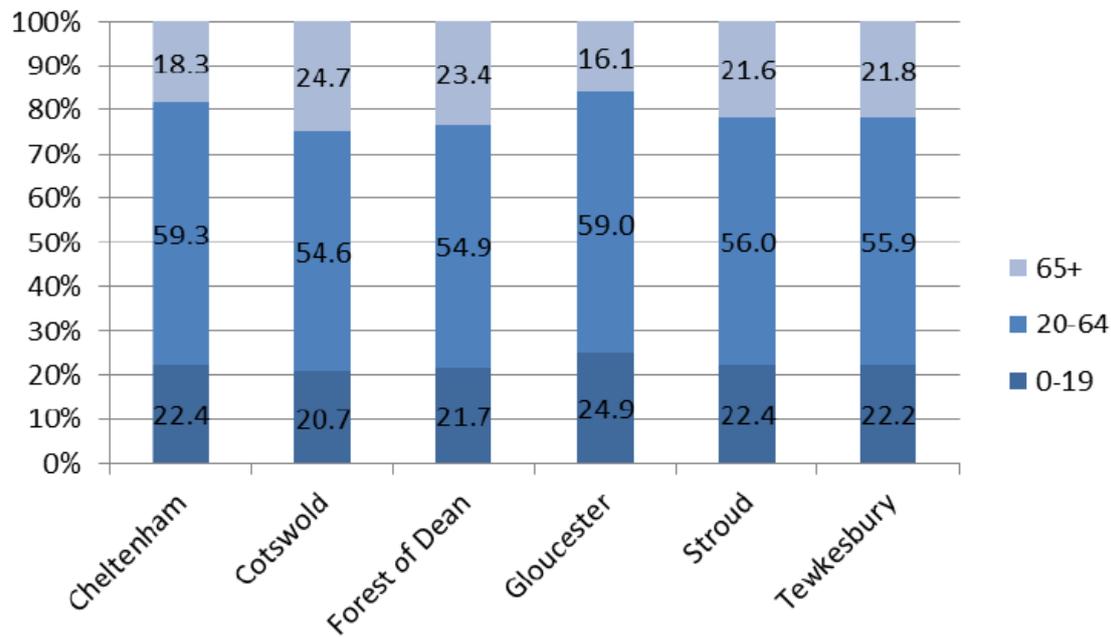


Figure 13: Age structure in Gloucestershire Districts 2015 (Gloucestershire County Council, 2017)

Figure 13 shows the age structure of the population in the six Gloucestershire Districts in 2015:

- Gloucester had the highest proportion of 0-19 year olds (24.9%) and Cotswold the lowest proportion (20.7%).
- Cheltenham and Gloucester had the highest proportion of 20-64 year olds (59.3% and 59.0% respectively) and Cotswold and Forest of Dean the lowest (54.6% and 54.9% respectively).
- Cotswold has the highest proportion of people aged 65 or over (24.7%) and Cheltenham and Gloucester the lowest (18.3% and 16.1% respectively).

Assuming current population trends continue, ONS projections suggest that the population in Gloucestershire will rise by 46,300 between 2014 and 2024, rising from 611,300 to 657,600. This increase of 7.6% of the 2014 population is equivalent to an average annual increase of 0.8% per annum. Between 2024 and 2039, the population is projected to rise to 714,000, an increase of 8.6% of the 2024 population. Over the full 25 year period of the ONS projections, the Gloucestershire population is projected to increase by 16.8%, with an annual average growth rate of 0.7%. These projections are slightly higher than those for England and Wales. The same projections suggest that 8.1% of the growth during the 25 year period will be accounted for by natural growth (births minus deaths) and 72.4% by internal migration (the net number of people moving into the county from within the UK). International migration is projected to contribute to the remaining 19.5% of growth.

Within the county, Tewkesbury and Gloucester are projected to have the largest percentage increases in population over the next 25 years (24.5% and 19.9% respectively) whilst the Forest of Dean is projected to have the smallest increase (10.9%).

	Number of people ²			Projected population growth (%)	
	2014	2024	2039	2014 to 2024	2024 to 2039
Gloucestershire	611,300	657,600	714,000	7.6	8.6
Cheltenham	116,500	123,800	133,800	6.3	8.1
Cotswold	84,600	89,800	96,400	6.1	7.3
Forest of Dean	83,700	87,600	92,800	4.7	5.9
Gloucester	125,600	137,200	150,600	9.2	9.8
Stroud	115,100	123,200	133,600	7.0	8.4
Tewkesbury	85,800	96,000	106,800	11.9	11.3
England & Wales				7.3	8.1

Figure 14: Projected population change in Gloucestershire by district 2014 to 2039 (Gloucestershire County Council, 2017)

The dominating feature of the projections is the sharp increase in population in the age group 65 or over, which is projected to increase from 123,800 in 2014 to 206,300 in 2039 (an increase of 66.6%). This increase is sharper than the national trend for England and Wales and means that by 2039 the proportion of people in Gloucestershire who are aged 65 or over will have risen from 20.3% of the population to 28.9%. The population of children and young people (those aged 0-19) is projected to rise by 11.0% over the twenty-five year period which is in line with the trend for England and Wales. By comparison, the working age population (those aged 20-64) is projected to rise by only 1.4% over the same period. This increase is lower than the national trend for this group and means that by 2039 the working population in Gloucestershire will have fallen from 57.1% of the population to 49.6% of the population.

Whilst *figure 14* shows the projected percentage population change for each Gloucestershire district for the period 2014 to 2039 whilst *figure 15* shows the projected population change by number of people for each district for the same period.

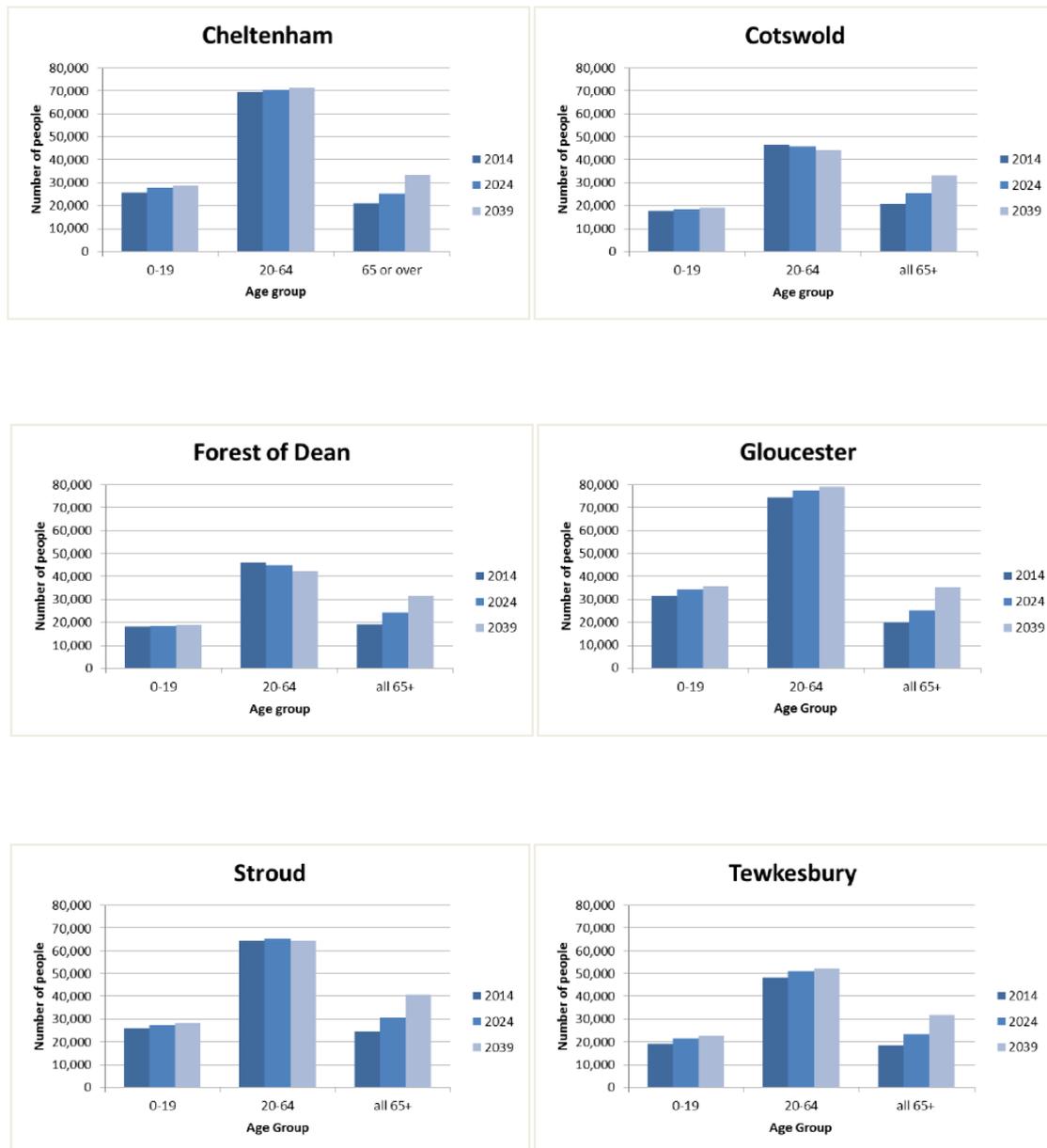


Figure 15: Projected population change by age group in each district 2014 to 2039 (Gloucestershire County Council, 2017)

- In all three age groups, the projected percentage increases in overall population are greatest in Tewkesbury and Gloucester.
- Amongst the 0-19 age group, the projected percentage increase is greatest for Tewkesbury (20.0%) and smallest for the Forest of Dean (3.8%).
- In the rural districts of Cotswold and the Forest of Dean, the working age group (those aged 20-64) is predicted to shrink by 4.7% and 8.2% respectively, whilst in Stroud little growth is predicted (only 0.2%). By comparison, this age group is predicted to grow in Gloucester and Tewkesbury by 6.7% and 8.3% respectively.

- Considerable growth in the older people age group is predicted in all districts. The increase is sharpest in Gloucester (78.0%) and smallest in Cheltenham (60.6%).

1.1.6 Carbon emissions²

Carbon emissions per capita in Gloucestershire in 2014 were 6.5 tonnes which is 0.5 tonnes per capita higher than the England average. Tewkesbury and Cotswold have the highest per capita emissions at 8.9 and 8.8 tonnes respectively whilst the more urban centres have lower emissions with 4.2 tonnes per capita in Gloucester.

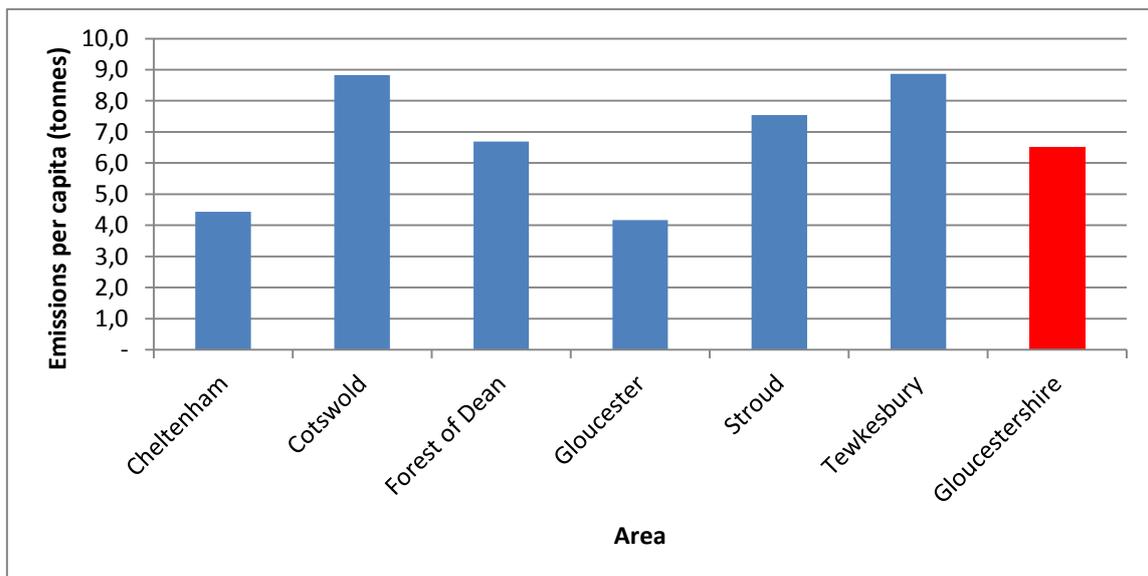


Figure 16: Carbon emissions per capita in Gloucestershire and its districts (Gov.uk, 2016)

Gloucestershire, as a whole, reduced carbon emissions by 13% per capita over the five year period between 2009 and 2014. The greatest reductions were in Gloucester, reducing their emissions by 21%. Although all districts reduced emissions, the more rural districts made fewer reductions, particularly in Cotswold where reductions were less than 10%.

² Data for this section is derived from the UK local authority and regional carbon dioxide emissions national statistics: 2005-2014 (Gov.uk, 2016)

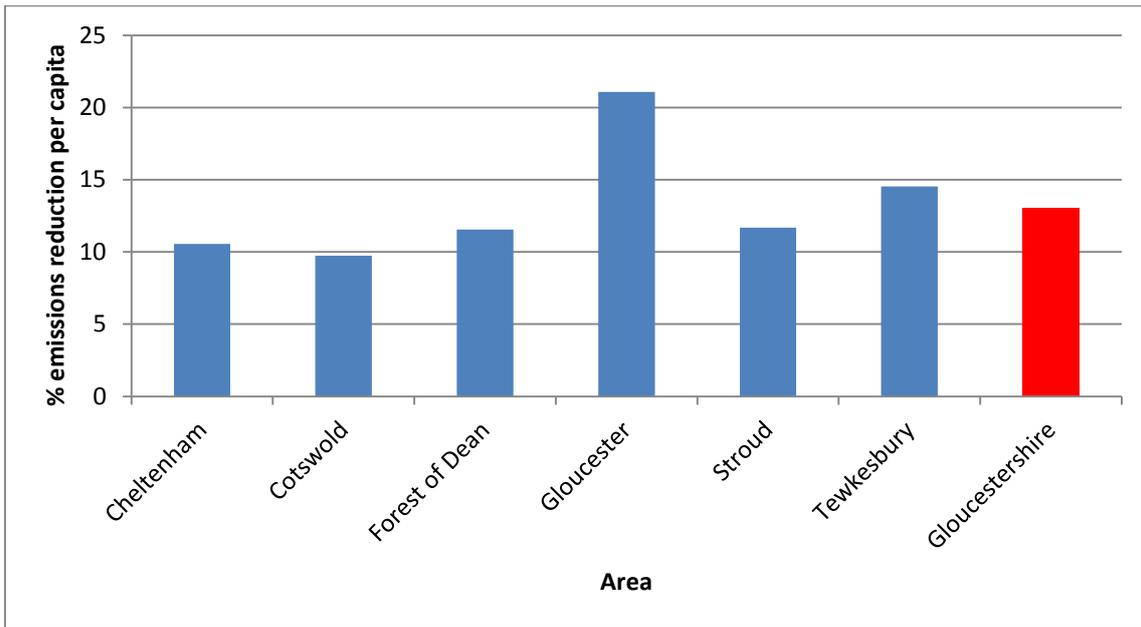


Figure 17: Percentage reduction in carbon emissions per capita in Gloucestershire and its districts between 2009-2014 (Gov.uk, 2016)

Figure 18 shows that transport is the greatest contributor to emissions within Gloucestershire with 37% of emissions in 2014 whilst the domestic sector usually has the lowest emissions at a total of 27%. Urban areas have proportionally fewer emissions from transport compared more rural areas.

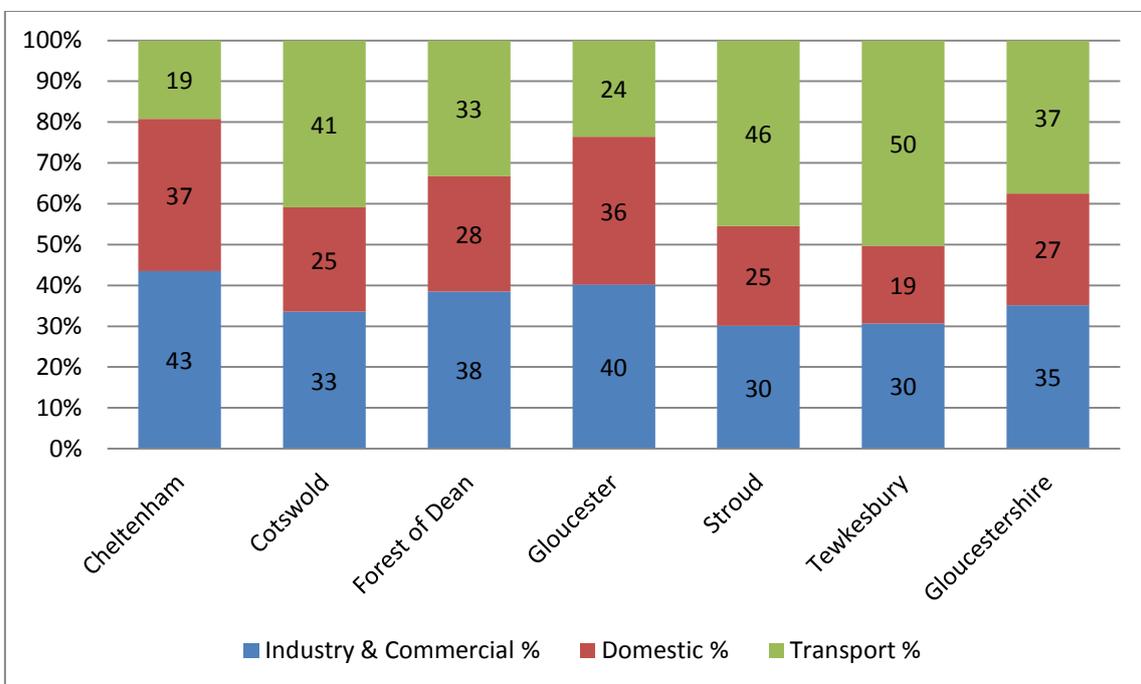


Figure 18: Proportion of carbon of emissions by sector and area 2014 (Gov.uk, 2016)

The greatest proportion of reductions in emissions between 2009 and 2014 occurred in the domestic sector in all areas of the country apart from Gloucester where a 22.7% reduction in emissions from the industrial & commercial sector have taken place. Gloucester has also made significantly greater reductions as a whole than other districts.

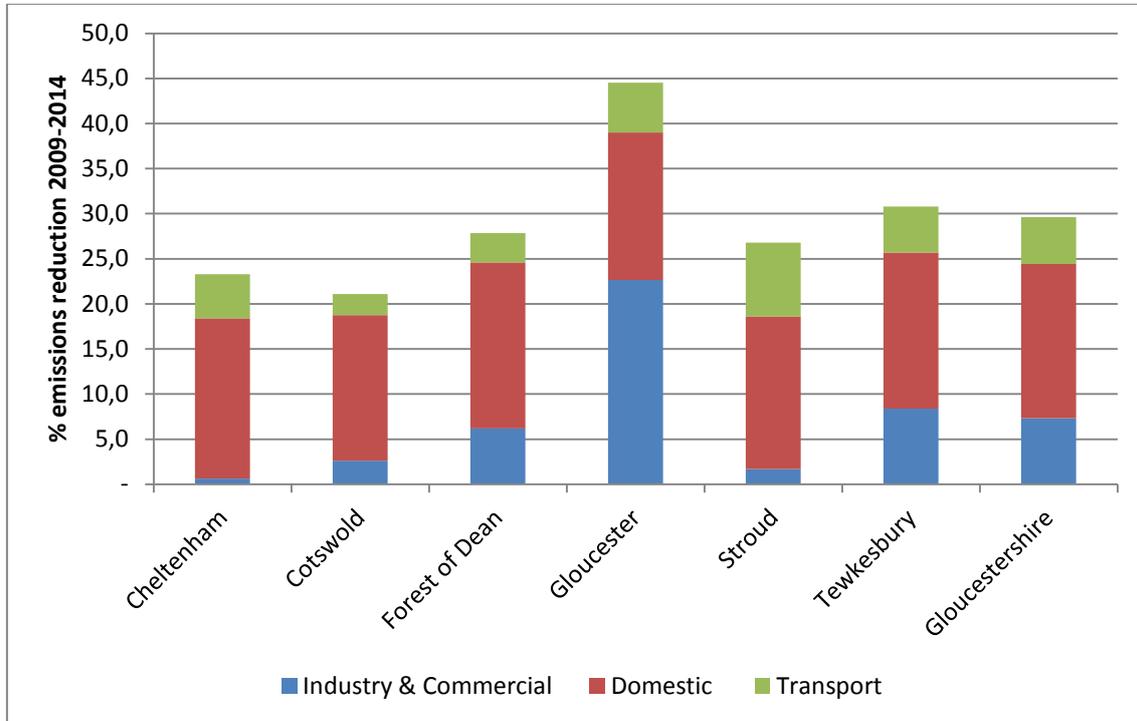


Figure 19: Percentage reduction in carbon emissions by sector in Gloucestershire and its districts between 2009-2014 (Gov.uk, 2016)

1.2 State of Play

1.2.1 UK EU Referendum

The result of the UK EU Referendum led to a delay in the ability for activity around Build to Low Carbon during the summer and early autumn of 2016. It is likely that Article 50 will be invoked in the spring of 2017, and at the current time announcements have been made that business should continue 'as normal' whilst the framework for the UK's exit from Europe is established and then negotiated. As such it only become possible to start engaging the necessary groups for involvement in the relevant committees from October 2016 and organisations have been reluctant to commit given to current uncertainty. Severn Wye Energy Agency appointed a Senior Project Manager who began in January 2017 and the project is now working to catch up.

The position taken is one that expects continued UK involvement in programmes that progress the UK's commitment to tackling Climate Change, and as such there is no consideration that the UK's involvement in Build to Low Carbon, or other EU programmes will be compromised in the short to medium term. Once Article 50 is invoked, the project can incorporate any plans made by the UK government into the action plan and use this to help inform regional policy and action. It could be suggested that the timing of these great changes will stimulate stakeholders to take local action.

1.2.2 Devolution to local government

Since 1999, the way the United Kingdom is run has been transformed by devolution - a process designed to decentralise government and give more powers to different areas of the UK. This initially happened in the national areas of Wales, Northern Ireland and Scotland where these nations can take ownership of agreed elements such as, housing, health, education and environment. Powers over aspects such as energy, foreign policy and defence are still centralised in London, England. (BBC News, 2010)

Since the 'no' vote to Scottish Independence in September 2014, and a number of consultations and pieces of research, the government decided to offer greater devolution on a more local scale. This initially began with some of the larger cities, including Greater Manchester, where greater control of housing, education and transport featured highly in agreements. By November 2016, devolution deals were agreed in 11 areas; some of these are local authorities which have pooled together. The West of England is the most local area with an agreement covering the local authorities of Bristol, South Gloucestershire, Bath & North East Somerset, North Somerset and the West of England Local Economic Partnership (LEP). This agreement was made in March 2016 and broadly focuses on transport; training and enterprise; and the use of EU structural funds. Gloucestershire applied for a devolution agreement however it is foundering due to opposition for a locally elected mayor.

There are mixed views about devolution in local regions. There are opportunities for local decision-making and to prioritise the needs of the local citizens and environment using those who have an in depth knowledge of the region. There is greater local accountability which means that there is a drive towards greater efficiency and performance. However, others argue that local devolution has been specifically targeted on the areas which have experienced the most severe funding cuts and that the government is ill-equipped to be able to implement the strategies they would like, or need, to. This process has also put a greater focus on local enterprise, again a positive action; although it could be argued that the emphasis on investment in enterprise will have long term benefits but there are immediate social challenges that need investment in the short term. (Sandford, 2016)

In terms of the Build2LC project, ESIF funding for the growth of enterprise has come to the Gloucestershire LEP however much of this funding was allocated in 2014. Close working with the LEP as members of the Steering Group will enable a holistic understanding and links to be made between the key local bodies. It is likely that greater devolution will come to Gloucestershire once there has been agreement about the role of a mayor. The Build2LC project could then be instrumental in supporting a collaborative and sustainable plan, and model, for other interested parties. However, energy policy and strategy is still heavily led from central government. This means that some decisions within the Build2LC project will not be ‘owned’ by local stakeholders and they will need to fit the action plan around government initiatives. It will be important to consider links with national agencies and, where possible, central government within any plans made.

1.2.3 UK housing market

Average house prices in the UK increased by 6.7% in the year to November 2016 (Office of National Statistics, 2017). This was slightly higher than the rate of growth in Gloucestershire as a whole which was 6.03%. However, the rate of growth in Gloucester and Tewkesbury districts far exceeded the UK average at 9.12% and 8.04% respectively. The rural districts experienced a far slower rate of growth with 2.74% annual increase in Cotswold and 3.56% in the Forest of Dean (Land Registry, 2017). *Figure 20* shows the relative change in UK house prices between 2006 and 2016 and demonstrates the general rise in recent years.

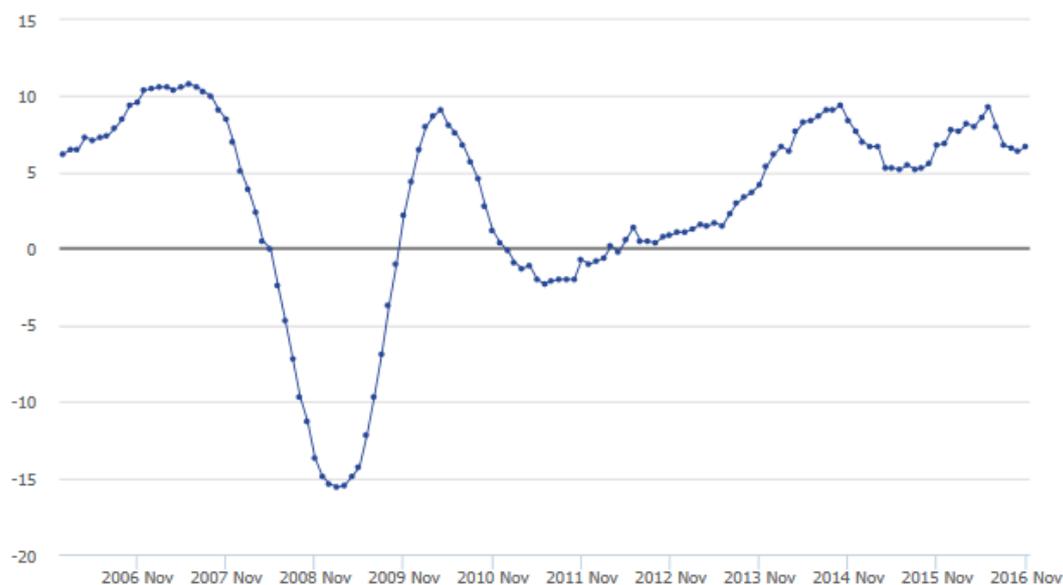


Figure 20: Annual house price rates of change, UK all dwellings from January 2006 to November 2016 (12 month percentage change) (Office of National Statistics, 2017)

The average UK house price was £218,000 in November 2016; a £14,000 increase on the previous year (Office of National Statistics, 2017). *Figure 22* shows the house prices in Gloucestershire and its districts. The average house price in Gloucestershire is £242,805, higher than the national average; four of the six districts have average house prices above the national average with Cotswold prices significantly higher at £357,424. This is well over £100,000 more expensive which is interesting given that there are a high proportion of households in fuel poverty in the Cotswold district. Both Gloucester and Cheltenham, the most urban areas, have house prices below national average. The lowest average is Gloucester at £184,328. (Land Registry, 2017)



Figure 21: Average UK house price, January 2005 to November 2016 (Office of National Statistics, 2017)

House prices have not been affected as much as first thought by the UK EU referendum; however this may change when Article 50 is invoked. The main challenge has been the slowing of the market do to owners being reluctant to put houses on the market since spring 2016.

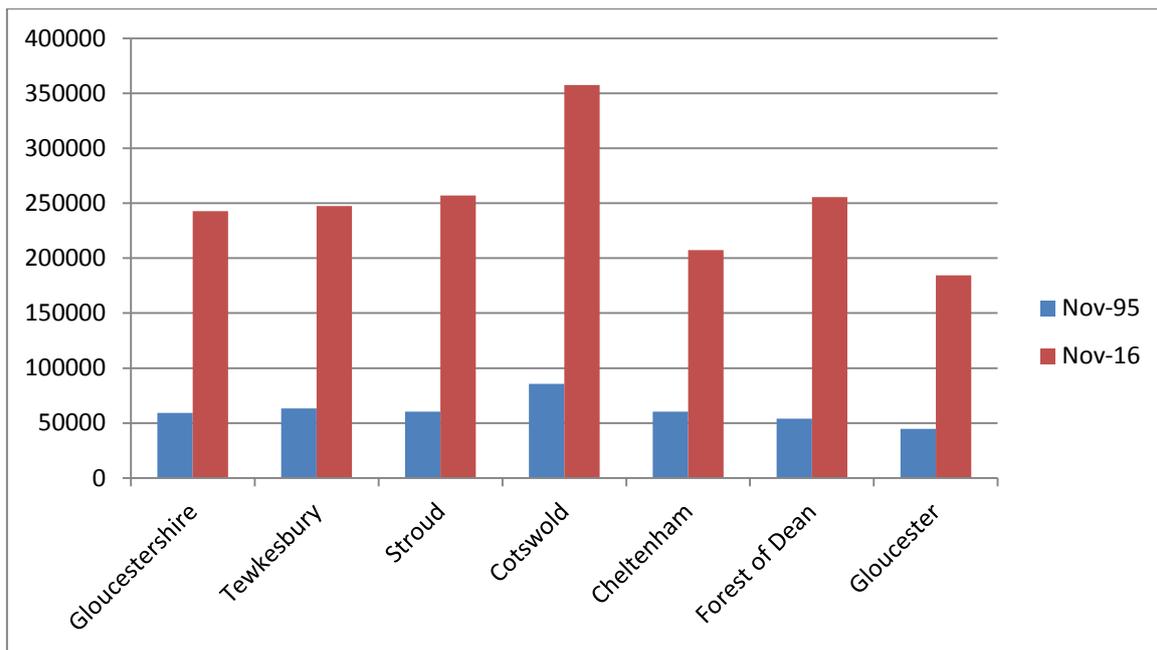


Figure 22: Average house price (£) in Gloucestershire and its districts (Land Registry, 2017)

The section below is taken directly from the English Housing Survey Headline Report 2014-15 (Department of Communities & Local Government, 2016) and shows the main findings:

- **After a period of recent decline, the fall in owner occupation appears to have abated.** Of the estimated 22.5 million households in England in 2014-15, 14.3 million or 64% were owner occupiers. The proportion of all households in owner occupation increased steadily from the 1980s to 2003 when it reached a peak of 71%.
- **Among owner occupiers, the proportion of households who owned outright remained larger than the proportion buying with a mortgage, although not in London.** In 2014-15, there were more outright owners (33%) than ‘mortgagors’ (30%), a continuation of the trend first identified in 2013-14.
- **The private rented sector remained larger than the social rented sector.** In 2014-15, 19% (4.3 million) of households were renting privately, while 17% (3.9 million) of households lived in the social rented sector. There was no change in the size of either sector between 2013-14 and 2014-15.
- **There has been an increase in the number of families with dependent children in the private rented sector.** Over the last 10 years, the proportion of households in the private rented sector with dependent children increased from 30% in 2004-05 to 37% in 2014-15.

- **Over the last decade the average age of first time buyers increased;** the average age of first time buyers in 2014-2015 was 33, up from 31 in 2004-05.
- **Younger people (aged 25-34) are more likely to rent privately than to be buying with a mortgage.** Over the last 10 years there has been a significant increase in the proportion of younger households in the private rented sector. In 2004-05, 24% of those aged 25-34 lived in the private rented sector. By 2014-15 this had increased to 46%. Over the same period, the proportion of 25-34 year olds buying with a mortgage decreased from 54% to 34%. In other words, younger households aged 25-34 are more likely to be renting privately than buying their own home, a continuation of a trend first identified in 2012-13. Over the same 10 year period, rates of younger households in the social rented sector remained stable.
- **The proportion of social renters who expect to buy their current home has increased.** The overall proportion of social tenants who expected to buy their current home increased from 35% in 2010-11 to 42% in 2014-15. This may, in part be explained by the reinvigoration of the Right to Buy scheme which allows local authority tenants to buy their home at a discount. As the Right to Buy scheme is extended to include housing association tenants we may expect to see a further increase in the overall proportion of social tenants who expect to buy their current home in future waves of the English Housing Survey.
- **While social rents increased between 2013-14 and 2014-15, private rents remained stable. Although this was not the case in London.** In 2014-15, the average (mean) rent (excluding services but including Housing Benefit) for households in the social sector was £99 compared with £179 per week in the private rented sector. For social renters, average rents increased between 2013-14 and 2014- 15, from £94 to £99. Average private rents were unchanged.
- **Rates of overcrowding remained low but under-occupation increased, driven by an increase in the proportion of under-occupied homes in the owner occupied sector.** The overall number and proportion of under-occupied households in England increased between 1995-96 and 2014-15 from 31% (6.2 million households) to 36% (8.2 million households). The overall rate of overcrowding in England in 2014-15 was 3%, unchanged from 2013-14, with 675,000 households living in overcrowded conditions.
- **The energy efficiency of the English housing stock continued to improve.** In 2014, the average SAP rating of English dwellings was 61 points, up from 45 points in 1996. The improvement was evident in all tenures.
- **The number of non-decent homes in England continued to decline.** In 2014, a fifth of dwellings (20% or 4.6 million homes) failed to meet the Decent Homes standard,

a reduction of 3.1 million homes since 2006, when 35% of homes failed to meet the standard. The private rented sector had the highest proportion of non-decent homes (29%) while the social rented sector had the lowest (14%). Among owner occupied homes, 19% failed to meet the Decent Homes standard in 2014.

1.2.4 Fuel poverty

The definition of Fuel Poverty has recently changed in England, although the old definition has been retained in devolved administrations. The traditional definition was *'A household which needs to spend more than 10% of its income in all fuel use in order to heat its home to an adequate standard of warmth'* (DECC 2006). The new Low Income, High Cost definition is *'A household that has required fuel costs that are above average (the national median level). Were they to spend that amount, they would be left with a residual income below the official poverty line'* (DECC 2015). (Severn Wye Energy Agency, 2016)

The South-West region has the highest proportion of fuel poor homes in England with 30,860 homes reported as fuel poor in 2014. Although Gloucestershire as a whole is not identified as one of the worst affected counties in England, over 10% of all homes are fuel poor (Department of Energy & Climate Change, 2016). Furthermore, the ratio of winter deaths to average non-winter deaths between 2008-2011 was 20.7, over 5% higher than the South-West as a whole (Office of National Statistics, 2012).

Within Gloucestershire, there is clear inequality between districts (*figure 23*). This is due to a range of factors, including the proportion of elderly residents, high proportions of off-gas homes, solid wall construction and the cost of living. Both Cotswold and Forest of Dean are rural districts where over a third of homes are considered 'hard to treat' (South Gloucestershire Council, 2013). This is characteristic of their rural nature and has led to both districts having the highest proportion of fuel poor homes in the county. The majority of properties are ageing (pre 1930) and those inhabitants are spending increasingly more money to fuel them. Many cannot afford the significant cost of retrofitting their properties to good standards. Those living in low carbon properties are typically those that can afford the cost of retrofit; however those unable to afford these costs are those that form the majority and are those most in need of assistance.

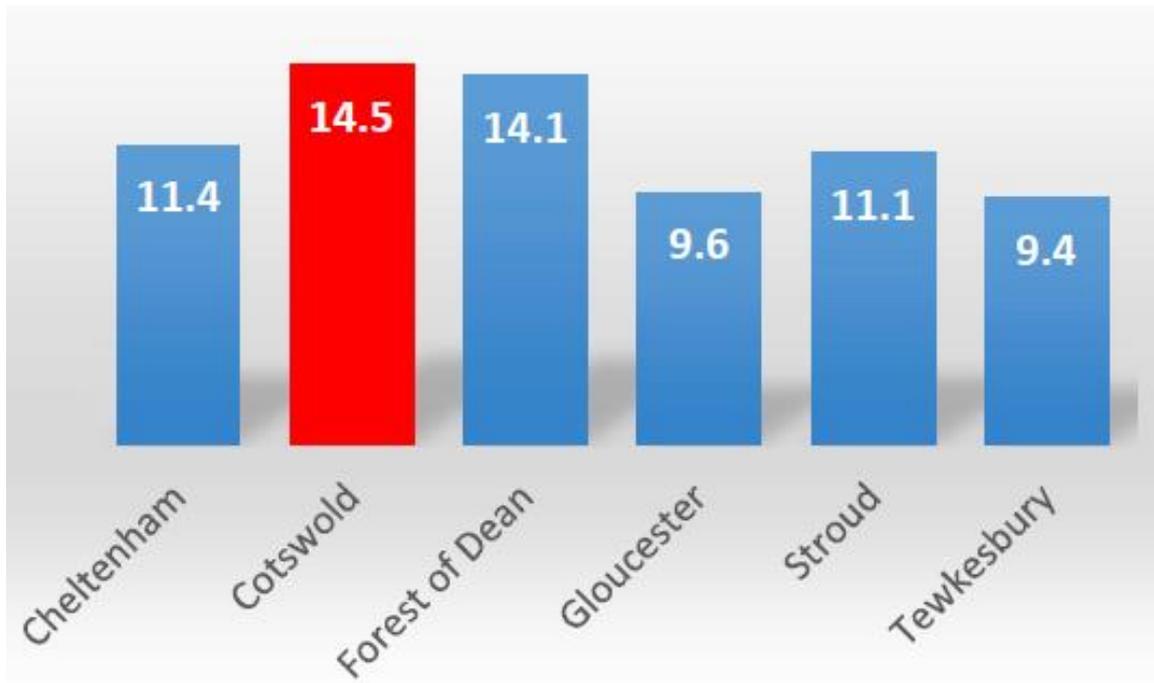


Figure 23: Proportion of fuel poor homes in Gloucestershire districts, 2014. (Department of Energy & Climate Change, 2016)

In recent years there has been a significant rise in the proportion of homes in all Gloucestershire districts and the South-West region (Severn Wye Energy Agency, 2016).

Year	Estimated number of Households	Estimated number of households in fuel poverty	Percentage
2011	359,849	31,133	8.7
2012	262,619	23,481	8.9
2013	267,971	28,680	10.7
2014	267,896	30,860	11.5

Figure 24: Increasing fuel poverty in the South West region (Department of Business, Energy & Industrial Strategy, 2016)

Although Cheltenham has a relatively low percentage of fuel poor homes, the proportion is almost 2% higher than Gloucester, a comparative urban area, and has the

largest number of fuel poor homes in the county (*figure 25*) making it a potential target for the initial phases of the project.



Figure 25: Number of fuel poor homes in Gloucestershire districts, 2014. (Department of Energy & Climate Change, 2016)

The work done to date demonstrates that the health sector, local authorities and the environment sector are all keen to improve building quality and availability whilst also securing the health of their populations. This is a challenge in a climate of financial restraints, aging and growing populations, and increasing impacts on the environment. A number of multiagency strategies have been developed, such as the Affordable Warmth Strategy (South Gloucestershire Council, 2013). The next step is to co-ordinate an efficient regional approach which should result in a positive and sustainable impact to reduce fuel poverty and improve the quality of housing stock.

Household composition plays a part in being able to target services and reach the right people. DECC analysis subdivides fuel poor households into several groups; couples with no dependent children (under 60), couples with no dependent children (60 and over), couples with dependent children, lone parents with dependent children, other multi person households, one person under 60, one person aged 60 and over.

A number of the household composition groups saw a decrease in the proportion of households that are in fuel poverty between 2003 and 2013, for example between 2003 and 2013 single person households with occupants aged over 60, and couples with no dependent children saw a particularly large reduction in fuel poverty. However, couples with dependent children saw the largest increase in the proportion of fuel poor, from 11 to over 15%. However, the highest proportion of fuel poverty is among lone parents with dependent children, on average more than a quarter of households in this group are fuel poor, since 2003. (Severn Wye Energy Agency, 2016)

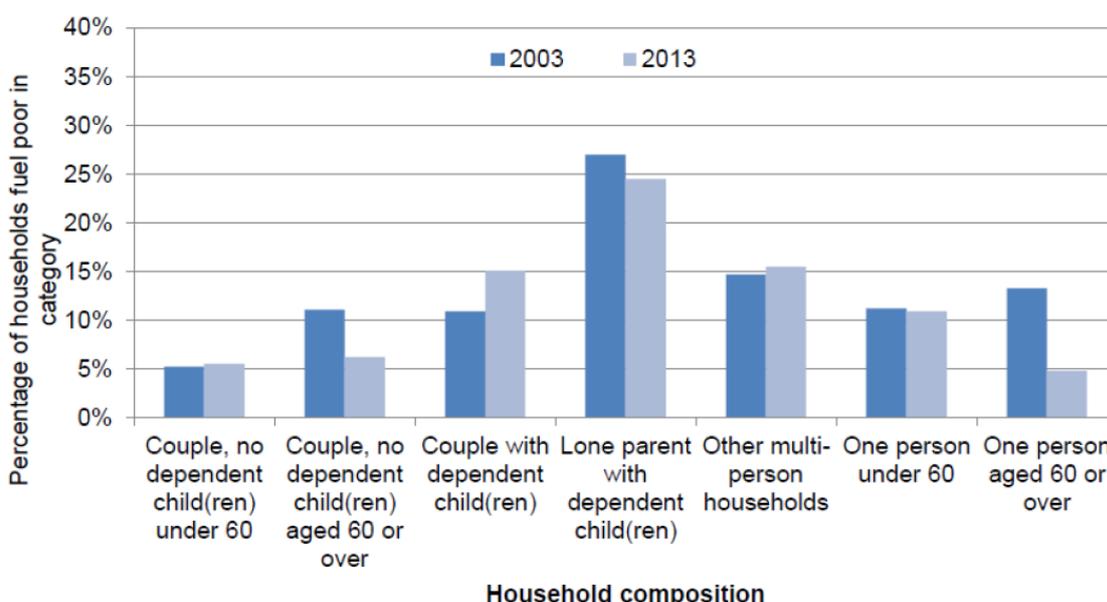


Figure 24: Percentage of households of different composition, 2003-2013 (Department of Energy & Climate Change, 2016)

Although the lone parent with dependent children group represents the highest proportion of fuel poor households, the fuel poverty gap is not as significant as it is in older households. Older households experiencing fuel poverty feel it most acutely. For example, households where the oldest occupant is aged less than 34 have a mean fuel poverty gap of £260 compared to those aged over 60 who have a gap of around £450. This may be attributed to the fact that lone parents with dependent children often live in smaller dwellings, which may be in the social sector and therefore are more efficient. Additionally older households are more likely to have a longer heating requirement being at home more during the week. (Severn Wye Energy Agency, 2016)

A Committee on Fuel Poverty was formed as an advisory Non-Departmental Public Body sponsored by the Department of Business, Energy and Industrial Strategy. The role of the committee is to advise the government on policies aimed at reducing fuel

poverty in England. The committee produced a report summarising their initial positions on September 2016 and the six priority outcomes from the report are shown in *figure 25*.

1. The strategy will be sufficiently funded and existing Government and supplier programme spend will be significantly better focussed on helping households in fuel poverty.
2. There will be additional finance in place from other sources to help fund household energy saving measures to meet the fuel poverty milestones and target.
3. Health agencies, local authorities and practitioners will recognise the impacts of cold homes and will be engaged in delivering solutions.
4. Regulatory changes will have demonstrably positive outcomes for households in fuel poverty.
5. The energy market will function for households in fuel poverty.
6. Households in fuel poverty will be well-informed and advised.

Figure 25: Committee on Fuel Poverty's six priority outcomes (Committee on Fuel Poverty, 2016)

The government released a fuel poverty strategy 'Cutting the Cost of Keeping Warm' in 2015. The focus of the strategy is on improving the energy efficiency ratings of households in fuel poverty primarily by reducing heating costs. The target is to ensure that as many fuel poor homes as is reasonably practicable achieve a minimum energy efficiency rating of Band C, by 2030. To track progress, two interim milestones have also been set:

- *as many fuel poor homes as is reasonably practicable to Band E by 2020*
- *as many fuel poor homes as is reasonably practicable to Band D by 2025*

(Taken from Committee on Fuel Poverty, 2016)

Despite these government targets, local authorities are no longer (since around 2013) obliged to provide statutory support for those in fuel poverty, and struggled to agree financial support to maintain a Gloucestershire Advice Centre beyond 2016. Whilst many certainly want to do more, they just do not have the financial means to do so.

In line with the increasing levels of people considered to be in fuel poverty is a consistent trend of reducing support from the public sector for areas around sustainable energy, and with the exception of European or wider policies, the level of available resource across the UK is not presently sufficient for the action required to improve the situation.

Currently the opportunities to support the domestic sector are limited to two main areas. Firstly the Energy Company Obligation (ECO) that is a government energy efficiency scheme across the UK to help reduce carbon emissions and reduce fuel poverty (see *Section 1.4*) and then less direct associations with the health sector (links to health issues resulting from substandard dwellings).

The European Structural Investment Strategy (ESIF) presents an indirect rather than direct, opportunity for both the provision of support to those in need. This is because it will consider the wider economic benefits for the region (looking at skills, capacity, and support needed for those providing low carbon services). The opportunity this presents will work in the short term but must be supported by strategic consideration for the long term in order to capitalise on this short term opportunity. It is the consequences of action for the target areas of the ESIF strategy that offers hope for a longer term commitment to support those without the means to support themselves.

Since 2001 Gloucestershire has benefited from a county wide energy efficiency advice centre that has been freely available for the domestic sector and provided impartial independent advice and support. It has also sought to secure capital funding to the county in order that more people in fuel poverty can benefit from grant aid in order to improve the condition of their properties. Over the past 15 years the advice centre (managed and delivered by Severn Wye) has engaged with more than 80,000 residents, and provided in excess of £35 million of home energy improvements across more than 40,000 properties. However, with reducing levels of financial support, the numbers of people contacting the advice team is reducing.

1.2.5 Sustainable construction

Links with the construction sector are currently limited, and whilst Building Control departments within local authorities regulate building standards, the level of competition across the construction sector is such that ambitions to increase building standards significantly beyond present Building Regulations are thwarted by the financial cost of implementation. The level of skills that directly relate to sustainable building practices across the construction sector is not currently known, however even with an appetite to increase standards there needs to be a whole sector approach to realising this for it to become 'mainstream'. There are several organisations focused on provision of support for sustainable construction (Greenheart Sustainable Construction and Sustainable Direction to name but two), and these will be invited alongside the Gloucestershire Local Enterprise Partnerships 'Construction and Infrastructure'

technology group³ (comprising 20 public/private members) to input to the planned Building Retrofit Action Plan.

1.2.6 Innovation sustainability

From a national perspective, innovation is largely led by the Government's 'Innovate UK'⁴ programme that frequently opens competitions for funding for the development of technological innovations. Severn Wye prides itself on identification of innovative solutions to overcoming barriers in relation to fuel poverty and education around the financial, social and environmental opportunities of sustainability. There is a wide network of local groups that can be accessed to bring together innovative propositions for implementation; however these need to be linked to a financial opportunity to enable their development. It is considered at the current time that there is only limited access to such funding. We now need to consider where this funding can be increase and maximise the opportunity to engage more fully on innovative solutions.

1.2.7 Finance for sustainability

The nature of finance mechanisms within Gloucestershire is reflected largely through national programmes, and these have been mostly 'traditional' financing. There are increasing innovative finance models becoming available, but they are considered embryonic at the current time, and until there is increased confidence in their longer term viability, they may be viewed with a degree of scepticism.

There have been a number of national initiatives with regard to financing mechanisms in recent years, and each have suffered problems that has led to market distrust of their long term stability. These are: Feed in Tariff; Renewable Heat Incentive and Green Deal. The first two are linked as government initiatives to support renewable energy generation on a local level. They provide payment for the generation of electricity and heat respectively, so where people or businesses install renewable energy systems, they are paid for the amount of energy that they generate. Whilst the level of payment is guaranteed for a fixed term, the agreed rate has reduced significantly by around 75% (Feed in Tariff), and as such is now considered by many to be unattractive as a purely economic opportunity for consideration.

³ <http://www.gfirstlep.com/gfirst-LEP/About-Us/Business-Groups/>

⁴ <https://www.gov.uk/guidance/innovation-apply-for-a-funding-award>

The Green Deal was an initiative that was intended for both the domestic and commercial sectors, however was only really established within the domestic sector. Its purpose was to provide people with an opportunities report for their homes that would identify energy saving solutions, and the financial case for considering their installation. The opportunities report included details of a finance mechanism that offered a loan for people to be able to achieve appropriate installations. The rate of interest attached to this loan was in the order of 7%. At a time where it is possible to secure mortgages against properties at a far lower rate, the level of take up of Green Deal was exceptionally low. As such the scheme never became truly established. Many people who invested in becoming ‘Green Deal Advisors’ never realised a return on their investments, and as such there is a degree of mistrust in such initiatives at the current time. There is currently a review of the Green Deal initiative and this will be outlined under *section 1.4*.

With a consistent reduction in public sector finance to support energy sustainability, more innovative solutions are required to enable the provision of even the most basic support to encourage the increased take up of energy saving options. Severn Wye are investigating more innovative income diversification in order to overcome this risk, and will be working hard with the Build to Low Carbon Steering Group and Policy Board to realise such opportunities.

1.3 Link to the Research and Innovation Strategies for Smart Specialisation (RIS3)⁵

Within the UK, Smart Specialisation complements and better informs existing policies, structures and funding programmes. Smart Specialisation in England adopts therefore an approach that fits within its unique circumstances. Policies for innovation are developed at the national level in partnership with businesses and research institutions based across the country. Local Enterprise Partnerships (LEPs) meanwhile bring together business and civic leaders to set economic strategy at the local level and are empowered to take the decisions that will allow their area to prosper. LEPs were asked by government to develop their own strategy for development, largely focusing on the EU Structural and Investment Fund strategy.

Within the UK, different aspects of Smart Specialisation need to be delivered at both national and local levels. Measures to increase levels of private sector investment can be taken forward primarily at the national level through the taxation system but LEPs have an important role to play in stimulating involvement and participation from local

⁵ The majority of this section is taken directly from *Smart Specialisation in England-Submission to the European Commission* (Department of Business, Innovation & Skills, 2015)

firms. Collaborative leadership for innovation is also needed at both levels. Other elements of Smart Specialisation can only best be delivered at the local level. These include:

- *strengthening of local innovation ‘ecosystem(s)’ and building local capabilities;*
- *supporting local supply chains to invest and collaborate;*
- *catalysing and leveraging the differing opportunities of social innovation; and*
- *branding and positioning places as credible centres of smart specialisation.*

As LEPs are in the driving seat for growth at the local level. Each LEP was asked to work with partners across its area to prepare a Strategic Economic Plan for 2014-2020. Each of these Strategic Economic Plans will be different as they will reflect the drivers and barriers to growth specific to each Local Enterprise Partnership area, but each will also have regard to national policy on growth, including, for example, housing, transport, skills, flooding, climate change, rural economies and the Innovation & Research Strategy for Growth and the Industrial Strategy. Research, development and innovation will therefore be integral in the individual LEP’s own way to each Strategic Economic Plan.

When creating the Strategic Economic Plan, each LEP and its partners had to decide how to make best use of a range of all available resources and levers – not just its allocation from the Single Local Growth Fund. This included guiding investments and maximising synergies with a range of other funding sources, including for example, City Deals, Regional Growth Fund, Enterprise Zones, the Growing Places Fund and the EU Structural & Investment Funds.

Alongside the wider Local Growth Fund, each LEP received an allocation of ESIF for the period 2014-2020. LEPs were responsible for: preparing a robust investment strategy for spending their allocation; identifying activities and projects to deliver that strategy, using a mixture of commissioning, bidding and co-financing as best meets local need; working with partners to find match funding for those projects; supporting those projects to deliver their targets; making sure their allocations are spent on time; and monitoring how well they are delivering against their strategies and the programme priorities. All ESIF is deployed within this framework but guidance was issued by government to ensure that plans for investments in innovation are informed by the concept of Smart Specialisation.

The government guidance strongly encouraged LEPs and their partners to embed Smart Specialisation in their Investment Strategies and to focus on specific actions in support of innovation. It also asked LEPs to consider the development of a specific strategy of Smart Specialisation and particularly encouraged the use the Joint Research Centre’s (JRC) RIS3 guide. A number of LEPs have chosen this route, including Cornwall & Isles of Scilly, Liverpool City Region, Greater Manchester, North East, and Tees Valley

LEP. Other LEPs were required to use a similar planned and staged approach to the development of their Investment Strategies in a manner proportionate to the scale of investment.

Gloucestershire created a plan for the local area and the LEP chose not to pursue RIS3. However, Smart Specialisation was referred to, and integrated, into Thematic Objective 1 where three key actions were identified (*figure 26*).

1. Forge stronger links between businesses and the University of Gloucestershire through the Growth Hub
2. Capitalising on the knowledge base of the Royal Agricultural University (RAU) through a new Agri-tech Research Centre
3. Developing the Gloucestershire Renewable Energy, Engineering & Nuclear (GREEN) Centre flagship project and the opportunities in low carbon and nuclear sectors

Figure 26: Gloucestershire LEP's ESIF Thematic Objective 1 priorities (GFirst LEP, 2014)

Build2LC in Gloucestershire is not directly linked to Gloucestershire LEP's plan and the three priorities identified in Thematic Objective 1; however the nature of the project means that partnerships and actions identified on the Build2LC Action Plan will link to priority 3 in particular and potentially priority 1. In fact, Severn Wye has recently met with the director of the GREEN project who will sit on the Build2LC Steering Committee and the site may host a site visit for the UK meeting in June 2017.

1.4 Policy Instruments: Regional and National Plans and Policies on Energy Rehabilitation of Buildings

The UK Government really began action related to energy efficiency when they published a White Paper⁶ in 2003. This largely focused on the issues at the time and did not focus sufficiently on actions. However, by 2007, another White Paper was produced which had clearer objectives.

In summary, the Government's 2007 **Energy White Paper: Meeting the Energy Challenge** (Department of Trade & Industry, May 2007) involved six key components.

⁶ A White Paper proposes changes to policy or legislation to Government

Those most relevant to Build2LC are:

- Providing legally binding carbon targets for the whole UK economy, reducing emissions through the implementation of the Climate Change Bill which resulted in the **Climate Change Act 2008**, committing the UK to reducing carbon emissions; including from the domestic sector.
- Encouraging more energy saving through better information, incentives and regulation.
- Providing more support for low carbon technologies, including increased international and domestic public-private sector collaboration in the areas of research, development, demonstration and deployment – for example through the launch of the **Energy Technologies Institute** and the **Environmental Transformation Fund**.

To achieve these aims the following domestic actions were recommended:

- A requirement for all new homes to be zero-carbon buildings as soon as practically possible and preferably by 2016.
- Improving the energy efficiency of existing homes.
- Improving the efficiency of consumer electronics and domestic appliances, and the possible phase-out of inefficient light bulbs by around 2011.
- Increasing the Carbon Emission Reduction Target for the electricity and gas industries for 2008-2011.
- A requirement that new domestic electricity meters should have real time displays from 2008, and a commitment to upgrade existing domestic meters on request.

The UK Low Carbon Transition Plan (HM Government, 2009) was published in July 2009 to ensure that certain criteria within the Climate Change Act 2008 were met; specifically reducing carbon emissions by 34% by 2020, based on a 1990 baseline. The transition plan aims to meet the following relevant targets:

- Over 1.2 million people will be employed in green jobs.
- The efficiency of 7 million homes will have been upgraded, with over 1.5 million of them generating renewable energy.
- 40% of electricity will be generated from low carbon sources (renewables, nuclear power and clean coal).

It is encouraging that the UK have now ratified the **Paris Agreement** and had a Pavilion at the **COP22** meeting in Marrakesh in 2016 focusing on innovation towards carbon reduction. Interestingly the programme⁷ for the Pavilion focuses on energy production rather than retrofit and references to the domestic sector.

Following the 2007 White Paper recommendations, the **Environmental Transformation Fund (ETF)** was established providing £400 million of funding from 2008-2011. The UK element of the ETF aimed to accelerate the commercialisation of low carbon energy and energy efficiency technologies in the UK. It brought together existing low carbon technology funding programmes together to invest in a number of areas which would have increased employment in the low carbon sector, including construction. Some of the relevant projects funded were:

- Low Carbon Buildings Programmes
- Carbon Trust funding for new low carbon technology enterprises, including Partnership for Renewables
- Carbon Trust investments in low carbon technology businesses
- Carbon Trust energy efficiency loans scheme for small and medium sized enterprises (SMEs)
- Salix Finance public sector invest-to-save loan schemes

Information derived from Environmental Transformation Fund (ETF): Funding for Low Carbon Technologies (Department of Business, Innovation & Skills)

The **Energy Technology Institute (ETI)**⁸ hub is based at Loughborough University. The consortium comprises the Universities of Birmingham, Loughborough and Nottingham with financial support from Advantage West Midlands and the East Midlands Development Agency. It has both private and public funding and aims to bring together work from academia, industry and the government to accelerate the development of low carbon technologies. This includes current work on buildings; energy storage and distribution; and smart systems & heat. One example is the £3 million 'Building Supply Chain for Mass Refurbishment of Houses' project.

⁷https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/565739/Programme_-_Green_is_GREAT_UK_pavilion.PDF

⁸<http://www.eti.co.uk/>

The government aims to make domestic energy more affordable for those in need. As a result, it has implemented a number of financial support mechanisms which either directly, or indirectly, reduce domestic energy costs. These mechanisms are outlined below. The information in the rest of this section is largely taken directly from *Cold Enough: Excess Winter Deaths, Winter Fuel Payments and the UK's problem with the cold* (Lloyd, March 2013)

Winter Fuel Payment: A non-means tested, tax-free cash payment worth £100-£300 depending on a person's circumstances. The stated purpose of the Winter Fuel Payment is to 'help pay your heating bills'. Most payments are made automatically between November and December - i.e. deliberately before the coldest point in the year. Winter Fuel Payments are paid automatically to anyone born on or before 5 July 1951 in receipt of the State Pension or another social security benefit (not Housing Benefit, Council Tax Benefit or Child Benefit).

Cold Weather Payment: Individuals in receipt of working-age and pensioner income support – such as Jobseeker's Allowance and Pension Credit – may be entitled to Cold Weather Payments, when local temperatures are recorded as, or forecast to be, an average of zero degrees Celsius or below over seven consecutive days. Cold Weather Payments are worth £25 for each seven-day period of very cold weather between 1 November and 31 March, and are paid automatically. In short, Cold Weather Payments are one-off, temperature contingent cash-payments to poorer households.

Warm Homes Discount Scheme: Introduced in 2011, the Warm Home Discount is a scheme coordinated by the Department of Work and Pensions (DWP), under which older pensioners on low-incomes receive a one-off annual discount worth up to £130 off their electricity bill, from participating energy suppliers.

Individuals may be entitled to the discount if they are:

- 80 or over and receive the Guarantee Credit element of Pension Credit;
- Under 80 and receiving the Guarantee Credit element of Pension Credit only.

These individuals are designated part of the so-called 'Core Group' under the scheme. In addition, the scheme contains provisions for a wider group of fuel poor customers – the 'Broader Group' - to whom suppliers are required to provide a minimum number of rebates. Suppliers can either use the predetermined criteria set out in the scheme's regulations or adopt their own criteria, which must be approved by Ofgem, the regulatory body supervising the gas and electricity industry. Rebates are provided at the same value as the Core Group throughout the duration of the scheme.

Although not discussed in detail in this document, the government provide additional non-energy specific support those who may struggle financially to maintain a good standard of living, including managing to heat homes. These include **Child Tax Credit** and **Pension Credit**; both mechanisms are means tested.

The Cold Weather Plan: A key policy framework for dealing with the effects of cold weather on the population is the annual Cold Weather Plan. It is targeted at individuals, commissioners and service providers in health and care, as well as the third-sector. The Cold Weather Plan is a 'best practice' guide and describes a set of actions that public health stakeholders should take at different levels of 'Cold Weather Alert'. Level 0 represents all-year around preparedness, while Level 1-4 Alerts are triggered depending on temperature levels, and should prompt health and social care services to take action. For example, the plan sets out that health and social care services should contact people identified to be at risk and ensure that rooms are adequately heated and that people are receiving all the benefits and services to which they are entitled.

Warm Homes, Healthy People Fund: This fund was launched by the Department of Health in 2011-12, with the aim of making around £20 million available to local authorities and charities to help them reduce illness and death caused by living in cold homes. Bids for funding were invited for initiatives that demonstrate how local authorities will reduce deaths over the winter months, and fundable activities that seek to:

- Deliver energy efficiency and heating improvements to the most vulnerable people;
- Provide residents with benefits advice;
- Ensure better public awareness of the impacts of cold weather;
- Provide staff and volunteers with fuel poverty/cold weather awareness training.

The fund was universally popular and many organisations were unhappy when the fund was quietly withdrawn in 2013.

Warm Front Scheme: As a precursor to the Warm Homes, Healthy People Fund, it is useful to note the existence of the Warm Front Scheme, which concluded on 19th January 19th 2013. This provided help to households in England worth up to £3,500 for heating and insulation improvements to their home, such as:

- Insulation - loft, cavity wall or hot water tank
- Draught-proofing

The scheme was targeted at households in receipt of means tested benefits such as: Pension Credit; Child Tax Credit; Working Tax Credit; and Jobseeker's Allowance. In

effect, the Warm Front programme was direct financial support for the poorest households to insulate their home. The Marmot Review Team have pointed out that the conclusion of the Warm Front Scheme brought to an end direct central government funding of improvements to residential energy efficiency (Marmot Review Team, 2010).

Green Deal loans scheme: One way in which the government has sought to encourage households to insulate their homes is the Green Deal loans scheme launched in January 2013, which essentially saw households borrow from a government loan company to undertake approved home insulation and energy efficiency modifications, with the cost repaid via lower energy bills for the property.

The Green Deal worked by a Green Deal Assessor doing a home visit and assessment. The Assessor recommended appropriate improvements, and approved Green Deal Providers then quoted for the recommended improvements, although households could seek quotes from other providers.

Once a Green Deal Provider was selected, the provider wrote up a Green Deal Plan, which is a contract between the households and the provider, setting out the work to be done, the repayments to be made and the interest that will be charged.

The government set up the Green Deal Finance Company as a not-for-profit company to provide financing to households via providers, and the company initially set its interest rate at 6.96%, although costs for households could be up to 9%. In addition, each Green Deal plan had a set-up charge of £63. There was an annual operating charge of £20 payable by providers, who could choose to add this to the overall cost of finance to the household, depending on the size and length of the plan.

The Green Deal loan scheme was a good idea in principle but was poorly planned hence the government stopped supporting the finance company in July 2015 and no new Green Deal loans are currently granted. According to Which? (2017) 'the National Audit Office conducted an independent audit of the Green Deal scheme. Its findings were published in April 2016 and found that, during its life span, the Green Deal loan scheme only funded 1% of energy efficient measures installed through the Energy Company Obligation (ECO) and Green Loans scheme combined. It also found that the scheme saved only negligible amounts of CO₂ and that households did not see these loans as an attractive proposition.' Therefore its success was very limited.

In June 2014, the £120 million **Green Deal Home Improvement Fund** was launched which did not require loans but offered cash back on specified retrofit options with a limit of £4000 for solid wall installations or £1000 for other options such as cavity wall insulation. The fund would cover a maximum of two retrofit options. When this scheme was launched in June 2014, the funds began to deplete too quickly as there

was a sudden rush of interest. By December 2014, funds were released in waves and the scheme has now halted as it was financially unsustainable. (Palmer, 2014)

With the exception of customers on the existing loan scheme, no form of Green Deal is currently in operation and those in the industry are concerned that a suitable replacement may not be found. The false expectations, and eventual failure, of the Green Deal scheme have left both the public and installers feeling uncertain and any new scheme will need to engender trust from all parties in order to be successful.

Energy Company Obligation⁹: Ultimately, the Green Deal was focused on home insulation measures that met the ‘golden rule’ of paying for themselves over the lifetime of the improvement. However, Green Deal interventions were unsuitable for those homes that require expensive home insulation, or for those on low income: hence the Energy Company Obligation (ECO). Under the scheme, larger energy suppliers have to deliver energy efficiency measures to homes in Great Britain. Suppliers are given targets based on their share of the domestic gas and electricity market. The scheme focuses on the installation of insulation and heating measures and aims to support vulnerable consumer groups. The energy regulator, OfGem, have responsibility for overseeing and monitoring ECO.

There are 3 main obligations under ECO:

1. **Carbon Emissions Reduction Obligation (CERO):** Under CERO, obligated suppliers must promote ‘primary measures’, including roof and wall insulation and connections to district heating systems.
2. **Carbon Saving Community Obligation (CSCO):** Under CSCO, obligated suppliers must promote insulation measures and connections to district heating systems in areas of low income. The CSCO target has a sub-obligation which states that at least 15% of a supplier’s CSCO must be achieved by promoting measures to low income and vulnerable households in rural areas or deprived rural areas.
3. **Home Heating Cost Reduction Obligation (HHCRO):** Under HHCRO, obligated suppliers must promote measures which improve the ability of low income and vulnerable households (the ‘affordable warmth group’) to heat their homes. This includes actions that result in heating savings, such as the replacement or repair of a boiler.

The first phase of ECO, known as ECO1, ran from January 2013 to March 2015 and was then modified to become ECO2; launched on 1 April 2015, this second phase will run until the end of March 2017.

⁹ The majority of the ECO information is taken directly from www.OfGem.gov.uk (OfGem, 2017)

The government are reviewing energy efficiency strategies and it is likely that there will be a period of reform later in 2018. The reform may account for the issues with the Green Deal alongside the ECO. It is expected that any modified strategy will be implemented for 5 years. After a consultation in 2016, the modified ECO3-Help to Heat (Department of Business, Energy and Industrial Strategy) was recently published on 30 January 2017. This will be launched as an interim measure between 1 April 2017 and September 2018. The modifications should simplify the scheme and make sure there is a greater chance of energy companies providing the necessary support to those in greater need.

Upon the publication of ECO3, the Minister for Energy and Industry, Jesse Norman said:

“The Government is committed to tackling fuel poverty, and a key part of that is to help people keep bills down by living in more energy efficient homes. These changes will move the UK a further step towards the goal of insulating a further 1 million homes by 2020.

As well as an increased focus on low income and vulnerable homes, eligibility will be extended to social housing tenants in EPC bands E, F and G, and local authorities will also be able to help match people with energy suppliers.

Suppliers will also be required to install a minimum 21,000 solid wall insulations per year, up from the consultation figure of 17,000.

There will be continuing protection for the delivery of energy efficiency measures in rural areas, with a requirement that 15% of suppliers’ Carbon Emission Reduction Obligation be delivered in these areas.

ECO has proved a very effective delivery mechanism with over 2 million measures installed in around 1.6 million properties between 2013 and the end of November 2016.”

One of the key challenges facing any measure, including ECO, is accurately targeting and accessing households in fuel poverty. The Committee on Fuel Poverty (2016) have proposed changes to Data Sharing legislation in order to facilitate targeting.

Code for Sustainable Homes: The Code for Sustainable Homes was introduced in 2007 to ensure that new-built homes reduce society’s carbon emissions and are energy efficiency. However, as the Marmot Review Team (2010) note, it is only since 2007 that the standards for new buildings have begun to approach those of other northern European countries, and although the strict targets imposed by the code make fuel

poverty unlikely, the proportion of the housing stock built since 2007 with these standards is very small. Whilst the Code for Sustainable Homes applies to new build properties, it is worth keeping this in mind in the context of the Build2LC project and the future landscape of the UK's housing stock.

Home Energy Conservation Act (HECA): The Act, introduced in 1995, put an obligation on local authorities to draw up plans to increase domestic energy efficiency. The Act has been amended since 1995, and in July 2012, the government issued new guidance under the Act to local authorities in England. This requires local authorities to identify practicable and cost-effective measures likely to result in significant energy reduction in all residential accommodation in their area. The guidance – issued by the formerly known Department of Energy and Climate Change (DECC) – also asks local authorities to consider the role key local partners, such as social housing providers and community organisations, can play in supporting their plans. Local authorities are required to publish a HECA progress report on alternate years; the next report is due on 31st March 2017. The guidance from the Department of Business, Energy and Industrial Strategy (January 2017) has produced a clear set of guidance for local authorities to help inform their plans for the next few years. Interestingly the guidance links closely to the needs identified for the Build2LC project and include:

- *What partnerships are established in the area to deliver support to low income and vulnerable households, including with the health sector, social care services, energy suppliers and charities?*
- *How Authorities are planning for enforcement of the minimum standards in the private rented sector?*
- *How can Authorities attract investment and promote local economic growth through commercial funding for the energy conservation measures proposed?*
- *Authorities may choose to identify opportunities for area based energy efficiency measures including potential local partners such as social housing providers and local community partners.*

The **Gloucestershire and South Gloucestershire affordable warmth strategy** forms the basis of the HECA report on behalf of a consortium consisting of all the district authorities in Gloucestershire and South Gloucestershire Council.

As affordable warmth stretches across many social aspects and sectors, it is also a priority within both counties to make links to local policies and objectives e.g. Gloucestershire Health and Wellbeing Strategy and the South Gloucestershire Joint Health and Wellbeing Strategy.

The Gloucestershire Health and Wellbeing Board have identified reducing excess winter deaths amongst the over 75s as a priority in its Joint Health and Wellbeing Strategy. The outcome this will contribute to is improving health and wellbeing into older age. The Affordable Warmth Partnership is key to ensuring that fuel poverty and its effects remain on the agenda for the Health and Wellbeing Board.

Members of the partnership come from a range of organisations that are concerned with issues around affordable warmth and fuel poverty including the six local authorities within Gloucestershire, South Gloucestershire Council, Age UK, debt and benefits advice centres, charities and community groups.

The Affordable Warmth Partnership also works closely with the Social Housing Action to Reduce Energy (SHARE) Forum, the Gloucestershire Climate Change Panel and South Gloucestershire Environment Forum. (Stroud District Council, 2016)

In order to successfully implement the strategy, the partnership has created an *Action for Affordable Warmth Strategy for Gloucestershire and South Gloucestershire* running from 2013-2018. (Affordable Warmth Partnership, 2013) The four key aims with the action plan at a national and regional level are:

Aim 1: Co-ordinate delivery, work in partnership and influence policy

Aim 2: Improve energy efficiency across all housing tenures

Aim 3: Promote and provide advice and information

Aim 4: Identify and help people at risk of fuel poverty

Domestic renewables are also offered support. The **feed-in tariff (FIT)**¹⁰ scheme offers guaranteed cash payments to households that produce their own electricity using renewable technologies, such as solar photovoltaic (PV) panels or wind turbines. The scheme, which launched in April 2010, is open to households and community groups in England, Scotland and Wales (but not Northern Ireland). The regular payments, which are paid for through a levy on all consumers' energy bills, are guaranteed by the government.

Again, whilst the FIT was seen as a good option when first launched, the payback was reduced to 4.39p per kWh for new installations after 15 January 2016 and the payments continue to decrease. When it was first launched, the FIT rate for solar PV was very generous: 43.3p per kWh of electricity produced. But owing to its success and the decreasing cost of solar panels, feed-in tariff rates (for new installations only) have since been cut. The tariffs were more than halved to 12.92p per kWh in August 2012.

¹⁰FIT section taken from *What is the feed-in tariff?* (Which?, 2017)

From 15 January 2016, the solar feed-in tariff was cut by a further 65% to 4.39p per kWh, and has been cut again since. The 2016 cuts mean the number of years it will take to recoup solar installation costs will be a lot longer and the payback time of solar panels is now closer to the full 25 years of the system's life. Feed-in tariff deployment caps limit the number of installations that qualify for FIT. The FIT scheme is suspended in each three-month tariff period where the cap is reached.

To qualify for the highest feed-in tariff, from April 2012 it became mandatory for each home's energy performance certificate to have at least a level D rating, encouraging households to improve energy efficiency as well as using a renewable energy source.

There are three savings elements to the feed-in tariff:

- *Generation tariff (G)* is a fixed rate payable to households for the total amount of electricity generated, calculated per unit.
- *Export tariff (E)* is payable on the units of electricity exported back to the national grid because it has not been used within the property.
- *Savings on electricity bills (S)* because a portion of your household electricity is self-generated, energy bills will be lower. The tariff is payable for up to 20 years, and the tax-free payments are usually paid each quarter.

The following renewable installations are eligible for the FIT: Solar photovoltaic (PV) panels; small-scale wind turbines; hydroelectricity; anaerobic digestion; micro combined heat and power (micro CHP).

An alternative to FIT is the **Renewable Heat Incentive (RHI)**¹¹. Unlike the feed-in tariff, which is designed to provide income for households, RHI payments are meant to help offset the cost of installing and running a renewable heating system. The RHI is overseen by the energy regulator, Ofgem; they are responsible for dealing with RHI applications and payments.

There are two RHI incentives: one for residential homes and one for the non-domestic sector. The overall aim of the RHI scheme is to help the UK achieve its target of producing 12% of its heat from renewable sources by 2020. The scheme runs in England, Scotland and Wales.

The domestic part of the RHI scheme launched on 9 April 2014. It offers regular 'tariff' payments to those using certain technologies to heat their homes. The amount of money households receive depends on which technology is used.

¹¹ RHI section taken from *What is the Renewable Heat Incentive?* (Which?, 2017)

Members of the scheme receive a quarterly tariff payment for every kilowatt hour (kWh) of renewable heat produced over a seven year period. It's possible for households to install more than one technology and receive payments for each system they use. Payment amounts are estimated based the home's Energy Performance Certificate (EPC) rating. Off the gas grid households are most likely to benefit from the domestic RHI scheme if the household replaces the current heating system with a renewable one.

Reforms to the RHI (Department of Business, Skills and Industrial Strategy), announced in December 2016, revealed that subsidies for heat pumps and biomass boilers will increase from spring 2017. Solar thermal panels will continue to be part of the scheme with the same tariff level as at present. The government also announced 'heat demand limits' for heat pumps and biomass boilers, which will cap the amount of renewable heat for which households can receive RHI payments. Heat pumps installed from spring 2017 onwards will also need to have electricity meters fitted to help consumers make the most efficient use of them.

Smart metering is a way to put both domestic and non-domestic customers in control of their energy use and improve consumer engagement in energy efficiency. As a result, the government aims for every home and small business in the country is offered a smart meter by the end of 2020 through the **Smart Metering Programme**; the programme should be as cost efficient as possible. The programme's aim is to roll-out over 50 million smart gas and electricity meters to all domestic properties, meeting the EU Smart Metering target.

The Smart Metering Programme began with the foundation stage in 2011 which was effectively a planning stage. The main installation phase has begun and should run until the end of 2020. 4.05 million meters operated in smart mode by large energy suppliers in domestic properties across Great Britain by the end of September 2016; this is 8% of all domestic meters operated by large energy suppliers (Department of Business, Energy and Industrial Strategy, 2016). Whilst the aim of the programme is good, the speed of installation has been a concern and some are apprehensive that some people may not understand how to use the meters properly and some residents who are subject to fuel poverty may look at their meters and turn off the heating when they should not.

The **EU Buildings Energy Performance Directive (EPBD)** was brought into force in January 2013. The following information summarises how requirements have specifically been implemented in the UK:¹²

With regard to calculation methodology, the UK system incorporated most of the requirements for dwellings some years before the Directive was introduced: this is the Government's **Standard Assessment Procedure for Energy Rating of Dwellings**, or SAP. The SAP was reviewed and extended so as ensure compliance with the Directive and to enable its use for regulations and energy performance certificates, leading to the current version known as SAP 2005 (www.bre.co.uk/sap2005). Although the basic model is unchanged the revision has been quite extensive at the detailed level, ranging from a more complete treatment of fabric heat loss to the addition or enhancement of low and zero carbon technologies (LZCT) such as micro-CHP, heat pumps, solar collectors, photovoltaics and biomass boilers. SAP covers dwellings with a total floor area up to 450 m².

The Building and Approved Inspectors (Amendment) Regulations 2006 amended the Building Regulations in England and Wales with effect from 6 April 2006. A set of new approved documents was produced including L1B for work in existing dwellings (including extensions) (www.odpm.gov.uk). For new buildings (of all types) the new regulations implement the calculation methodology as a central part of demonstrating compliance. Essentially it has to be demonstrated that the annual CO₂ emissions from the proposed building will not exceed a target level that is established by reference to the calculated emissions from a notional gas-heated building of the same size and shape as the proposed building. The notional building complies precisely with the minimum requirements of the 2002 Part L regulations and, to establish the target emissions, an improvement factor is applied, i.e. as well implementing the EPBD the new regulations also raise the performance standards. The Approved Documents also specify minimum performance levels for individual aspects of the building design, including fabric insulation; air tightness; heating system efficiency; air handling plant; lighting; limitation of solar gain in summer; commissioning and provision of information. These requirements apply in addition to attaining the overall CO₂ emission target.

The Energy Performance of Buildings Regulations (England and Wales) 2007 were updated in 2013 to reflect changing requirement from the EPBD for **Energy Performance Certificates (EPCs)**.

¹² EBDB related content is largely taken directly from the BRE document *Energy Performance of Buildings Directive* (Anderson, 2006)

When making energy efficiency improvements to homes there are a range of standards, accreditations and certifications that installers should recognise and that consumers should be made aware of. These should ensure that work completed meets health; safety; welfare; convenience; and sustainability standards.

In order to satisfy compliance, energy efficiency retrofit work typically needs to be notified to, and approved by, a building control body. This could either be a local authority's **Building Control** or a private sector approved inspector. However if the work is carried out by installers registered with a **Competent Person Scheme**, they can self-certify that their own work is compliant.

An example of a competent person scheme includes the **Gassafe register** which ensures that all engineers working with gas appliances are suitably qualified.

Other energy efficiency retrofit work that needs to be completed by a **competent person** registered with a relevant scheme or notified to a building control body includes:

- Cavity wall insulation
- Solid Wall Insulation
- Installation of replacement hot water or heating systems
- Installation of oil fired boilers and storage tanks
- Installation or replacement of solid fuel burners
- Installation of fixed air conditioning or mechanical ventilation systems in dwellings
- Any electrical installation work in dwellings
- Replacement windows, doors, roof windows or roof lights in dwellings
- Replacement of roof coverings on pitched and flat roofs
- Installation of microgeneration or renewable technologies

A range of quality assurance standards also exist, including:

Microgeneration Certification Scheme - The vast majority of microgeneration and renewable technology installations are now accredited via the Microgeneration Certification Scheme (MCS). This nationally recognised quality assurance accreditation allows consumers to access government incentives such as the Feed in Tariff scheme and the Renewable Heat Incentive.

A survey of installers was conducted as part of a review into the Renewable Heat Incentive by the Department of Business, Energy and Industrial Strategy. *Figure 27* shows summarised responses to MCS related questions.

What did they think of the MCS?

Although over half (55%) of installers believed that the quality of installations had improved under the MCS. Around two thirds (67%) felt that the costs and effort of being MCS accredited were 'not proportional to the volume of installations that it brought to their organisation'.

How did MCS renewable heat installers rate their training and skills?

The overwhelming majority (81%) of installers were confident in the training they had received on installing renewable heat technologies. Despite high levels of confidence in their own training, around two-thirds (68%) of installers believed that general skill levels within the renewable heat technology market were 'satisfactory' or 'poor'.

Figure 27: Summary feedback from MCS Renewable Heat Technology Installers Survey-A research project commissioned as part of the Evaluation of the Renewable Heat Incentive January 2016

Renewable Energy Consumer Code (RECC) - Installers registered with the MCS will commonly also be registered with the Renewable Energy Consumer Code (RECC). This covers all of the factors that contribute to a high standard of consumer service and protection before, during and after a contract is agreed with an installer.

Benchmark – This is a nationally-recognised scheme that places responsibilities on both manufacturers and installers to ensure best practice in the installation, commissioning and servicing of domestic heating and hot water products in line with Building Regulations in England and Wales. It is managed and promoted by the Heating and Hotwater Industry Council (HHIC).

If the installer is Benchmark registered then they will be required to ensure they:

- Give a full and clear explanation/demonstration of the product/system and its operation to the customer.
- Hand over the manufacturer's user instructions on completion of the installation.

Benchmark also requires all of its installers to be competent, qualified and committed to provide a service of a high quality. They must also work to the Benchmark Code of Practice.

PAS2030 - Publicly Available Specification for the installation of energy efficiency measures in existing buildings - To coincide with the launch of the government's Green Deal scheme in 2012, a new set of quality standards for energy efficiency work was launched by the British Standards Institute within the PAS2030. This swept up over 30 improvement measures recommending best practice for managing the installation process for each measure and the services to the customer before, during and after installation.

PAS 2030 addresses topics such as:

- Installation methods and quality control
- Installer operative competence
- Equipment
- Inspections
- Handover
- Corrective action procedures

Any company wanting to complete work within the framework of the Green Deal or the Energy Company Obligation are required to be PAS2030 accredited. A few specific exceptions were made so that installers holding Gassafe or MCS accreditations were not required to obtain PAS2030 if they were completing work already covered by these accreditations.

The take up of PAS2030 as an industry standard has probably been limited due to the failure of the Green Deal. It appears as though it has been adopted in the main by the larger of the retrofit organisations, partly as a means to access the funding and work provided under ECO, and partly due to the time and costs involved in integrating the specified Quality Management System which was seen as prohibitive by smaller SMEs.

PAS 2031: 2012 Certification of energy efficiency measure (EEM) installation services is an accreditation developed specifically for evaluators of PAS2030 accredited installers. This was particularly common under the Green Deal where installers had to be registered with a Green Deal certified body, such as BRE. The body would quality assess the installers and required PAS2031 to ensure a consistent and accurate approach was adopted.

Insulation Guarantees- As well as being work notifiable to a building control body or competent person scheme, cavity wall and solid wall insulation work can attract independent guarantees that provide householders with a uniform and dependable guarantee for up to 25 years. Installers are not required to provide this guarantee, but it is commonly recommended that householders employ companies that offer this.

The two main guarantees available are provided by:

- CIGA – Cavity insulation Guarantee Agency
- SWIGA – Solid Wall insulation Guarantee Agency

In 2013, the Department of Communities and Local Government (DCLG) produced the consultation document ***Next steps to zero carbon homes - Allowable Solutions***. The aim of the strategy was to ensure all new homes from 2016 were zero carbon. This

included allowing carbon offsetting offsite, as well as on-site measures. 'The definition of Zero Carbon has been debated at length, and it was eventually agreed that only 'regulated' emissions would be included. It was proposed that a 19% uplift over the current Part L standards would be introduced in 2016, with allowable solutions being used to offset the remaining carbon where it could not be achieved on site. It was also agreed that a site of 10 plots or less would be exempt from the allowable solutions scheme' (Elmhurst energy).

On 10th July 2015, the Government announced that neither the Zero Carbon Homes nor Allowable Solutions schemes would be introduced. This followed the production of the HM Treasury ***Fixing the foundations: Creating a more prosperous nation*** July 2015 publication which stated: *'The Government will therefore repeat its successful target from the previous Parliament to reduce net regulation on housebuilders. The government does not intend to proceed with the zero carbon Allowable Solutions carbon offsetting scheme, or the proposed 2016 increase in on-site energy efficiency standards, but will keep energy efficiency standards under review, recognising that existing measures to increase energy efficiency of new buildings should be allowed time to become established.'* This stems from the need to speed up the planning process and ensure planning decisions are made on time, hence stimulating productivity within the construction sector and economy.

The decision was a contentious one with some local authorities, including those involved in the Affordable Warmth Strategy in Gloucestershire and South Gloucestershire, already in the process of making and implementing plans. Although these strategies were focused on new build properties, the removal of these strategies means that there is a greater requirement to improve energy efficiency of existing properties in order to meet carbon reduction targets.

The **Decent Homes Standard** (modified in 2006) aims to improve local authority and housing association homes to ensure they all meet a minimum standard. To meet the standard, homes must meet four main criteria, the two most relevant to the Build2LC project are:

1. Meet the Housing Health and Safety Rating System (HHSRS) minimum safety standards for housing
2. Have efficient heating and effective insulation

Houses can be deemed hazardous if health is affected by damp and mould growth or excessive cold. Alternatively safety hazards including a faulty gas boiler or dangerous electrics will also count as a serious hazard. Serious hazards are termed 'Category 1 hazards' and are hazards that pose a serious threat to the health and safety of people living in or visiting a home. In such cases, councils are obliged to take action.

As mentioned in *sections 1.2.2 and 1.3*, **Gloucestershire LEP** has an instrumental role in developing the economy of the county and for ensuring the future needs of industries are planned for. The *Gloucestershire EU Structural and Investment Fund Strategy 2014-2020* (GFirst LEP, 2014) has developed a number of investment areas relevant to the Build2LC project. These are outlined in *figure 28* below:

Thematic Objective	Strategic Investment Area	Link to Build2LC
1, 4 & 10	Development of GREEN-a centre for training in renewable energy, engineering and nuclear	Training current and future installers and members of the construction industry to provide for future needs. The GREEN site will also house a new UTC which will be a specialist engineering and computing school for 14-18 year olds.
1	Greater partnership between the University of Gloucestershire and The Growth Hub	An improved partnership will help to use the knowledge base at the university to inform the action plan. The project may also identify areas for research.
4	Demonstration and deployment of renewable technologies and approaches to businesses and households	An opportunity for engagement and investment in projects related to this priority within the action plan.
9	Developing young people's financial inclusion including: increasing interest in financial management amongst young people; and young people and adults addressing issues associated with child poverty locally	The investment area could be linked to training young people about how to maximise energy efficiency within their homes. It could also be used as a mechanism for identifying households in fuel poverty.
10	The Gloucestershire STEM (Science, Technology, Engineering & Maths) strategy	Creates awareness and routes into industries relevant to Build2LC
10	Apprenticeships clearing houses	Creates opportunities for young people to access training and potential employment in relevant businesses.

Figure 28: Gloucestershire LEP's Strategic Investment Areas relevant to the Build2LC project. (GFirst LEP, 2014)

The LEP have a range of plans to finance the EU Structural Investment Fund Strategy for the County. These include working with South-West Investment Group (SWIG) to

provide loan schemes, microcredit finance and equity/innovation funds. The LEP is also proposing to form a Gloucestershire Investment Panel which will comprise representatives from the public, private, education and voluntary sectors to consider and make decisions on all investment opportunities. Both of these avenues are worth exploring as potential frameworks for any financial instruments planned for the Build2LC project and a representative from SWIG has been secured for the local steering group.

In terms of future planning, the long awaited **Bonfield Report** was released in December 2016 and is now referred to across all sectors related to energy efficiency and fuel poverty making it a key consideration within the Build2LC Action Plan. The report was commissioned as the UK are facing changes and a need to think more strategically and holistically about the measures currently available and what can be done to make outcomes more productive and efficient.

The report states: *'This Review comes at a key time for the energy efficiency and renewable energy industry. The UK is facing a significant but exciting infrastructure challenge: the retrofit of its housing stock to meet government ambitions for fuel poverty and carbon reduction and the desire for everyone to live in warm, comfortable and energy-efficient homes.'* (Bonfield, 2016)

It is expected that the Bonfield Report will be instrumental in the production of a new energy efficiency framework and that recommendations will begin to be implemented within the next couple of years. As a result, the Build2LC Steering Group will need to be fully versed in the recommendations being made when making decisions about actions. One of the main recommendations from the report is to establish a **quality mark** for the domestic retrofit sector. Those who wish to use the quality mark will need to adhere to three key elements of the new framework: a code of conduct; a consumer charter; and codes of practice and standards.

The other recommendations are summarised in *figure 29*.

Cross-Cutting Recommendations

Consumer Protection

- 1** Develop a set of minimum requirements for a Code of Conduct for all organisations that wish to gain the quality mark, including agreed requirements on issues such as sales practices, better pre-contractual information, and a requirement for appropriate financial protections for installations.
- 2** From the Code of Conduct, write a clear Consumer Charter setting out what a household can expect from organisations across the energy efficiency and renewable energy sector covering the entire consumer journey.
- 3** Ensure the quality mark is easily recognised by consumers as providing appropriate protection and effective signposting to reliable organisations that meet its requirements through sustained promotion.
- 4** Put in place a consistent and fair redress process, including providing a single point of contact for consumers, with the capability to support vulnerable consumers, an agreed standard for complaint handling, and access to ADR.

Advice and Guidance

- 5** Develop new approaches for engaging consumers with energy efficiency and renewable energy (e.g. by using trigger points and promoting the wider benefits of the measures which are valued by households), and deliver awareness-raising programmes at national and local levels.
- 6** Make available a set of impartial information and guidance to support more effective industry communications with customers and to aid consumer decision-making on installing measures, by establishing a central Information Hub (to act as a collection point for best practice advice and guidance) and a Data Warehouse (to act as a store for property-level data and information).
- 7** Develop a range of services and tools linked to the Information Hub and Data Warehouse to provide advice (both online and by telephone) and to enable engagement with all consumers, including vulnerable households, in ways most appropriate to them.

Quality and Standards

- 8** Develop an overarching standards framework document for the end-to-end delivery of retrofit of energy efficiency and renewable energy measures, building on existing standards and make it freely available (under licence) to all those installing under the new Framework.
- 9** Establish a Retrofit Standards Task Group to address the UK's standards needs in the retrofit sector in the broadest sense, i.e. including formal and non-formal standard solutions, as appropriate in the short and long-term.
- 10** Commission a research project to map existing formal and informal standards to shape and deliver a standards development programme for retrofit.

Cross-Cutting Recommendations

Skills and Training

11 Industry to begin to embed core knowledge, including basic building physics, design stage and consumer interaction into all relevant vocational and professional pathways, including qualifications, training courses and apprenticeships.

12 Improve the way in which businesses are assessed for 'competence', acknowledging the correct mix of skills, knowledge and experience for all roles; and back this up with a consistent assessment strategy and Approach to recognising Prior Experiential Learning (APEL).

13 Establish a process for greater collaboration within the skills sector to ensure that the appropriate skills and knowledge are properly and consistently integrated across the sector and are available for all.

Compliance and Enforcement

14 Develop, deliver and maintain a strong consumer-facing brand in the form of a new quality mark, which provides effective redress for the consumer and has a positive association with reputable products and services.

15 Identify or establish an organisation to develop and oversee the quality mark and facilitate activities for the day-to-day management of the quality mark, including enforcement, sanctions, technical, operational, and consumer protection related activities.

16 Put in place a robust and joined-up industry-wide compliance and enforcement regime coordinated nationally; share information on the quality of assessors, designers and installers to facilitate the identification and sanctioning of poor practice, as necessary; and review and align the frequency of, and mechanism for performing, technical monitoring or on-site audits, possibly introducing a random audit and risk-based approach (where the monitoring frequency is increased when poor quality installations are detected).

Sector-specific Recommendations

Insulation and Fabric

17 All retrofit projects will have an appropriate design stage process which takes a holistic approach and adequately considers the home, its local environment, heritage, occupancy, and the householders' improvement objectives when determining suitable measures.

18 Put in place a process for gathering information and the design specification ahead of any installation of insulation or fabric measures; store this in the Data Warehouse for future use and to facilitate continuous improvement; and load aftercare support and quality information into the Data Warehouse following an installation.

19 Ensure that the Insulation and Fabric workstream feeds into the standards, skills and quality assurance development processes, and that these reflect best practice, and fully take account of the issues specific to the measures.

Sector-specific Recommendations

Smart Meters

20 Provide tailored home energy efficiency advice to consumers during the smart meter installation visit, and ensure key delivery partners work together to deliver a good customer journey throughout the roll-out.

21 Industry should work together to ensure that the capacity and skills of smart meter installers deliver a safe and efficient roll-out.

22 Industry should work together effectively to ensure that smart meters can be installed in as many properties as possible, regardless of property type.

Home Energy Technologies

23 Undertake a review of all technologies covered by the Framework to identify compatibility with the new Framework; and develop action plans for each technology, as required, to align with the new Framework.

24 Industry to develop a set of independent, impartial advice documents and/or web-based tools for both consumers and the supply chain covering each specific technology, where possible using existing material, and working with the organisation responsible for delivering the Information Hub.

25 Ensure the new Framework is sufficiently flexible to cover existing technologies and facilitate the entrance of new technologies; and develop a route map setting out the steps that new technologies will need to go through to operate under the Framework.

26 Industry to develop any relevant new standards, specifications and guidance covering the integration and inter-operability of home energy technologies under the Framework, and consider these as part of the standards mapping exercise recommended by the Quality and Standards workstream.

Application to Social Housing

27 Housing Associations will collaborate with industry and government to ensure that the Framework applies to the delivery of improvements in their housing stock, incorporating energy efficiency and renewable energy measures at scale.

Figure 29: Summary of recommendations made in the Bonfield Report (Bonfield, 2016)

It is clear that the UK is currently experiencing a great deal of change in relation to energy efficiency. This is not purely driven by Brexit but there is increasing recognition that there needs to be a more collaborative approach to meet the following needs:

- Local economies need to become more self-sustaining
- More investment in preventative care to reduce the pressure on the NHS
- Reduce energy consumption to meet targets
- Manage an aging population and keep people living well at home for longer
- Reducing financial and social inequality

It is important to note that, following Brexit, the UK Government's Department for Energy and Climate Change (DECC) was combined with the Department of for Business Innovation and Skills (BIS) to become the Department of Business, Energy and Industrial Strategy (BEIS) in July 2016. There is concern that decisions will be delayed and that there could be a slowing of action directly related to the green economy. However, BEIS is led by Greg Clarke MP who is a climate science advocate and the combining of these two departments may lead to a more collaborative approach and have a greater long term impact.

Build2LC comes at a good time and can work with public and private bodies to strategically plan. However, central government plans will ultimately determine the course of action and the timing of their decision making will make a difference to the sustainable success of the action plan.

1.5 Legislation & Regulation

Much of the legislation, regulation and policy relevant to the energy efficiency of buildings and households have already been described in *section 1.4*. The following section briefly outlines some of the standard pieces of legislation.

1.5.1 Primary Legislation (Acts or Orders)

Climate Change Act 2008 commits the UK to reducing carbon emissions by 80% compared to the 1990 baseline by 2050, including reductions from the domestic sector.

Energy Act 2016 covers a wide range of aspects linked to energy including energy supply and regulation as well as energy efficiency and decarbonisation. The act has been updated a number of times in the last five years and the most recent 2016 modifications include the new definition of fuel poverty and an increase in the capacity of community Feed-in-Tariff installations.

Localism Act 2011 gives local authorities greater autonomy and accountability over a range of sectors including planning and housing. Changes to the Act in 2011 included the removal of Housing Information Packs (HIPs) which were introduced in 2007 to provide prospective buyers with a range of information about the property they were purchasing. The act repeals the use of HIPs due to expense and questions raised over the usefulness of the packs. There is now a sole requirement to produce an Energy Performance Certificate (EPC).

1.5.1 Secondary Legislation (Regulations)

Building Regulations & (Amendment) Regulations 2016 updates the Building Regulations 2010. The regulations cover all structural and safety elements of construction including ventilation and electrical safety. Part L: Conservation of Fuel Power is the most relevant section to Build2LC and including heating efficiency. The regulations were amended to transfer the EPC requirement from the Building Regulations to the Energy Performance of Buildings Regulations.

Energy Performance of Buildings (Certificates and Inspections) (England and Wales) Regulations 2012 implement the requirements of the 2010 EU Directive on the energy performance of buildings. It focuses on reducing the level of carbon emissions from public buildings by 2018 and all new buildings by 2021. Energy Performance Certificates are a main focus of this regulation.

Energy Related Products Regulations 2010 as amended by the Ecodesign for Energy-Related Products and Energy Information (Amendment) Regulations 2016 implements the requirements of the EU directive on Ecodesign for Energy-Related Products and covers specific products including boilers and air-conditioning units.

1.5.2 Policy

A number of policies have already been discussed, including the EPC and smart-metering. Three additional policies are discussed below:

CRC Energy Efficiency Scheme formerly the **Carbon Reduction Commitment** is a UK Government scheme designed to improve energy efficiency and cut carbon dioxide (CO₂) emissions in private and public sector organisations that are high energy users. The scheme is currently in phase 2 which began in 1 April 2014 and runs to 31 March 2019.

In each compliance year, an organisation that has registered for CRC needs to do the following:

- collate information about its energy supplies
- submit a report about its energy supplies
- buy and surrender allowances equal to the CO₂ emissions it generated
- tell the Environment Agency about changes to its organisation that could affect its registration (designated changes)

- keep records about its energy supplies and organisation in an evidence pack

The CRC scheme will cease in March 2019; in order to recover the lost revenue, the main rates of Climate Change Levy (CCL) will increase from April 2019.

The government is planning to work with the devolved administrations, private and public sectors to develop a new framework resulting in a simplified energy and carbon reporting framework for introduction by April 2019.

ESOS (Energy Savings Opportunity Scheme) Regulations 2014 was established by Government to implement Article 8 (4 to 6) of the EU Energy Efficiency Directive (2012/27/EU). ESOS is a mandatory energy assessment scheme for large organisations within the UK and is administered by the Environment Agency.

Organisations that qualify for ESOS must carry out ESOS energy audits of their buildings, industrial processes and transport to identify cost-effective energy saving measures. Although ESOS occurs in phases which could be stalled by Brexit, the scheme is built in to UK regulations hence it is likely to continue.

ESOS was also reviewed alongside CRC; no changes have yet been made to ESOS and, unlike CRC, some expect ESOS to continue.

National Planning Policy Framework 2012 focuses on planning for sustainable development. It is relevant to Build2LC as it guides local planners to make strategic decisions about developing the local and rural economy and also providing a range of high quality housing. It is important to develop links with decision-makers and understand local priorities and plans in order to establish how retrofit fits into the wider plan.

1.6 Financial Support and Instruments

Financial support instruments can be classified under the four categories shown in *figure 30*.

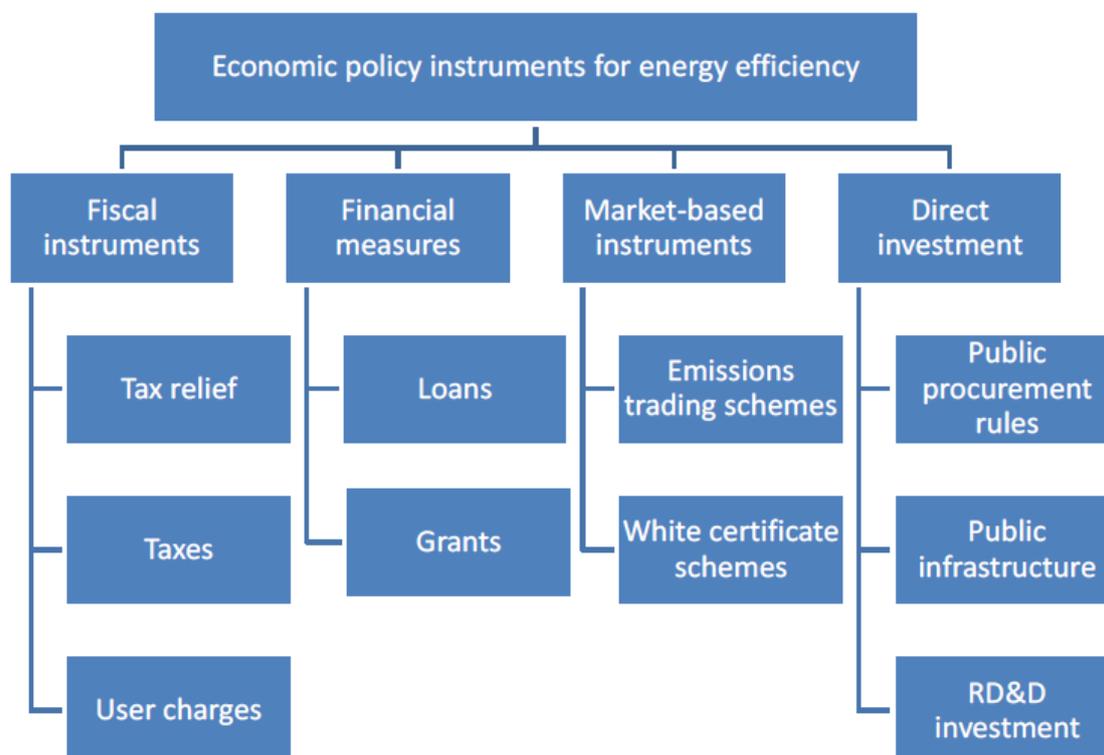


Figure 30: Schematic diagram of economic policy instruments for energy efficiency (International Energy Agency)

1.6.1 Fiscal instruments¹³

Landlords Energy Saving Allowance: This policy, announced in 2004, provided an incentive for private landlords to improve the energy efficiency of the residential properties that they let. The policy gave upfront relief (up to £1500) for capital expenditure on investment in cavity wall and loft insulation. In 2005, it was extended cover solid wall insulation, in 2006 to include draught proofing and hot water system insulation, and again in 2007 to include floor insulation. Also in 2007, the programme was extended to 2015, and the government also sought state aid approval to extend its availability to corporate landlords. The scheme ended at the end of 2015.

¹³ Information for this section has been directly taken from <http://www.iea.org/policiesandmeasures/energyefficiency>

Climate Change Levy (CCL) was introduced on energy use in the non-residential sector and became effective from 1 April 2001. Its aim is to encourage energy efficiency and help meet the United Kingdom's targets to reduce greenhouse gas emissions. It applies to gas; electricity; liquefied petroleum gas (LPG); and coal. The rates of the levy are based on the energy content of the different energy products.

Climate Change Agreements (CCAs) were introduced in 2001 to allow energy-intensive business users to receive a 65% discount from the Climate Change Levy, in return for meeting energy efficiency or carbon saving targets. CCAs have delivered substantial carbon savings. The first agreements took effect on 1 April 2001 and ran until 31 March 2013. A new phase began in April 2013 and will run to 2023 with the discount raised to 90% for electricity. A total of 53 industrial sectors across more than 9 000 sites have signed up to targets. Targets apply to participating sectors from 2013 to 2020, with the scheme running until 2023.

Exemption from the CCL for Good Quality CHP: CHP schemes that are fully or partially certified as 'Good Quality CHP' under the CHPQA programme and have obtained a Secretary of State (CHP) Exemption Certificate are exempt:

- From the CCL on the fuel they utilise (assuming they meet a power efficiency threshold of 20% otherwise this exemption is scaled back)
- On the qualifying power output (QPO) generated.

For exporting schemes, a CHP Levy Exemption Certificate (LEC) certifies each Megawatt hour (MWh) of QPO electricity produced and, for indirect supplies, should be transferred with the QPO to the third party electricity supplier.

Enhanced Capital Allowances (ECA): Using experience gained in other EU countries, the UK introduced on 1 April 2001 a system of Enhanced Capital Allowances (ECA). While most capital expenditure in the UK can be written off against taxable profits on a reducing-balance basis, investments eligible under ECA will be allowable against taxable profits at 100% in the first year. Businesses can write off the whole of the capital cost of their investment in energy-saving plant and machinery technologies against their taxable profits of the period during which they make the investment. This can deliver a helpful cash flow boost and a shortened payback period. In July 2008 the UK revised the Energy Technology Criteria List, introducing technology categories including: Compressed Air Equipment, Heat Pumps and Lighting. The scheme will now include all necessary equipment for combined heat and power facilities to use solid refuse fuel. Also, those that make a loss during the period in which they invest in energy-saving equipment are now able to surrender their tax losses in return for a cash payment equivalent to 19% of the loss surrendered.

Reduced VAT for energy saving materials: In 1998 the government introduced a reduced value-added tax (VAT) rate of 5% (down from 17.5%) for the grant-funded installation of certain energy-saving materials (ESMs) in the homes of elderly, less well-off and vulnerable households. This reduced VAT rate applied to all insulation, draught stripping, hot water, and central heating controls. In Budget 2000, the Government extended this scheme to all households, even if the service is not grant funded. Budget 2000 and 2002 also introduced further reduced VAT rates for ESMs when they are part of grant-funded installations into vulnerable households — including central heating systems, heating appliances, and factory-insulated hot water tanks. The 2004 Budget announced reduced VAT for ground source heat pumps, and the 2005 Budget extended this to air source heat pumps. The 2005 and 2006 Budgets also announced reduced VAT to encourage microgeneration technologies for use by individual households. These include small wind turbines, solar panels and micro-combined heat and power (CHP) units. The 2007 Budget further confirmed this commitment to maintaining reduced VAT for microgeneration technology.

The **Energy Company Obligation (ECO)**, **Feed-in-Tariff (FiT)** and **Renewable Heat Incentive (RHI)** have all been discussed in *section 1.4*.

1.6.2 Financial measures¹³

Salix Finance Ltd: A private company funded by government to establish energy efficiency revolving loan schemes in the public sector. The company, set up by the Carbon Trust, is developing and delivering innovative spend-to-save programmes to overcome barriers in the public sector that currently prevent cost-effective capital investment projects. Salix received DECC funding of £30m from 2008-11 from the Environment Transformation Fund, which built on the £20m it received between 2005 and 2008. Salix provides interest free loans to organisations, who are required to provide matched funding and establish an on-going ring-fenced energy saving fund within the organisation. The energy or estates team (typically) then uses this fund to support projects across the estate that pay back into the loan fund using the energy savings they generate. The loans, once established, continue to deliver energy and emission savings over time, with recycled energy savings used to repay the individual project loan and then released for front-line services. In normal circumstances Salix will keep their funding in place until the client runs out of projects. The value of the recycling approach is that the energy costs saved by the projects are fed back into the fund which then supports further projects, which in turn deliver more energy savings and so on. This allows each pound to be used several times over time to generate carbon savings.

1.6.3 Market-based instruments¹³

The **CRC Energy Efficiency Scheme (CRC Scheme)** is designed to improve energy efficiency and cut emissions in large public and private sector organisations. The CRC affects large public and private sector organisations across the UK, together responsible for around 10% of UK greenhouse gas emissions. Participants include supermarkets, water companies, banks, local authorities and all central government departments. Qualification for the scheme is based on electricity usage. Phase 2 runs until 2019; organisations will qualify if, during the qualification year, they consumed over 6000 megawatt-hours (MWh) of qualifying electricity through settled half-hourly meters. Organisations that meet the qualification threshold must register using the CRC Registry, which is administered by the Environment Agency. Qualifying organisations have to comply legally with the scheme or face financial and other penalties. Organisations that participate in the CRC are required to monitor their energy use, and report their energy supplies annually. The Environment Agency's reporting system applies emissions factors to calculate participants' carbon dioxide (CO₂) emissions on the basis of this information. Participants must purchase and surrender allowances to offset their emissions. Allowances can either be bought at annual fixed-price sales, or traded on the secondary market. One allowance must be surrendered for each tonne of CO₂ emitted. The allowance price in Phase 1 was set at £12 per tonne of CO₂.

1.6.4 Direct investment

The **Central Heating Fund** ran until August 2016 and aimed to incentivise the installation of first time central heating systems in fuel poor households who do not use mains gas as their primary heating fuel.

The seven local authorities in Gloucestershire and South Gloucestershire was awarded £3 million, which has been administered through the Warm and Well¹⁴ scheme at Severn Wye Energy Agency. The eligibility criteria for the fund were as follows:

- The maximum funding available through the scheme was £4,000 per property.
- The scheme installed gas central heating, but other forms of heating (excluding storage heaters) may be available and will be decided on a case by case basis.
- Quotes from at least two installers from the Link to Energy network were required.
- All work through the scheme must be completed by the end of August 2016. The fund has finite resources.

¹⁴ http://www.healthwatchgloucestershire.co.uk/News/Warm_Well_Central_Heating_Fund.aspx

Households were eligible for the Central Heating Fund if they:

- Were in receipt of Energy Company Obligation Funding Affordable Warmth eligible benefits OR met the criteria through having a low income and high fuel costs as determined by a calculator.
- Were privately rented households where the tenant met the eligibility criteria (subject to the landlord meeting state aid requirements). Housing association properties were not eligible at this stage.
- Were Houses of Multiple Occupation (HMO's) eligibility was decided on a case by case basis by the local authorities.
- Did not have central heating or use mains gas as primary heating type. A property using a gas fire with additional electric heating would be eligible.
- Had over 50% of the property was heated by storage heaters.

The **Fuel Poor Network Extension Scheme (FPNES)** is designed to increase the number of households with access to the central gas network. This is undertaken by Wales and West Utilities, under the Warm Homes Assistance Scheme, in the South-West region. The network companies use a voucher calculator to means test households applying to connect to the network. For those deemed eligible, the cost of connection is covered by the voucher but some households will need to make up the difference. The eligibility criteria to access the scheme have been tightened since April 2016, as shown in *figure 31*.

Criteria for those who apply by 31 March 2016	Criteria for those who apply from 1st April 2016
You must live within the 20% most deprived areas in the UK measured by the Government's Index of Multiple Deprivation (IMD). The IMD is defined separately for England, Scotland and Wales	You must live within the 25% most deprived areas in the UK measured by the Government's Index of Multiple Deprivation (IMD). The IMD is defined separately for England, Scotland and Wales
You must be eligible for support under the Warm Front Scheme in England, Nest in Wales, or the Energy Assistance Package in Scotland	You must be eligible for support under Home Heating Cost Reduction Obligation in England, Wales or Scotland, Nest in Wales or the Home Energy Efficiency Programmes in Scotland
You must fall within the Priority Group (low income households and over 70 years of age) for measures under the Carbon Emissions Reduction Target	You must be in fuel poverty based on the latest government definition or indicator. This currently is: <ul style="list-style-type: none"> ▪ In England, the Low Income High Cost Indicator where a household is considered to be fuel poor if its income is below the poverty line (taking into account energy costs) and its energy costs are higher than is typical for its household type ▪ In Scotland and Wales, a household spends more than 10% of disposable income on all household fuel use
You must be in fuel poverty based on the standard Government definition/indicator - that is spend more than 10% of your disposable income on all household fuel use	

Figure 31: Eligibility criteria for the Fuel Poor Network Extension Scheme (Ofgem, November 2015)

Gloucestershire Energy Efficiency Grant (GEEG) is a grant provided by the Local Authorities within Gloucestershire alongside South Gloucestershire to fund energy efficient installations in the county. The fund provides support to those referred through the Warm and Well Scheme. The continuing availability of this fund depends on local authorities choosing to allocate money through the fund.

Carbon Trust Loans¹⁵ are the result of collaboration between The Carbon Trust and Siemens financing to develop a loans package for businesses to improve energy efficiency measures in their organisations. Whilst this is not directly related to the domestic sector, this may be an avenue for registered social landlords and private landlords to explore. Repayments are made over 1-7 years and are designed to ensure there are net financial savings to the business.

A pilot scheme for a **Fuel Bank** was established with the NEA, nPower and local Food Banks. The Fuel Bank provided vouchers to the value of £49 and provided some urgent support for identified customers in a four areas in the UK, including Gloucester. The scheme is likely to be rolled out further but on average, 80% of customers who have received fuel bank vouchers in Gloucester have returned and had either a second or third voucher suggesting there is room for preventative work as well as emergency support. Severn Wye Energy Agency are currently discussing this with National Energy Action (NEA) and the Gloucester Food Bank a way to become involved in the scheme and propose plans which could have more sustainable impacts.

1.7 Construction and Buildings Market Brief Description

According to the CITB (2016) “The construction industry accounts for 8% of United Kingdom Gross Domestic Product (GDP) and has a workforce of 2.6 million. The industry generates a return of £2.84 to the economy for every pound of investment.”

More locally, the county of “Gloucestershire has 3,170 construction businesses and 30,800 construction jobs” (CITB, 2016).

The industry in Gloucestershire is fairly active with nine of the top ten construction companies having bases within, or very close to, the county. The industry in Gloucestershire generally operates in line with the rest of the UK.

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https://www.carbontrust.com/media/53936/eef001_energy_efficiency_financing_customer_benefits.pdf

Rank by turnover	Rank by profit	Company	2014 turnover (£m)	2014 pre-tax profit (£m)	2014 margin (%)	Offices in Gloucestershire
1	8	Balfour Beatty	10,118	32	0.3	Yes
2	1	Carillion	4,081	110.6	2.7	Yes
3	6	Kier Group (Inc. May Gurney)	2,669	47.2	1.8	Yes
4	4	Interserve	2,582	68.1	2.6	Yes
5	19	Morgan Sindall	2,095	13.9	0.7	No (Bristol)
6	2	Amey UK/Enterprise	1,762	78.7	4.5	Yes
7	15	Laing O'Rourke	1,640	21.5	1.3	No
8	14	BAM Construction/Nuttall	1,596	21.6	1.4	No (Bristol and Cardiff)
9	3	Galliford Try	1,467	74.1	5.1	Yes
10	5	Keller	1,438	52	3.6	Yes (Phi Group)

Figure 32: The top ten construction companies in the UK in 2014 (The Construction Index, 2017)

Two nuclear power projects are underway within the area; Oldbury is within the county and Hinkley Point is within easy reach. These facilities provide jobs for over 11,500 construction workers during the core construction phase. Whilst this is excellent for the industry and economy during the period of construction, it reduces the availability of workers elsewhere in the county and the core builds are estimated to last approximately 10 years so further planning will be required to manage the excess number of workers following this period.

It is important to differentiate between 'construction' and 'installation' with regard to the Build2LC project: the majority of energy efficiency retrofit is classified as 'installation' which is a sub-category of construction and companies often operate entirely separately from core construction industries. Installation businesses range from large regional organisations through to small 'one-man-band' operations. 122 of these installation businesses are registered under Link to Energy¹⁶ which is a central network of Gloucestershire installers established in 2007. This network supports both consumers and businesses. It is difficult to work out exactly how many installation

¹⁶ <http://www.linktoenergy.org.uk/homeowners/about/>

organisations there are within the county as many companies do installation as part of their other work and they are not generally categorised in a distinctive group.

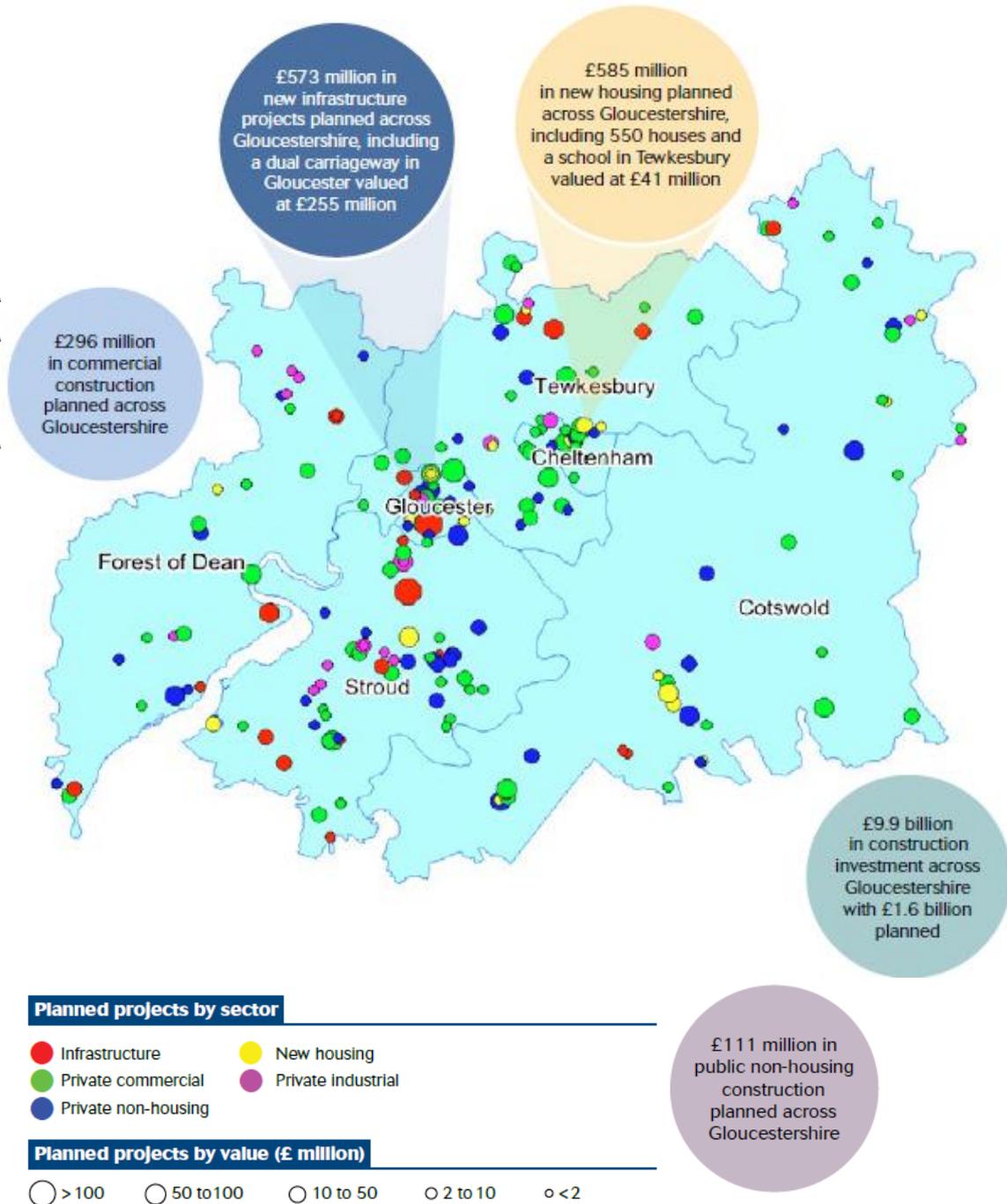


Figure 33: Map showing projects planned in Gloucestershire (Map produced by Digital Mapping Solutions from Dotted Eyes (CITB, 2016)

The construction sector is well-represented within the activities of Gloucestershire LEP. There are 19 members on the Construction and Infrastructure Business Group¹⁷ and conversations with the LEP suggest that this group will be able to feed-in to Build2LC; communication mechanisms are currently being established.

1.8 Professional Characterisation (Labour)¹⁸

1.8.1 Employment structure

Gloucestershire's employment structure reflects that of the rest of the UK with employers across a wide range of sectors. However, Gloucestershire has particular concentrations of employment in manufacturing; public administration & defence; and agriculture.

Highly-skilled jobs account for 46.6% of local employment, higher than regional and national averages. Gloucestershire also has particular concentrations of employment in professional; skilled trades; and sales & customer service occupations. Over half (52%) of people are employed in knowledge-intensive Sectors in line with the national picture. Most of this is in knowledge-intensive services (125,500) but medium-high technology manufacturing (9,600) and high-technology manufacturing (8,900) businesses also provide significant numbers of jobs. Four-fifths (80%) of employment within the Gloucestershire LEP area is in the private sector.

1.8.2 Recession and job losses

Gloucestershire lost around 1,400 jobs between 2009 and 2011 (1% of all employment). Construction was not amongst the hardest hit sectors. However, some sectors gained - public administration & defence and administrative & support service activities both made gains during the recession period.

1.8.3 Skills shortages and skills gaps

Around 3% of Gloucestershire's employers have hard-to-fill vacancies, 77% of which were difficult to fill due to a lack of skilled applicants (around 10% of vacancies). Skilled trades occupations made up 23% of these, compared with 17% nationally. At the same time, 18% of Gloucestershire LEP employers (3,600 employers) reported having a skills gap, with around 14,500 employees assessed as not being fully proficient in their jobs. This accounted for 5.6% of total employment (in line with the national average).

¹⁷ <http://www.gfirstlep.com/gfirst-LEP/About-Us/Business-Groups/>

¹⁸ The majority of this section is taken directly from the *Gloucestershire LEP Skills Statement* (Marchmont Observatory, University of Exeter, March 2014)

Around 20% of these were where staff lacked proficiency, or there were insufficient strategic management skills.

1.8.4 Future skills demand

Employment is expected to increase by 34,000 (or 11%) between 2012 and 2025 with 5700 more jobs expected in construction. However, the contraction in education employment predicted is significant, representing a loss of 8,400 jobs and 30% of the 2012 workforce. Higher-skilled occupations will account for an additional 34,000 jobs and will comprise 49% of total employment in 2025, compared with 43% in 2012. The highest rate of employment growth is expected to be seen in the professional occupations (+43%).

Although Gloucestershire's population is set to increase by around 46,000 (8%) over the next decade, rising to 644,000 in 2021, the working age population will remain static. The 16-18 and 19-24 age groups are set to shrink in absolute terms over the forecast period, with a total drop of more than 5,300 16-24 year olds (-8.2%) living in Gloucestershire in this time. This will limit the pool from which employers can recruit and may have implications for the ability of the local economy to grow, unless growth is accompanied by a rise in productivity.

Youth Apprenticeships accounted for 27% of all Apprenticeship starts in 2012/13, 34% higher than in 2008/9. The lion's share of Apprenticeship starts continues to be at the intermediate level (69%) although there is growing interest in Advanced and Higher Apprenticeships. Construction, Planning & the Built Environment (17%) was the most popular subject areas for youth Apprenticeships in 2012/13. More than 3,600 adults started an Apprenticeship during 2012/13 and numbers are increasing year on year. Adult Apprenticeship starts are now broadly equally split between those at Intermediate (50%) and Advanced (47%) levels. In line with national policy, growth in 2012/13 was focused on Advanced Apprenticeships at Level 3. There is a small but rapidly growing minority at Higher level (3%). Adult Apprenticeship starts are heavily clustered in three sector subject areas; construction is not one of these sectors.

1.8.5 Local Higher Education provision

In 2011/12, 10270 students were studying at Gloucestershire's two Higher Education Institutions (HEIs). In the same year, 18100 Gloucestershire residents were students of HEIs across the UK, making Gloucestershire a net exporter of around 8000 students. Looking first at provision being delivered by the two local HEIs, there were 2,850 students in STEM subjects in 2011/12, representing 27.8% of all students. The Royal Agricultural University has a large proportion of STEM students (74.8%); 21.6% of the students at the University of Gloucestershire study STEM subjects. This figure is considerably below the national average of 42%.

Looking at the subject choices of local residents compared with the level of provision being offered locally suggests that there are some areas of demand from local people that are not being met by the current local HE offer. This is most obviously in those subject areas not offered by the two local HEIs i.e. Medicine and Dentistry, Mathematical Sciences and Engineering and Technology.

As a result, four key priority areas have been developed to build skills within the area:

1. *Apprenticeships*
2. *Develop STEM Skills*
3. *Higher Education*
4. *Support Sector and Business Skills*

In 2014, the London Chamber of Commerce and KPMG analysed the UK construction skills base within the UK, particularly in London and the South-East, in 2014 (Skills to Build). They supported other concerns suggesting that although the construction industry had seen an upturn in activity following a period of severe decline during the recession at 7.5% in 2012, there is great concern about a skills crisis in the sector. They noted specifically that the shortfall in labour by mid-2015 would be 20%.

Figures in the report show that:

- *“Current levels of training provision will be insufficient to meet the increased demand for labour over the coming years*
- *Training providers are not supplying qualifications that the industry needs*
- *Unless the supply of construction workers is increased, house building targets will not be met and the delivery of large infrastructure projects will be jeopardised”*
(London Chamber of Commerce and KPMG, 2014)

Additional conversations with the Gloucestershire LEP suggest that those who are recruited to the construction industry are swayed by offers from large employers such as Land Rover or construction work at new nuclear power facilities which offer considerably more money than local SMEs are able to provide, exacerbating the gap. It is also apparent that the demographic profile of those in the SMEs is far older with younger employees opting for the higher paid provision.

As a result, Gloucestershire LEP has prioritised the construction of the GREEN training facility and the UTC at Berkeley and is currently working with other partners to provide a training facility in the Forest of Dean. Work is also being conducted both nationally and locally to engage young people in the industry. The challenge will be ensuring a steady and well-trained supply of labour to the smaller organisations.

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3 SWOT ANALYSIS

3.1 Strengths

- A **number of partnerships and activities are already in place**, such as the Affordable Warmth Partnership, Well & Well and Link to Energy.
- Local activities do **focus on the needs of individuals** and aim to target the correct residents; therefore people are not lost within the statistics.
- The LEP development plan does include **projects focused around sustainable growth of the construction sector**, such as the GREEN project.
- There are relatively **high employment rates** in the County and the **construction sector is growing**.
- There is a **multi-sectoral, diverse, resilient economy** in Gloucestershire.
- There is a high concentration of **high tech manufacturing** firms.
- Gloucestershire has an **appealing natural environment** which stakeholders are keen to preserve.
- There is generally a **high standard of living**.
- There are **High business survival rates** and a **highly skilled workforce**.
- The **SME community is vibrant** and there is **high self-employment**.
- The proportion of young people not in education, employment or training (**NEET**) is **low**.
- There are **two HEIs**, the University of Gloucestershire and the Royal Agricultural University, in the County who show a keen interest in working with the local community and enterprise.
- There is a **focus on STEM and work-related learning activities** in schools and colleges providing an avenue to encourage students into construction and engineering sectors.

3.2 Weaknesses

- There is a **lack of clarity** about who is responsible for those in fuel poverty. Often multiple agencies are dealing with individuals so there are inefficiencies and a lack of accountability.
- Homes in rural areas are often **'hard to treat'**. There is a disparity across districts with some rural areas experiencing high levels of fuel poverty.
- **Lack of access to early interventions** in both health and housing.
- The **ECO is not well targeted** – it is target driven and focuses on the number of installations completed. It is difficult to identify the correct households to target and only the six largest energy suppliers are required to commit to the obligation.

- The **Green Deal is almost redundant** and the rapid changes to the initiative had a negative impact on households and the industry. Both parties have now lost faith in initiatives and may be sceptical of any new developments.
- There is currently an **under-representation in knowledge-intensive services**.
- Although the County is fairly affluent, there are **pockets of persistent deprivation and high unemployment**.
- There are **barriers to services and a lack of employment opportunities** in rural areas such as the Forest of Dean.
- House prices relatively high, creating problems for first time buyers. This has driven up rental prices and pushed more people into fuel poverty.
- **Families are a group who are struggling financially**. Stagnating wages, increasing house prices and inflation are putting pressure on households.
- The **sustainability agenda has been removed from the curriculum** which makes it more challenging to engage young people, the future employees, in energy related education.
- There is currently a **lack of government leadership** regarding supporting people in fuel poverty. The requirements for local authorities to take action have been removed and although there is some requirement for energy companies to make improvements through the next phase of the ECO programme, this is a national programme and does not devolve ownership or power to local regions. Current plans or visions seem to be very short term.
- The **uncertain financial situation** in the UK and **political uncertainty** means that many organisations do not want to commit to policies or strategies because of risk. Therefore, organisations and individuals are often focusing only on key priorities which may conflict with, or are not shared with, other relevant bodies.
- With a rising population and a need for urgent housing, the **national focus is on new build**.
- **Highly restrictive data sharing regulations** make it difficult for organisations to work efficiently together and effectively target households in greatest need.
- With the majority of housing stock being privately owned or rented by private landlords, **communication and engagement** with so many parties who do not necessarily have a common motivation could be a barrier. There is also a concern that there may be conflict between tenants and landlords. This could be because the landlord wants to take action but the tenant does not, or vice versa.
- Currently **funding mechanisms are unsustainable and inconsistent** with many opportunities being time-limited or changing after a short period of time. Where mechanisms do exist, there are issues with how these operate or, the mechanisms are not targeted on individuals suffering fuel poverty. Some mechanisms involve costs to the individual which is acceptable to many but is not appropriate to the

identified target group who are already suffering from financial difficulties. This makes many current mechanisms inaccessible to those in need.

- There is a **cost attached to making changes and implementing strategies** including the administration of any actions identified. With all public bodies facing increasing financial constraints and the uncertainty of the future landscape, lack of money is a barrier for private and public organisations as well as individuals.

3.3 Opportunities

- There is an opportunity to **make education more resourceful and efficient**, improving communication with hard to reach areas. Again, with a growing recognition in public bodies of the links between health, energy and housing stock, there is potential to maximise the use of communication channels to educate and inform those in need.
- Furthermore, there is the potential to **improve communications between establishments**-including workplaces, schools, social services and health professionals- and individuals in need or/and energy support systems as there is a recognition of the links between fuel poverty and health, the economy and educational performance. Action for these people could transform lives.
- Some stakeholders have proposed that the community, and stakeholders, need a **shock to stimulate action**. It was suggested that there are opportunities to communicate a 'good life' vision and encourage people to develop energy efficient values. Gloucester has a **reputation for improving efficiency** and there may be an opportunity to maximise the benefit from this to make further changes.
- There is a further **chance to educate young people** about making good choices, using what they have appropriately and to avoid making inaccurate assumptions. Education of both adults and young people could be further developed to enable individuals to accurately assess their own property's efficiency, to understand the impacts of poor efficiency or energy behaviours on their lives and how to improve the situation.
- There is an opportunity to **develop new financial methods**, including incentives, to facilitate people to make improvements and reduce fuel poverty.
- Much of the **technology required to improve building stock already exists** which means that there is an opportunity to improve the energy efficiency of current housing stock. There is **potential for technological innovation** which could also be applied. There was also an acknowledgement that more could be done to recover waste heat.
- With an increasing population, there is an **acknowledgement that current housing stock needs to be fit for the future**, including the need to create 50 000 new

homes, and by making improvements in these areas, there will be less demand for other more drastic and costly interventions.

- An **increased awareness of legislation** surrounding tenures is important and any opportunity to adopt a clear balance of power in terms of improving energy efficiency of homes between tenants and landlords should be taken.
- **Develop partnerships to increase financial efficiency** and clear lines of accountability and communication.
- **Growth in knowledge-intensive services** in the region builds on the existing entrepreneurial culture and encourages creativity and innovation.
- The **HEIs, the new GREEN facility and large organisations** in the area can encourage other businesses and help to develop partnerships.
- There is **planned investment in infrastructure** which supports the construction sector.
- The recent change in **definition of Fuel Poverty** may present an opportunity to link these issues more closely to wider poverty initiatives.
- Although the building stock is considered 'hard to heat' in some rural areas, appreciation of the heritage and beauty of the area can encourage investment in historical properties.
- The potential **devolution of Gloucestershire** could enable greater investment in retrofit and improved communication within the County.
- **Government are undergoing a period of change** and are reviewing the energy agenda and priorities. This could potentially have positive impacts for the Build2LC action plan.
- There is an **increased opportunity for efficiency and investment** through linking health providers, including public health bodies and the NHS with energy related bodies and local authorities. This is due to the increased awareness that preventative actions save the NHS money and national government are beginning to recognise the importance of preventative care and are directing more funding into this area.
- Engagement with private landlords can be facilitated by the **National Landlords Association** who are represented on the Build2LC Steering Group.

3.4 Threats

- Large construction or engineering organisations and the new nuclear power projects **out-compete smaller companies** and reduce the local labour pool.
- Changing bad habits and cultural norms is not quick to remedy and this is exacerbated by the low visibility of fuel poverty causing a lack of comprehension of the issue. Where problems are identified there may be a **lack of willingness to act** and a fear of change. In some cases, the lack of knowledge of both the consumer

and contractor can reduce the effectiveness of remedial actions or identification of suitable intervention measures.

- The identification of people in fuel poverty is a barrier; **if data sharing legislation is not reformed** the effective targeting would be limited. There is currently no simple method and some people will suffer in silence and be too proud to get help, even if it is available. Being given the label of 'fuel poor' is uncomfortable, again limiting self-referral.
- Agencies and authorities may also have **varying priorities** and although they appreciate the issue, they may not be able to allocate resources.
- **Competition** between different organisations may limit the willingness to share and collaborate.
- People, both in communities and organisations, do not always have a **comprehensive understanding** of the problems, effects and the integral links between health, housing and energy.
- National energy policy is under **review and reform** may be more extreme due to Brexit. The current period of change can **slow decision-making** and reduce commitment. As yet, the outcomes of the review period are unknown and could have a negative impact.
- Although the potential devolution of Gloucestershire could be an opportunity for the Build2LC agenda, the **financial cuts** implemented over the last few years mean that there is great competition for resources hence other areas may be prioritised.
- **Legislation requiring local authorities to improve energy efficiency and housing quality has largely been removed** and has been scaled down. Therefore, it is up to the individual local authority to decide what, and where, to prioritise. This threatens the position of the Build2LC agenda but also makes agreement between authorities more challenging.
- The **ageing population and contracting numbers of young people** may increase the frequency of fuel poor homes and make it difficult to meet the construction demands.
- Although there are HEIs and large organisations in the area, **links are under-developed** and have not been optimised.
- A significant **skills gap** in the construction sector is forecast.
- **Rising energy prices** continue to increase the proportion of fuel poor households.
- Gloucestershire continues to directly suffer from the **impact of climate change**, especially flooding. This was particularly evident in the July 2007 floods.

4 NEEDS

4.1 Partnership and collaboration

- Existing partnerships need to be more holistic and less internally focused. There should be good representation in the following areas: voluntary forum; Leadership Gloucestershire; SHARE Forum; Landlord Association; AW Group; HealthWatch; Link to Energy installers; LEP.
- There must be engagement and commitment both locally and at a government level.
- Links to government and national agendas must be forged.
- Funders and finance providers should be included.
- There needs to be clear governance of the Build2LC project as the outcome of the project could make a significant difference.
- A Delivery Partnership should be established to pull direct services together e.g. fire service, health and social care, education.
- Groups in certain areas are useful. There is a need for cross sector working but the right people need to attend so that decisions can be made and time is not wasted.
- There needs to be an open, honest sharing of different approaches and information.
- Data sharing legislation needs to be changed to allow efficient targeting to take place.
- Circular feedback mechanisms need to be created within the project structure.
- Specific engagement with the private rental sector should be a priority.

4.2 Finance

- Develop a security of investment to enable businesses to engage. There is a need to overcome poor experiences from the past, such as Green Deal, to encourage private sector investment.
- Encouraging government investment by raising awareness of 'Invest to Save'. Further savings in the NHS can be made by investing in Affordable Warmth by allocating preventative spend.
- More data and information needs to be gathered and presented regarding health benefits.
- Any financial 'offers' need to be easy to obtain and accessible to those who need it. Green Deal was too expensive and bureaucratic
- Highlight to all stakeholders and policy makers the myriad of other benefits relating to education, employment, vulnerability and the economy.

- Ensure vulnerable customers are a priority for ECO. There is an opportunity to pull resources together surrounding investment using local funding as lever.
- Find and analyse the current financial instruments available in the context of reducing fuel poverty.
- Develop an 'Energy Bank' project.

4.3 Technology

- Develop commercial solutions. For example, recovering heat from commercial properties or providing district heating. Ensure there is benchmarking to show the benefit from the starting point. There may be a high management demand which is a challenge to be overcome. For example, batteries and storage, monitoring and display management, phase change material (PCM).
- Create a demonstration property answering the questions: How easy is it to access support? How do modifications in the property work? How is it funded? How will it impact my life?
- Make the payback more attractive. The current timing of 5-6 years or more is not appealing.
- Develop commercial collaboration and donation. This will promote commercial bodies and show a pioneering approach. The positive marketing can be used as a good news story.
- Ensure quality assurance of Link to Energy companies. Continue checking accreditations and insurance.
- Develop a more collaborative approach to communication about technology.
- There is value in working locally with local suppliers. People do not want to travel for meetings or for work.
- Explore technological options to reduce the limitation of current systems.
- Keep stakeholders up-to-date on technological improvements and current availability.

4.4 Behaviour, culture, education and awareness

- Develop a mobile app which is tied to a smart meter. The app should be used for energy awareness. It is important to remember that the elderly may not have access to, or use, the app.
- Link in with latest technology and best practice regarding new inventions and materials.
- Target private tenants via landlords. Homeowners also need hand holding.
- Develop a methodology for ensuring landlords are socially responsible. Consider whether there need to adopt a 'carrot and stick' approach.
- Support community voice which allows people to steer their future.

- Enable the community and individuals to overcome the stigma of handouts or receiving charity and recognise the benefits of the change.

4.5 Policy for transformation

- All new buildings should meet stringent energy requirements similar to PassivHaus concepts. Develop Part L of the Building Regulations.
- There should be rigorous standards which areas are required to meet.
- Follow the Welsh legislation on the Well-being of Future Generations Act 2015.
- Incentivise business models with a long term hold and aligned benefits.
- Distributed policy 'experiments' with learning loops to share with the rest of the region.
- Feed in to the current and future Gloucestershire Sustainability and Transformation Plan (STP) and a prevention self-care plan. Create or feed in to a health and social care plan for the next five years.
- Increase engagement with the construction industry around retrofit rather than new build.
- Raise the level of buy-in across all potential partners to get a countrywide commitment.