Appendix A
Logistic regression

Methodology

3.1. Logistic regression has been used to assess which key factors (independent variables) are statistically related to households/landlords having carried out energy.

3.2. As all of the independent variables are categorical variables, the regression analysis provides an insight into which types of households/landlords are more or less likely to have undertaken any energy improvement to their home during this period. When using categorical variables in regression analysis one of the groups needs to be specified as the baseline group. The odds ratio, EXP (β) of the baseline group, is set as 1(labelled as 'reference category' in the tables). The odds ratios of the other groups are then calculated relative to the baseline group.

3.3. For this analysis, where the odds ratio is greater than 1, this group is less likely to have had an energy improvement measure compared with the baseline group. Alternatively, where the odds ratio is less than 1 this group is more likely to have had an energy improvement measure compared with the baseline group, see Table A1.

3.4. The independent variables below are presented in order of their 'predictiveness' (based on the R squared value of the model) with the most important factors in explaining a household's likelihood of carrying out an energy improvement measure listed first. This mirrors the order of the textual information provided in this chapter.

3.5. The logistic regression used standardised weighted data, (by weighting the weights by the overall mean weight) so that any relationships found would be not biased to the over-sampled groups or the very large weighted data sample size.

3.6. Although logistic regression can be used to explore associations between variables, it does not necessarily imply causation and results should be treated as indicative rather than conclusive.

Table A1: Logistic regression model for households who have carried out an energy efficiency improvement in the last 12 months, 2012-13

all households

Independent variables	Odds ratios	Significance
accomodation type		
detached house or bungalow	*Reference category*	
semi-detached	1.09	0.07
terrace/end of terrace	1.24	0.00 *
purpose built flat/maisonette	2.29	0.00 *
flat conversion/rooms	2.30	0.00 *
tenure		
housing association	*Reference category*	
owner occupier	0.61	0.00 *
private renter	1.17	0.04 *
local authority	0.91	0.33
household composition		
couple with dependent child(ren)	*Reference category*	
couple, no dependent child(ren) under 60	1.08	0.15
couple, no dependent child(ren) aged 60 or over	1.08	0.19
lone parent with dependent child(ren)	1.10	0.21
other multi-person household	1.19	0.02 *
one person under 60	1.77	0.00 *
one person aged 60 or over	1.40	0.00 *
income band		
highest 20%	*Reference category*	
lowest 20%	1.60	0.00 *
quintile 2	1.26	0.00 *
quintile 3	1.14	0.02 *
quintile 4	1.03	0.54
age of HRP		
35-44	*Reference category*	
16-24	1.66	0.00 *
25-34	1.24	0.00 *
45-54	0.89	0.04 *
55-64	0.90	0.08
65+	1.12	0.04 *
employment status of hrp		
full time employment	*Reference category*	
part time	0.96	0.53
retired	1.16	0.00 *
unemployed	1.18	0.10
full time education	2.04	0.00 *
other inactive	1.35	0.00 *
sample size	*13,652*	

Note: 'other' types of accommodation were excluded from the analysis (42 cases)
Significance: * the result is significant at (or below) the .05 level
Source: English Housing Survey, full household sample

Table A2: Logistic regression model for owner occupiers who have carried out an energy efficiency improvement in the last 12 months, 2012-13

owner occupier households

Independent variables	Odds ratios	Significance
household composition		
couple with dependent child(ren)	*Reference category*	
couple, no dependent child(ren) under 60	1.00	0.99
couple, no dependent child(ren) aged 60 or over	1.23	0.00 *
lone parent with dependent children	0.90	0.40
other multi-person household	1.09	0.38
one person under 60	1.42	0.00 *
one person aged 60 or over	1.50	0.00 *
accomodation type		
detached house or bungalow	*Reference category*	
semi-detached	1.07	0.19
terrace/end of terrace	1.11	0.07
purpose built flat/maisonette	1.89	0.00 *
flat conversion/rooms	2.07	0.00 *
age of HRP		
35-44	*Reference category*	
16-24	0.71	0.20
25-34	0.96	0.60
45-54	0.94	0.37
55-64	1.01	0.84
65+	1.27	0.00 *
employment status of hrp		
full time employment	*Reference category*	
part time	1.04	0.66
retired	1.32	0.00 *
unemployed	1.07	0.71
full time education	0.67	0.59
other inactive	1.13	0.36
income band		
highest 20%	*Reference category*	
lowest 20%	1.49	0.00 *
quintile 2	1.13	0.08
quintile 3	1.05	0.49
quintile 4	0.98	0.71
sample size	*13652*	

Note: 'other' types of accommodation were excluded from the analysis e.g. boats or caravans (35 cases)
Significance: * the result is significant at (or below) the .05 level
Source: English Housing Survey, full household sample

Table A3: Logistic regression model for private renters who have carried out an energy efficiency improvement in the last 12 months, 2012-13

private renter households

Independent variables	Odds ratios	Significance
household composition		
couple with dependent child(ren)	*Reference category*	
couple, no dependent child(ren) under 60	1.77	0.00 *
couple, no dependent child(ren) aged 60 or over	0.76	0.24
lone parent with dependent child(ren)	0.85	0.30
other multi-person household	1.32	0.06
one person under 60	2.04	0.00 *
one person aged 60 or over	1.11	0.62
accomodation type		
detached house or bungalow	*Reference category*	
semi-detached	0.85	0.35
terrace/end of terrace	1.13	0.47
purpose built flat/maisonette	1.91	0.00 *
flat conversion/rooms	1.70	0.01 *
employment status of hrp		
full time employment	*Reference category*	
part time	0.69	0.01 *
retired	0.82	0.26
unemployed	0.78	0.21
full time education	1.26	0.31
other inactive	0.73	0.04 *
age of HRP		
35-44	*Reference category*	
16-24	1.56	0.01 *
25-34	1.19	0.15
45-54	1.08	0.62
55-64	0.95	0.78
65+	0.82	0.27
income band		
highest 20%	*Reference category*	
lowest 20%	0.96	0.79
quintile 2	0.85	0.31
quintile 3	0.84	0.27
quintile 4	1.08	0.67
sample size	*13,652*	

Note: 'other' types of accommodation were excluded from the analysis e.g. boats or caravans (5 cases)
Significance: * the result is significant at (or below) the .05 level
Source: English Housing Survey, full household sample